NI 43-101 Technical Report
for the
Island Gold Mine,
Dubreuilville, Ontario, Canada

Prepared for

Alamos Gold Inc.

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1 SUMMARY

1.1 Introduction

In a press release dated July 14, 2020, Alamos Gold Inc. ("Alamos" or "Alamos Gold" or the "Company") announced the results of its Phase III Expansion Study ("Phase III") completed on the Island Gold Mine ("Island Gold"), located in Northern Ontario, Canada. Having successfully completed expansions to 1,100 tpd and 1,200 tpd at Island Gold, the objective of Phase III was to consider the most cost and capital effective strategy to increase annual production and mine the current Mineral Reserves, and a portion of the Mineral Resources located to a depth of 1,500 metres. This report outlines the results of that study and conforms to National Instrument 43-101 Standards of Disclosure of Mineral Projects ("NI 43-101").

The study involved the evaluation of five scenarios, which demonstrated that the Shaft Expansion at a new production profile of 2,000 tpd was the most economic, efficient, and productive alternative. This also best positions Island Gold to capitalize on further growth in Mineral Reserve and Resources. The Shaft Expansion will result in the construction of a new shaft amongst other infrastructure upgrades.

Island Gold utilized the services of several consulting firms to design and cost the components making up the various options. They included: Hatch Ltd., Cementation Canada Inc., Golder Associates Ltd., Halyard Inc., and Airfinders Inc.

All costs are in Q2 2020 Canadian dollars unless otherwise stated.

All units of measurement are in metric, unless otherwise stated.

1.2 Property Description

The Island Gold Mine and its surrounding project lands (collectively, the "Island Gold Property") is situated 43 km northeast of Wawa, Ontario within the Sault Ste. Marie Mining Division. The town of Dubreuilville, a forestry center, is 10 km to the northwest of the mine site. The Island Gold Property, which is divided into nine (9) property areas, is comprised of 831 tenures consisting of patented fee simple and/or patented leasehold mining rights and surface rights claims, mining licences of occupation and unpatented cell claims covering approximately 9,511 hectares. Alamos holds 100% of all mining titles related to the Island Gold Property.

The following royalties apply to the currently defined Mineral Reserves and Mineral Resources:

- The Lochalsh property area is subject to a 3% NSR payable to Osisko Gold Royalties Ltd. ("Osisko");
- The Goudreau Lake property area is subject to a 1.38% NSR royalty payable to Osisko and a 0.62% NSR royalty payable to Franco-Nevada Corporation, and a 10.35% net profit interest ("NPI") royalty in favour of a private company; and
- The Goudreau property area is subject to a 2% NSR payable to Osisko and a 15% NPI royalty payable to a private company.

1.3 Accessibility, Climate, Local Resources, Infrastructure and Physiography

Access to the area is provided by the TransCanada Highway (Highway 17), which continues north from Wawa for 35 km, and Highway 519 to Dubreuilville which is 10 km to the northwest of the mine site. The Goudreau Road, an all-weather road, extends from east of Dubreuilville for 17 km to the mine site.

The Island Gold Property is contained within the Lake Superior Regional climatic zone is "modified continental". The mean annual temperature is about 10C, with extremes of –51˚ C and 38˚ C being recorded. Precipitation is in the range of 980 mm per year, with about 600 mm as rainfall and evaporation at 517mm/year principally during the summer months.

Wawa has a population of approximately 3,500 inhabitants and, Dubreuilville, originally a forestry community, has a population of approximately 900 permanent residents and contains accommodations for mine personnel. The Island Gold Mine is also within a few kilometres of railway lines operated by Canadian National and Algoma Central Railways. A hydro-electric power substation, water supply, gravel roads, and living accommodations are all available within the general mine area. Power is connected to the provincial power grid and is supplied by Algoma Power Inc. ("API").

The Island Gold Mine infrastructure includes a primary tailings pond, a secondary settling pond, the Kremzar mill (the "mill"), the Lochalsh ramp and portal, a mine access road, power lines, and an electrical substation. Offices, core logging and storage facilities, a fire hall and separate mine drys for men and women are also located at the mill site. The mill currently has a capacity off 1,200 tpd and the fully permitted tailings area is located at Miller Lake, west of the historic Kremzar Mine.

The Island Gold Property lies in the Superior Province of the Canadian Shield. Topography within the mine area varies from a high of 488 metres above sea level (masl) in the vicinity of Miller and Maskinonge Lakes to a low of 381 masl at Goudreau Creek. Periods of intense glacial activity have contributed to the hummocky, rock knelled and largely bedrock-controlled topography, characteristic of the region. Glacial advance from the north deposited a thin mantle of stony sand till over a scoured rock surface.

1.4 History

The Goudreau – Lochalsh Gold Camp area has been the subject of interest dating back to the early 1900's and has attracted prospectors and mining companies in search of iron ore, gold, and base metal deposits. The Wawa – Michipicoten area has been recognized for its long history of iron exploration which has resulted in the development and production of several iron ore mining operations. Gold exploration followed shortly thereafter, resulting in several gold discoveries which were subsequently developed and brought into commercial production in the area which would later become the Island Gold property.

The initial discovery of gold was made by a group of prospectors at Emily Bay on Dog Lake in Riggs Township in 1900. Up to 1944, prospecting, geological mapping, trenching, shaft sinking, and 1,732 m of diamond drilling were completed to explore various gold prospects. Ultimately this period is marked principally by various exploration efforts by several companies carrying out surface trenching and diamond drilling on several gold prospects.

After an extended period of relatively little interest and activity in the area, exploration was resumed by Amax Inc. and its Canadian division, Canamax Resources Inc. ("Canamax") in 1974. In 1985, drilling approximately two kilometers south of the Kremzar mine intersected a series of sub-parallel lenses containing gold mineralization within deformed rocks of the Goudreau Lake Deformation Zone (GLDZ). In December 1988, the Canamax Kremzar project began commercial production. From 1988 to 1990, production from the Kremzar mine was 306,000 tonnes grading 4.80 g/t Au. Over 1989 and 1990, underground access was established into the Island Gold deposit with an adit from the north shore of Goudreau Lake. A 4,167 tonne bulk sample was extracted and processed at the Kremzar Mill. At the end of 1990, Canamax suspended all operations at both the Kremzar and Island Gold projects.

In 1996 the Island Gold property was acquired from by Patricia Mining Corp. (“Patricia”). From 1996 to 2002, various exploration activities on the property included prospecting, surface trenching, geological and geophysical surveys, and diamond drilling was carried out to explore for both Island Gold and Kremzar styles of gold bearing prospects and zones. In 2003, Patricia and Richmont Mines Inc. (“Richmont”), entered into a joint venture agreement. Work completed during the joint venture included 72,984 m of surface and underground diamond drilling to test the various zones. On January 1, 2005, Richmont became the operator of the project.

Commercial production at Island Gold began on October 1, 2007. Richmont acquired Patricia’s 45% interest in December 2008, becoming 100% owner of the property and operations. Exploration activities ramped up in 2009 with a minimum of 30,000 metres of drilling completed in each of the next several years, increasing sharply to more than 80,000 metres in 2012. This included drilling below the 400 metre level as part of the Island Gold deep exploration program, which was successful in extending the main C Zone at depth with an initial Inferred Mineral Resource being calculated on the high-grade deep C Zone in January 2013.

A large exploration program commenced at the end of 2015 to explore beneath the Island Gold Mine. Directional diamond drilling was used to reach targets at depth with allowed greater accuracy than conventional drilling techniques. As a result of this program, Mineral Resources were added in the C zone at depth and to the east in the E1E zone in Extension 2 area. A total of 161,446 m of directional drilling was completed between 2015-2019.

1.5 Geological Setting and Mineralization

The Island Gold Property is located in the Michipicoten Greenstone Belt (MGB) which is part of the Wawa Subprovince within the Archaean Superior Province. The MGB is approximately 140 km long and up to 45 km wide. The metamorphic grade of the subprovince is greenschist but amphibolite facies can be seen locally or proximal to intrusions. A major regional deformation zone called the Goudreau Lake Deformation Zone (GLDZ) is situated throughout the area. It is a north-easterly trending structure which has been traced along strike for 30 km with a width of 4.5 km and believed to be the main control of gold mineralization for the Project area. It is a high angle oblique-slip fault zone with an overall dextral movement cutting stratigraphy at a shallow angle. There are three main splays to the GLDZ in the area, the southernmost of which hosts the Island Gold Mine structure which contains a stacked sequence of east-northeast striking, steeply dipping, and subparallel zones of gold mineralization.

Lithologies appear to form a conformable homoclinal volcano-stratigraphic sequence, facing and younging to the north in the project area. Tight to isoclinal folds and local attenuation or boudinage of units along fold limbs appear to occur regionally. Fold axes are subparallel to the regional foliation at N070°E to N095°E.

The Island Gold Mine is stratigraphically positioned in the upper portion of the Wawa Assemblage, on the northern limb of the Goudreau Anticline. The hinge is south of the area displayed in Figure 7-2. This assemblage is mostly composed of felsic volcanic rocks of various facies of tuffs and lavas.

Quartz veins commonly bear visible gold in the form of aggregates, disseminated fine grains or along chlorite-sericite slickensides within the veins. The degree of veining appears to change at depth, transitioning from a stringer style quartz-carbonate vein on scales between millimeter to larger scale veins which can be over 4 metres in width.

The Island Gold deposit is composed of multiple, stacked, south dipping lenses. The mineralized corridor expands from 50 m wide in the upper levels to over 150 m wide at depth. The zone's dip varies from sub-vertical to vertical from -50° to -90° south. Locally, north dip reversals occur but are not common. Rare instances of offset or folding have been seen. Around the 400 metre level there is a shallow dipping southern inflection of the mineralized zones. It is not yet clear if this inflection is related to a fault, a shear zone, or a fold. This inflection point is the division of what is locally referred to as the Upper Island Gold Mine and the Lower Island Gold Mine.

1.6 Deposit Types

The Island Gold Mine is an Archean orogenic lode gold deposit. It is a structurally hosted quartz-carbonate vein system situated within the Goudreau Lake Deformation Zone (GLDZ), a major regional brittle-ductile structure. The host terrane is a sequence of felsic to intermediate volcanic rocks of the Wawa Assemblage which are in the greenschist metamorphic range as is common for this type of deposit. High strain zones associated with the GLDZ have the tendency to develop at variable scales along lithologic unit contacts where complex geology and related competency contrasts can control stress patterns and facilitate shearing and the consequent development of dilatancy zones and concomitant quartz carbonate vein formation. It is generally accepted that these Archean orogenic lode gold deposits are related to compressional and transpressional tectonics and the associated metamorphic dewatering and devolatization of magma processes from which the gold bearing fluids are derived.

1.7 Exploration

The deep directional diamond drilling program started in October 2015 and, at the end of 2019, a total of 132,917 metres were completed from underground diamond drilling and 225,190 metres were completed from surface diamond drilling.

The underground and surface exploration programs have added since 2015 close to 2.3 million ounces of gold to mineral inventory, net of depletion. Measured and Indicated Mineral Resources increased by 112,100 ounces of gold, Inferred Mineral Resources increased by 1,530,000 ounces of gold and Mineral Reserves increase by 653,000 ounces of gold, in the five year period. This includes the addition of nearly one million ounces of Mineral Reserves and Resources through the 2019 exploration program. The exploration cost has been approximately $25 per ounce during this period.

The results of these programs up to December 31, 2019 were used in the December 31, 2019 Mineral Resource estimate and have been incorporated into the Phase III Expansion Study.

1.8 Drilling

An optimal drilling pattern of 20 m by 20 m hole spacing is sought during the planning of the delineation-definition drilling. A 50 m to 100 m spacing pattern is used for the first phase of exploration drilling in new sectors. Island Gold employees use a Leica Global Positioning System to survey surface collar locations. Surveying of underground drill holes collars is performed using a Leica Total Station. Single shot Reflex down-hole survey measurements start at 15 m from the collar and are carried out at every 30 m thereafter along the hole. Surface exploration holes have used Reflex or a gyro to survey the hole and measurements are taken every 30 m in surface holes. Diamond drill holes are grouted at the collar once they are completed or abandoned.

A total of 831 holes representing 549,287 m have been drilled from surface and 5,580 holes totaling 814,063 m have been drilled from underground at the Island Gold Mine.

Under the direct supervision of Qualified Persons, geologists prepare a detailed description of the drill core. A computerized log is entered for each drill hole with the following basic information collar location, down hole surveys, rock quality designation (RQD), main and secondary geological units, texture and structure mineralization and alteration: mineralogy, thickness, type sample location, and core photos.

1.9 Sample Preparation, Analyses and Security

Most drill core samples are prepared and assayed by Lab Expert in Rouyn-Noranda, Quebec. which has been operating a fire assay laboratory for over 20 years. A small portion of the definition drill core as well as all underground production samples are assayed at the Wesdome laboratory, in Wawa, Ontario. Pulps and occasionally drill core are sent to Actlabs in Thunder Bay, Ontario. The laboratories use industry-standard sample preparation and assay methods.

Alamos maintains an internal QA-QC program at the Island Gold Mine which is used to validate core and production chip assay analyses. Certified Reference Materials ("CRMs") are inserted with diamond drill core samples at a rate of 1 in 25 samples. In-house blank material is inserted in the core sample stream at a rate of 1 in 25 samples. In addition, pulps from Lab Expert and Wesdome are regularly sent to Actlabs.

Island Gold Mine's QA-QC procedures were audited in 2019 by ASL Canada and they concluded that Island Gold's assay quality control program meets or exceeds industry standards. In addition, ASL audited the Lab Expert and Wesdome laboratories in 2019 and made recommendations for improvements which have been completed or are being implemented.

1.10 Data Verification

The Qualified Person considers that the Island Gold Mine database is suitable for use in the Mineral Reserve and Resource estimation. The SQL database is adequate and acceptable for supporting Mineral Resource estimation. This database contains all the information related to drill holes, drift sampling, assay results and the laboratory certificates. Some verification of the original data was performed, and modifications were completed if needed prior to the calculation of any estimates. The verification of, and corrections to, the Island Gold database were done prior to the Mineral Resource and Mineral Reserve estimates of December 31, 2019.

1.11 Metallurgical Test Work

The mill has been processing Island Gold ore since 2008 and has consistently been achieving recoveries of greater than 96%. Since 2016, the ore feed has been almost exclusively from the Lower Island Gold Domain. Historical data shows that the Lower Zone ore behaves similarly to ore from the other zones and therefore has no significant effect on mill gold recoveries.

Testwork carried out in 2013 at URSTM on a Lower Mine composite confirmed that Lower Mine ore would continue to be recovered at, or greater than, 96% recovery with very low cyanide consumption.

1.12 Mineral Resource Estimates

The December 31, 2019 Mineral Resource and Mineral Reserve Estimation was carried out by the Island Gold Mine Technical Services department's staff under the supervision of Raynald Vincent, P.Eng., M.G.P., Chief Geologist and Nathan Bourgeault, P.Eng., Chief Engineer of the Island Gold Mine. Both are considered Qualified Persons within the meaning of Canadian Securities Administrators' National Instrument 43-101.

The Mineral Resource evaluation methodology involved the following procedures:

- Database compilation and validation;
- Construction of wireframe models for the boundaries of the gold mineralization;
- Geostatistical analysis and variography;
- Block modelling and grade interpolation;
- Definition of Mineral Resource domains;
- Assessment of "reasonable prospects for economic extraction" and selection of appropriate cut -off grades;
- Preparation of the Mineral Resource Statement.

Mineral Resources as of December 31, 2019 are found in Table 1-1.

Table 1-1 Island Gold Mineral Resources as of Dec 31, 2019

Mineral Resource	Tonnes	Grade (g/t Au)	Ounces
Measured	25,200	4.52	3,700
Indicated	853,400	6.57	180,300
Total Measured and Indicated	**878,600**	**6.51**	**184,000**
Inferred	5,392,300	13.26	2,298,000

Notes:

- *CIM definitions of Mineral Resources were followed.*
- *Mineral Resources are estimated at a cut-off grade of 4.03 g/t Au.*
- *High-grade samples were capped at 75 g/t Au for most of the Upper Island Gold zones except IG-E1E and IG-C capped at 100 g/t Au, most of the Goudreau zones except for G2 and G6 capped at 100 g/t Au.*
- *High-grade samples in Lochalsh were capped at 75 g/t Au for E1E, 45 g/t Au for D, 60 g/t Au for C and 55 g/t Au for E2.*
- *In the Lower mine high-grade samples were capped at 90 g/t Au for B, 70 g/t Au for G and GNW, 45 g/t for G1, 50 g/t Au for D and STH, 40 g/t Au for D1, and 160 g/t Au for E1E zones.*
- *Lower C zone has 2 capping grades, at 300 g/t Au inside the HG domain and at 225 g/t Au everywhere else.*
- *Mineral Resources are estimated using a long-term gold price of $1,250 per ounce.*
- *A minimum mining width of 2.00 m was used.*
- *A specific gravity value of 2.78 t/m^3 was used in the Lower Zones and 2.82 t/m^3 otherwise.*
- *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.*
- *Totals may not match due to rounding.*

1.13 Mineral Reserve Estimate

The global Mineral Resource was reviewed by the Island Gold engineering department, with assistance from the geological staff, to define the Mineral Reserve blocks that could be economically extracted with a mining plan. The conversion of Mineral Resources into Mineral Reserves is based on the economic parameters detailed in Table 1-2. Only Mineral Resources that are classified as Measured or Indicated Mineral Resource categories were used in the economic calculations to estimate Mineral Reserves as of December 31, 2019.

Table 1-2 Mineral Reserve Estimation Parameters

Mineral Reserves Parameter	Value
Gold Price (USD)	$1,250
Exchange Rate (USD/CAD)	0.77
Stope Cut-off Grade (g/t Au)	4.03
Development/Marginal Cut-off Grade (g/t Au)	2.82
Stope Dilution[1] (%)	15%-50%
Development[1] Dilution (%)	20%-30%
Dilution Grade (g/t Au)	0.50
Mining Recovery[1] (%)	67%-95%
Process Recovery (%)	96.5%
Ore Specific Gravity[2] (t/m^3)	2.78
Minimum Mining Width (m)	2.0
Mining, Processing and G&A Cost (CAD $/t)	203

Notes:

1. *Dependant on sector and mining method.*
2. *2.82 t/m^3 for Upper Mine.*

Mineral Reserves as of December 31, 2019 are presented in Table 1-3.

Table 1-3 Island Gold – Mineral Reserve Estimate as of Dec 31, 2019

Mineral Reserve	Tonnes	Grade (g/t Au)	Ounces
Proven	786,000	13.48	341,000
Probable	2,857,000	9.52	874,000
Total Proven and Probable	**3,643,000**	**10.37**	**1,215,000**

Notes:

- *CIM definitions of Mineral Reserves were followed.*
- *Mineral Reserves are estimated at a cut-off grade of 4.03 g/t Au.*
- *High-grade samples were capped at 75 g/t Au for most of the Upper Island Gold zones except IG-E1E and IG-C capped at 100 g/t Au, most of the Goudreau zones except for G2 and G6 capped at 100 g/t Au.*
- *High-grade samples in Lochalsh were capped at 75 g/t Au for E1E, 45 g/t Au for D, 60 g/t Au for C and 55 g/t Au for E2.*
- *In the Lower mine high-grade samples were capped at 90 g/t Au for B, 70 g/t Au for G and GNW, 45 g/t for G1, 50 g/t Au for D and STH, 40 g/t Au for D1, and 160 g/t Au for E1E zones.*
- *Lower C zone has 2 capping grades, at 300 g/t Au inside the HG domain and at 225 g/t Au everywhere else.*
- *Mineral Reserves are estimated using a long-term gold price of $1,250 per ounce.*
- *A minimum mining width of 2.00 m was used.*
- *A specific gravity value of 2.78 t/m^3 was used in the Lower Zones and 2.82 t/m^3 otherwise.*
- *Totals may not match due to rounding.*

1.14 Mining Production Plan

The Island Gold deposit is accessed via a single decline from surface down to the 425 Level, at which point multiple ramps are utilized to access the main IG, IG West, Extension and East zones. These ramps are also connected at numerous points throughout the mine allowing for easy travel between mining zones.

The LOM plan includes the addition of a mine shaft which will be constructed between 2021 and 2025. Once commissioned, the shaft will be utilized to hoist ore and waste from the 1305 Level to surface. Additionally, the shaft will used to transport personnel and materials to any of the three shaft stations. From the shaft collar location ore and waste will be trucked to either the mill or the surface waste stockpile.

A total of 95 km of lateral and vertical development are planned as part of the life of mine. Of this total approximately 28% is operating development, 67% is capital development and 5% is planned to support exploration activities.

Presently, level accesses are designed towards the center of the ore vein and stopes are mined longitudinally from sill extremities towards the level intersection. As mining progresses deeper level accesses are designed to access the extents of the deposit with stopes being mined from the center towards the extremities to support improved mining stress management.

The mining method for a particular stope is selected based on a variety of factors such as overall geometry of the mineralization, width of the ore zone, local stresses, mapping and geotechnical data, spatial location of the stope, and existing nearby development and infrastructure. Other factors considered include equipment size and limitations as well as available fill type. Presently, stoping is undertaken with longitudinal open stoping (modified Avoca) and transverse open stoping. A limited amount of Alimak stoping will be undertaken, beginning in 2021.

Island Gold presently uses unconsolidated rockfill for most of the longitudinal stoping and cemented rockfill for transverse stoping. With the Phase III expansion a paste fill plant will be constructed and paste fill underground will be implemented.

An internal scoping in 2019 determined that expanding the mining rate beyond 1,200 tpd, to take advantage of the growing Mineral Resource, was viable. Furthermore, the scoping study concluded that two material transport options, continued truck haulage and a shaft for ore and waste, should be advanced to a pre-feasibility level of design and engineering.

In undertaking the Phase III Expansion Study, it was assumed that the Mineral Reserves and a significant portion of the Mineral Resource would ultimately be available for mining. Total Mineral Reserves and Mineral Resources included within the mine plans for the Study are 9.6 Mt at a gold grade of 10.45 g/t.

Three different mine capacity rates were examined, 1,200 tpd, 1,600 tpd, and 2,000 tpd. The current mill capacity of Island Gold is 1,200 tpd and this case was deemed the Basecase for the Study. Two material handling options were examined: ramp ore and waste haulage and skipping ore and waste with a shaft. In all five scenarios were developed: a ramp at 1,200 tpd (R1200) and at 1,600 tpd (R1600), and shaft at 1,600 tpd (S1600) and at 2,000 tpd (S2000). The ramp scenario at 1,200 tpd was evaluated with and without a paste plant (R1200NP), to assess the incremental economics of adding a paste plant on similar mining scenarios.

Detailed capital and operating costing models were developed for each of the five scenarios studied. Combining these models with the physicals, cash flow models were constructed that allowed for sensitivity analysis of costing and productivity input parameters. In comparing the five scenarios several observations were made that will focus on the R1200, R1600 and S2000 scenarios.

Capital costs increase moving from the R1200 scenario to the R1600 scenario to the S2000 scenario. The increase in capital from the R1200 to the R1600 is attributable to the increase in daily mining capacity requiring more trucks, ventilation infrastructure and an additional ramp to surface, in addition to the cost associated with expanding the milling capacity. The increase in capital from the R1600 scenario to S2000 scenario is attributable to construction of the shaft and hoisting facility and the capital required to expand the mill to 2,000 tpd, partially offset by less capital required for trucks, ventilation infrastructure and capital development.

Productivity levels between the R1200 scenario and R1600 are very similar and begin to drop as the mine gets deeper and it takes longer for employees to enter and leave the mine. Productivity levels dramatically increase with the use of the shaft to transport personnel. Using 2020 as a baseline, effective time at the face increases by 20% with the shaft. With additional time at the face, development metres per employee and stoping tonnes per employee increase. Increased productivity results in less personnel required to attain the same tonnage or alternatively the same number of personnel to achieve higher tonnage rates.

With the ramp scenarios mining costs increase over the mine life due to increased haulage cycle times from lower mine horizons (Figure 1-1). Mine unit operating costs decrease moving from the R1200 scenario to the R1600 scenario to the S2000 scenario. Annual mining costs decrease moving from the R1200 scenario to the R1600 scenario because of economies of scale, namely the sharing of fixed costs such as supervision, engineering, and geology, pumping etc. over more tonnes. Costs are further reduced moving to the S2000 scenario as a result of economies of scale, operating less trucks and reduced ventilation costs.

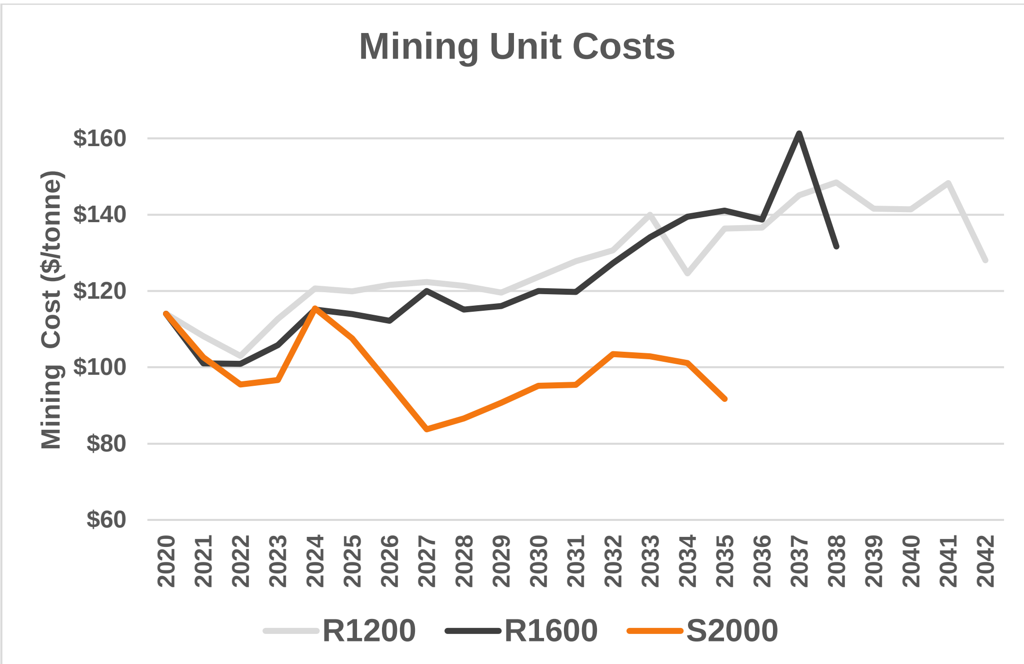


Figure 1-1 Mining Units Costs

The two primary conclusions from the Study were:

- The paste plant should be built given:
  - The 100,000 additional ounces produced;
  - The increased geotechnical de-risking; and
  - Positive after-tax IRR of 32%.
- In expanding the Island Gold Mine, the shaft at a 2,000 tpd mining rate (S2000) scenario should be adopted given that it:
  - Provides the strongest economics (free cash flow, after-tax NPV, and IRR) of all the scenarios studied;
  - Provides the highest annual gold production;

- o Has the lowest operating costs, as well as the lowest cash costs and mine-site all-in sustaining costs per ounce;
- o Has the lowest combined operating and capital costs;
- o Provides access to higher grade stopes sooner in the mine life
- o De-risks the lower mine operation;
- o Provides for reduced congestion and reduced personnel and mobile fleet requirement; and
- o Provides a significantly reduced carbon footprint and reduced exposure to diesel price and carbon tax increases.

Based upon these conclusions Island Gold is proceeding the permitting and construction of the paste plant, the shaft complex and mining at a rate of 2,000 tpd.

1.15 Processing

The current process plant at Island Gold is composed of a two-stage crushing circuit followed by a two-stage grinding circuit. The mill uses cyanide leaching and a carbon-in-pulp process to recover gold.

To determine the maximum throughput capability of the existing process plant equipment, and to provide several alternatives for additions to the grinding circuit and balance of plant, an assessment of the current plant flowsheet was undertaken. The major element effecting the throughput of the plant is the comminution circuit, specifically milling, therefore, the assessment of the current and recommended crushing and milling areas were completed first which lead into the assessment of the balance of the plant.

In all, six options for increasing the plant throughput were evaluated as part of this study, with two options considering an increase from 1,200 tpd to 1,600 tpd, two options considering a staged increase from 1,600 tpd to 2,000 tpd, and two options considering and increase directly from 1,200 tpd to 2,000 tpd.

The six options (Options “A” to “F”) were evaluated with consideration of their metallurgical performance (potential for gold loss mitigation), versatility (ability to cope with spikes in head grade, varying feed particle sizes, mitigation of bottlenecks), construction complexity (duration of downtime, tie-in points to the existing plant), equipment reliability and capital and operating costs.

Upon evaluation of each option, it was decided to proceed with a combination of Options A and C, which in summary involves upgrades to the crushing plant, changes to the fine ore storage arrangement, addition of a new ball mill, addition of a Pumpcell plant and a new elution circuit.

1.16 Infrastructure

1.16.1 Surface Site Infrastructure

The Island Gold Mine is accessed via a singular portal and decline. The ore stockpile pad and waste storage are located directly adjacent to the mine portal. The mill feed is hauled approximately 1 km from the stockpile to the mill complex. The maintenance facility, surface office and dry complex are located adjacent to the mill. The Kremzar Portal, accessing old mine workings, is detached from current underground mine, and is utilized to access the bottom of the surface ore bins, which are used to feed the crusher section of the mill.

The primary tailings pond is located approximately 500 m west of the mill and the secondary pond is located just west of the portal area. Mine ventilation is via two surface fresh air fans and raises located adjacent to Goudreau Road, approximately 2.5 km away from the main site along with one exhaust raise located across from the fresh air fans.

1.16.2 Tailings Management

The tailings management facility (TMF) represents the main water retention structures on the mine site. It consists of two ponds, the Primary Pond and the Secondary Pond which acts as a polishing pond in addition to water transfer systems via a siphon system. The Primary Pond (built in the former Miller Lake basin) occupies an area of 109 ha. The Secondary Pond has an area of 22 ha.

Tailings slurry is conveyed by a pressurized pipeline from the mill and spigotted around the inside perimeter of the Primary Pond. The surface of the tailings forms a sloped beach allowing for a pond to form at the lowest part. Water is reclaimed (pumped) from the Primary Pond to the mill. Both the primary tailings and reclaim pipes are placed in an engineered ditch, with drainage to an emergency catchment section (with an area of 0.8 ha) at its lowest points and reinforced by construction of earthen berms. The TMF also includes seepage collection and pump back systems at dykes Nos. 1 and 2 at the Primary Pond; these were built to prevent any migration of seepage to Maskinonge Lake.

Water treatment is managed through natural degradation in the Primary Pond and Secondary Pond. Natural degradation is primarily active during ice-free periods, and batch discharge cycles are timed to accommodate the natural processes. Cycle duration is typically 40 days:

- 10 days transfer from the Primary Pond to the Secondary Pond;
- 20 days of final polishing at the Secondary Pond; and
- 10 days discharge of treated water from the Secondary Pond to the receiving environment in a series of streams, wetlands, and ponds, eventually discharging into the central part of Goudreau Lake.

Water quality is routinely monitored in the Primary Pond and Secondary Pond, and in Goudreau Lake at the discharge point and downstream. A comprehensive water monitoring program has been implemented for the site, and includes twelve compliance sampling locations, and effluent limits as mandated by the MECP.

1.16.3 Phase III Infrastructure Expansion

Island Gold recently undertook an engineering and economics study on a possible Phase III Expansion to increase underground tonnage rates and implement associated infrastructure upgrades as required. The study involved the evaluation of five scenarios (reduced from 12 during the scoping study), which demonstrated that the Shaft Expansion at a new production profile of 2,000 tpd was the most economic, most efficient, and productive alternative. This also best positions Island Gold to capitalize on further growth in Mineral Reserve and Mineral Resources. The Phase III Expansion will result in the construction of a new shaft amongst many other infrastructure upgrades as listed below:

- Development of a new production/service shaft down to 1,373 m in depth (initial depth);
- Development/implementation of a new ore and waste handling system underground;
- Upgrade to the main site power supply;
- Construction of a paste plant and underground distribution system;

- Upgrade of the existing mill from 1,200tpd to 2,000tpd;
- Upgrade of the Tailings Management Facility to process higher and longer LOM production; and
- Upgrade of the mine water treatment system.

1.17 Environmental Studies, Permitting and Social or Community Impact

From exploration to operations to closure, one of the goals at the Island Gold Mine is to safeguard the environment, educate its employees and the communities about the mine's environmental programs and commitments, and apply best management practices to prevent or mitigate any potential environmental impacts. The operations at Island Gold use a range of materials and consumables that includes explosives, chemicals, and fuels.

The Island Gold Mine is located within the Maskinonge Lake and Goudreau Lake sub-watersheds (total area of 48.2 km^2), approximately 40 km south of the Arctic drainage divide. Both sub-watersheds are part of the Michipicoten-Magpie watershed and Lake Superior Drainage Basin. Surface water drainage at the site is bedrock-controlled, generally flowing from northeast to southwest within the valleys between the elongated hills and ridges.

A comprehensive environmental monitoring program is in place at the Island Gold Mine. It includes inspections, sampling schedules, data management and reporting. Also included in the program are sampling frequency, various parameters of concern (for field and laboratory analyses) and QA-QC procedures. Key performance indicators are tracked, and any deviations from targets are addressed and corrected.

Tailings, water management and final effluent monitoring and quality requirements are regulated under an amended ECA (No. 9118-B9CM3R) which was issued in May 2019. This ECA also allows for a mill production rate of up to 38,480 tonnes per month. Final treated water from the mine flows into the upper portion of Goudreau Lake via Goudreau Creek, which flows into the Michipicoten River system, entering Lake Superior near Wawa.

Additional monthly surface water quality monitoring is conducted by Island Gold Mine at two locations in Goudreau Lake (the receiving water body), one on Maskinonge Lake and one on Pine Lake. Both Maskinonge Lake and the upper basins of Goudreau Lake would be characterized as meeting provincial objectives. For the most part, metal concentrations were below their respective Provincial Water Quality Objectives (PWQO), with levels of many metals below the Method Detection Limit (MDL). Annual results have been comparable from 2007 to 2019.

Air and noise discharges are regulated under an amended ECA, No. 1821 BAWLAC which was issued in May,2019 to the Island Gold Mine, allowing for an annual ore processing rate of 461,760 tonnes per year.

The ECA requires that the Island Gold Mine be in compliance with Ontario Regulation 419/05, applicable MECP Guidelines for Air and Noise, and other performance requirements as specified in their conditions. It allows modifications such as process changes, de-bottlenecking, or addition of new equipment subject to limits on operational flexibility.

Alamos Gold's strategy is to reduce consumption, reuse any waste generated, and dispose final waste in a safe and responsible manner. A Waste Management Procedure (WMP) has been developed and implemented for the site; it provides guidance to site and non-site personnel on the handling, processing and disposal of waste, including hazardous waste and domestic materials generated during the normal operations of the facility.

Excess underground waste rock is transported to the surface and stockpiled for use as future backfill and/or maintaining site roads and future dam raise projects. In 2019, Golder was subcontracted to conduct an assessment on the geochemistry of Island Gold tailings and waste rock. Historical documentation, from Wood PLC, (formerly AMEC) was also reviewed. Golder determined that the waste rock did not generate any acid-rock drainage (ARD) nor metal leaching and recommended reducing the sample analyses to monthly. Weekly analyses were conducted for tailings and waste for metal leaching and ARD and kinetic testing of these materials is underway.

Anticipated permitting activities identify and address the various municipal, provincial, and federal regulatory requirements applicable to the Island Gold Mine. Relevant agencies for Phase III permitting needs include Department of Fisheries and Oceans (DFO), Ministry of the Environment and Conservation and Parks (MECP), Ministry of Natural Resources and Forestry (MNRF), and Ministry of Energy, Northern Development and Mines (ENDM).

Island Gold's philosophy is to maximize local hiring of employees from the labour pool in the surrounding communities. This has increased the economic stability of the local communities of Dubreuilville, Wawa and White River who have been hit hard by the downturn of the forestry industry.

To date the following Indigenous groups have been identified as having varying degrees of interest in the area of the Island Gold Mine: Michipicoten First Nation (MFN), Missanabie Cree First Nation (MCFN), Batchewana First Nation (BFN), the Garden River First Nation (GRFN). A Community Benefits Agreement (CBA) was signed with the Missanabie Cree First Nation in March 2017 and is valid until March 2024. Other Indigenous groups that may have interest in the mine are include the Métis Nation of Ontario (MNO).

The Island Gold Closure Plan (the "Closure Plan" details the decommissioning strategy for the Island Gold Mine. It reflects the current and expected site conditions and defines a program which ensures the long-term chemical and physical stability of the site. The goal of the Closure Plan is to ensure that chemical and physical impacts to the site are minimized during operations and that the site is returned as closely as possible to pre-development conditions at close-out. The Closure Plan has been developed using data collected during physical, chemical, and biological studies of the site (treated effluent, surface water, ground water, ore/waste rock) and the surrounding environment during advanced exploration and production phases.

1.18 Capital and Operating Costs

1.18.1 Capital Expenditures

As this report covers an expansion scenario at Island Gold, capital expenditures are divided into two distinct categories: growth capital and sustaining capital.

Growth capital expenses are defined as expenditures that allow the mine to expand from the current throughput of 1,200 tpd to 2,000 tpd. Once the Shaft Expansion is completed and production has sustainably reached the targeted tonnage for a period of three months, all further capital expenditures are classified as sustaining capital.

Sustaining capital expenditures are expenditures related to sustaining the existing production and operating plan and allow Island Gold to mine its current Mineral Reserves, and a portion of its Mineral Resources, during, and post, the project period. The project period is defined as 2020 to 2025 and the post project period is defined as 2026 to the end of the life of the mine. Table 1-4 summarizes the total capital costs.

Table 1-4 Total Capital Costs

Total Capital Cost	**LOM C$M**	**LOM US$M**
Sustaining Capital	$736	$552
Growth Capital	$685	$514
Total Capital Costs	**$1,421**	**$1,066**

The sustaining capital requirements reported in the Study for the Shaft Expansion total $736 million and include $6 million of reclamation costs, $29 million of contractor indirects, $27 million of contingency, and $26 million of delineation drilling. In the Shaft Expansion mine development will require the largest sustaining capital investment, totaling $373 million from 2020 to 2033. Table 1-5 presents the life of mine sustaining capital expenditures for the S2000 (Shaft Expansion) scenario.

Table 1-5 Sustaining Capital Costs

Sustaining Capital Cost	**LOM C$M**	**LOM US$M**
TSF Earthworks	$13	$10
Misc. U/G Infrastructure	$14	$10
U/G Mine Dewatering	$23	$17
U/G Power	$58	$43
General UG Facilities	$24	$18
Mobile Equipment	$144	$108
Sub-total Direct costs	**$276**	**$207**
Indirects	$29	$21
Contingency	$27	$21
Delineation Drilling	$26	$20
Capital Development	$373	$280
Total Sustaining Capital	**$730**	**$548**
Reclamation	$6	$4
Total Sustaining Capital (including Reclamation)	**$736**	**$552**

The Island Gold growth capital expenditures for the Shaft Expansion are estimated to be $685 million, including; $315 million of direct costs, $133 million of indirect costs (contractor indirects, EPCM, and owner's costs), $70 million of contingency, and $166 million of capital development (Table 1-6). This is expected to be spent between 2020 and 2025, until the completion of the shaft and mill expansion by 2025 with the bulk of this spending occurring between 2021 and 2024.

Table 1-6 Growth Capital Costs

Growth Capital Cost	LOM C$M	LOM US$M
Site Wide Surface Works	$41	$31
Power Upgrade	$18	$14
Mill Expansion	$36	$27
Paste Plant	$38	$28
Shaft Surface Works	$9	$7
Headframe and Hoisting Plant	$59	$44
Shaft Sinking and Equipping	$78	$59
U/G Ore and Waste Handling	$13	$9
U/G Misc.	$18	$14
Other	$6	$5
Subtotal Direct Costs	**$315**	**$236**
Indirect Costs	$104	$78
EPCM	$22	$17
Owner's Costs	$7	$5
Contingency	$70	$52
Capital Development	$166	$125
Total Growth Capital	**$685**	**$514**

1.18.2 Operating Costs

Operating expenses were calculated using the Island Gold's 2020 budget as a reference point where applicable and were developed from first principles when budgetary items were not available. The 2020 budget costs were adjusted to reflect increases related to mining at greater depths, increased operational efficiencies associated with shaft access and higher underground throughput. Fixed and variable components of cost centers were considered. Costs were adjusted to reflect the total volume of material moved (waste and ore) per year. Costs were also adjusted to reflect the reduction in labour related to the completion of capital development activities.

Total LOM operating costs, as presented in Table 1-7, amount to $1,747M (US $1,310M), including silver by-product credits, royalties and refining and transportation charges. This translates into an average cost of $182/t mill feed processed over the life of mine ($176/t from 2026 to 2035 when the mine is at 2,000 tpd).

Table 1-7 Summary of Operating Costs

Operating Cost	C$/t Processed	LOM C$M	US$/t Processed	LOM US$M
Mining	$98	$936	$73	$702
Processing	$31	$300	$24	$225
G&A	$39	$377	$29	$283
Subtotal	**$168**	**$1,613**	**$126**	**$1,210**
Silver Credit	-$1	-$12	-$1	-$9
Royalties	$15	$146	$11	$109
TOTAL Operating Costs	**$182**	**$1,747**	**$137**	**$1,310**

1.19 Economic Analysis

1.19.1 Taxes

Island Gold will be subject to provincial, federal, and mining taxes as follows:

- Ontario Mining Tax: 10%;
- Ontario Provincial Income Tax: 10%; and
- Federal Income Tax: 15%.

The rates above are current as of the date of this report and are subject to change in the future. Based on these rates and the financial assumptions used in this report, Island Gold is expected to have payable income and mining taxes of $620M (US$465M) over its 16-year life. Alamos has various Canadian tax pools that could be applied against future income from its Canadian operations, and 60% of the pools were used in this study to reduce taxes payable at Island Gold.

1.19.2 Royalties

Island Gold is subject to third-party royalties that range between 0.6% and 3.0% on certain claims, with an average royalty rate of 2.4% over the mine life. Total royalties included in the economic analysis of this report are $146M (US$109M).

1.19.3 Economic Analysis

Island Gold's shaft expansion project is economically viable with an after-tax internal rate of return (IRR) of 17% over the Basecase ramp scenario, as demonstrated in Table 1-8. The after-tax net present value at 5% ($NPV^{5\%}$) of the Island Gold mine for the shaft scenario is $1,359M (US$1,019M). Other economic factors used in the economic analysis include the following:

- US $1,450/oz gold, US $16.00/oz silver and a $0.75 USD/CAD were used in the cash flow model;
- Discount rate of 5%;
- Closure cost of $5.7M (US $4.3M);
- No salvage assumed at the end of mine life; and
- Exclusion of all costs prior to 2020. However, 60% of Alamos' Canadian tax pools as of December 31, 2019 are utilized in the tax calculations.

Table 1-8 Summary of Economic Results

Category	Unit	Value (C$)	Value (US$)
Net Revenues	$M	$6,000	$4,500
Operating Costs[1]	$M	$1,747	$1,310
Capital Costs & Closure Costs	$M	$1,421	$1,066
Total Cash Cost (over life of mine)	$/oz	$563	$422
Total Cash Cost (post-shaft completion)	$/oz	$537	$403
Mine-Site All-In Sustaining Cost (over life of mine)	$/oz	$798	$598
Mine-Site All-In Sustaining Cost (post-shaft completion)	$/oz	$713	$534
Net After-Tax Cash Flow	$M	$2,212	$1,659
After-Tax NPV5%	$M	$1,359	$1,019
After-Tax IRR[2]	%	17%	17%

Notes:

1. *Operating Costs and Cash Costs include mining, processing, G&A, royalties, transport & refining costs, and silver credit;*
2. *IRR is calculated on the differential after-tax cash flow between the shaft expansion scenario and the base case of continuing to mine at 1,200 tpd with ramp only access*

A sensitivity analysis of the after-tax results was performed using various gold prices. The results of this analysis are demonstrated in Table 1-9.

Table 1-9 Gold Price Sensitivity on NPV and IRR

Gold Price	After-Tax NPV (C$M)	After-Tax NPV (US$M)	After-Tax IRR[1] (%)
$1,250	$969	$727	14%
$1,350	$1,165	$874	16%
$1,450	**$1,359**	**$1,019**	**17%**
$1,550	$1,552	$1,164	19%
$1,650	$1,744	$1,308	20%
$1,750	$1,934	$1,450	22%
$1,850	$2,124	$1,593	24%

Notes:

1. *IRR is calculated on the differential after-tax cash flow between the shaft expansion scenario and the base case of continuing to mine at 1,200 tpd with ramp only access*

1.20 Interpretations and Conclusions

Alamos personnel reviewed and audited the historical exploration data available for the Island Gold Mine as well as the exploration methodologies adopted to generate the data. Exploration work is professionally managed, and procedures are adopted that meet accepted industry best practices. The author is of the opinion that the exploration data is sufficiently reliable to interpret with confidence the boundaries of the gold mineralization and support evaluation and classification of Mineral Resources in accordance with generally accepted CIM Estimation of Mineral Resource and Mineral Reserve Best Practices Guidelines and CIM Definition Standards for Mineral Resources and Mineral Reserves.

The drilling database includes information from 6,411 drill holes (831 form surface and 5,580 from underground) comprising 1,363,350 m of drilling.

The mining methods used at Island Golf include longitudinal open stoping and transverse open stoping and are deemed suitable considering the geometry of the orebody.

Island Gold performs regular reconciliations between production and the reserve block model and results have generally been within industry acceptable ranges. Island Gold uses the reconciliation process to validate its Mineral Resource estimation parameters and procedures.

Island Gold has undertaken a detailed engineering and economic study of five possible scenarios to mine the Mineral Reserves and Mineral Resources. Island Gold has concluded that constructing a shaft to a depth of 1,373 m and expanding the mining and milling capacity to 2,000 tpd is the best way to proceed.

The current 1,200 tpd mill consistently achieves recoveries of greater than 96%. In undertaking the Shaft Expansion, the mill will be expanded to 2,000 tpd with the addition of an additional primary ball mill, modification to the crushing circuit and other upgrades, additions, and expansions within the circuit.

As part of the Shaft Expansion and to support sustainable development of mine going forward the following infrastructure upgrade will be undertaken:

- Development of a new production/service shaft down to 1,373 m in depth (initial depth);
- Development/implementation of a new ore and waste handling system underground;
- Upgrade to the main site power supply;
- Constructions of a paste plant and underground distribution system;
- Upgrade to the Tailings Management Facility to suit longer LOM production; and
- Upgrade to mine dewatering and water treatment system.

The Island Gold Mine is operating within environmental compliance.

A number of operational permits will need to be amended to allow for the expansion up to 2,000 tpd. In addition, a number of other permits will need to be acquired for construction activities. Permitting is expected to take between 18 and 24 months.

The Island Gold Mine has been and will continue to be major contributor to the local economy. Alamos will continue to engage and work with area Indigenous communities and other communities of interest.

The shaft expansion option is economically viable with an after-tax internal rate of return (IRR) of 17% IRR, which is calculated on the differential after-tax cash flow between the Shaft Expansion scenario and the Basecase scenario of continuing to mine at 1,200 tpd with ramp only access. After-tax net present value at 5% ($NPV^{5\%}$) is $1,359M (US $1,019M).

1.21 Recommendations

At the conclusion of the Phase III Expansion Study the following recommendations are being made:

- Continue to invest in the surface exploration drilling program to potentially add to the Mineral Resource base;
- Continue with the underground delineation drilling program to convert Inferred Mineral Resources to Indicated Mineral Resources;
- Complete the geology model and deploy it to aid in identifying additional targets on the Island Gold Property;
- Continue with the production to Mineral Reserve reconciliations to further refine Mineral Resource estimation parameters and methodologies;
- Proceed with the paste fill plant construction;
- Proceed with the Shaft Expansion project;
- Start early works engineering as soon as possible to advance the procurement of long lead time items and help inform the permitting process;
- Continue with the environmental baseline program to support the permitting program; and
- Initiate the process of amending existing operational permits and acquire a series of new permits and/or authorizations for both future operational requirements and Phase III construction related activities.

2 INTRODUCTION

In a press release dated July 14, 2020, Alamos announced the results of its Phase III Expansion Study (“Phase III”) completed on the Island Gold Mine, located in Northern Ontario, Canada. Having successfully completed expansions to 1,100 tpd and 1,200 tpd at Island Gold, the objective of Phase III was to consider the most cost and capital effective strategy to increase annual production and mine the current Mineral Reserves, and the Mineral Resources located to a depth of 1,500 metres. This report outlines the results of that study and conforms to National Instrument 43-101 Standards of Disclosure of Mineral Projects (“NI 43-101”).

The study involved the evaluation of five scenarios, which demonstrated that the Shaft Expansion at a new production profile of 2,000 tpd was the most economic, most efficient, and productive alternative. This also best positions Island Gold to capitalize on further growth in Mineral Reserve and Resources. The Phase III Expansion will result in the construction of a new shaft amongst and other infrastructure upgrades.

Island Gold utilized the services of a several consulting firms to design and cost the components making up the various options. They included:

- Hatch Ltd (“Hatch”) was commissioned to undertake the design and engineering of the overall surface infrastructure as well as the underground ore and waste handling system. Hatch also aided in generating the life mine mining costs (Hatch, 2020);
- Cementation Canada Inc. (“Cementation” was commissioned to do the shaft sinking design and engineering;
- Golder Associates Ltd. (“Golder”) was commissioned to evaluate the life of mine tailings requirements and water treatment options and develop the design and engineering around them (Golder 2020a). As well Golder, undertook the paste testwork and plant design and engineering (Golder 2020b). Golder is currently undertaking the environmental baseline monitoring and permitting;
- Halyard Inc. (“Halyard”) developed various flowsheet options to expand the existing milling facility to 1,600 and/or 2,000 tpd and undertook the design and engineering for these options (Halyard, 2020);
- Airfinders Inc. (“Airfinders”) undertook the ventilation network design and engineering;
- All the consultants were engaged to provide input and contributed to the development of the Operating Cost (OPEX) and Capital and Sustaining Capital Expenditures (CAPEX); and
- Island Gold reviewed and developed those elements of the Project relating to the geological setting and mineralization, Mineral Resources, mine plan, market studies and contracts and economic analysis. Island Gold and Alamos compiled the overall Technical Report.

2.1 Terms of Reference

All costs are in Q2 2020 Canadian dollars unless otherwise stated.

All units of measurement are in metric, unless otherwise stated.

2.2 List of Qualified Persons

Table 2-1 sets out the Qualified persons responsible person for each section of this Technical Report.

Table 2-1 Section Qualified Persons

Section	Description	Qualified Person	Company
1	Summary	All in part	
2	Introduction	Nathan Bourgeault & Raynald Vincent	Island Gold
3	Reliance on Other Experts	Nathan Bourgeault & Raynald Vincent	Island Gold
4	Property Description and Location	Raynald Vincent	Island Gold
5	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Raynald Vincent	Island Gold
6	History	Raynald Vincent	Island Gold
7	Geological Setting and Mineralization	Raynald Vincent	Island Gold
8	Deposit Types	Raynald Vincent	Island Gold
9	Exploration	Raynald Vincent	Island Gold
10	Drilling	Raynald Vincent	Island Gold
11	Sample Preparation, Analyses and Security	Raynald Vincent	Island Gold
12	Data Verification	Raynald Vincent	Island Gold
13	Mineral Processing and Metallurgical Testing	Nathan Bourgeault	Island Gold
14	Mineral Resource Estimates	Raynald Vincent	Island Gold
15	Mineral Reserve Estimates	Raynald Vincent & Nathan Bourgeault	Island Gold
16	Mining Methods	Nathan Bourgeault	Island Gold
17	Recovery Methods	Nathan Bourgeault	Island Gold
18	Project Infrastructure	Nathan Bourgeault	Island Gold
19	Market Studies and Contracts	Nathan Bourgeault	Island Gold
20	Environmental Studies, Permitting and Social or Community Impact	Colin Webster	Island Gold
21	Capital and Operating Costs	Nathan Bourgeault	Island Gold
22	Economic Analysis	Nathan Bourgeault	Island Gold
23	Adjacent Properties	Raynald Vincent	Island Gold
24	Other Relevant Data and Information	n/a	
25	Interpretations and Conclusions	All in part	
26	Recommendations	All in part	
27	References	All in part	

2.3 Site Visits

The following Qualified Persons (QPs) visited the Island Gold Site as indicated below:

- Raynald Vincent, P.Eng., M.G.P., Chief Geologist, Island Gold Mine is employed at the site;
- Nathan Bourgeault, P.Eng., Chief Engineer, Island Gold Mine is employed at the site; and
- Colin Webster, P.Eng., Vice President – Sustainability and External Affairs, Alamos Gold Inc, has visited the site on numerous occasions during the previous year with his last site visit occurring February 10th to 12th, 2020.

3 RELIANCE ON OTHER EXPERTS

The Qualified Persons have relied on the input from Alamos and qualified independent consulting companies in preparing this report. This report was prepared using the reports and documents noted in Section 27 “References”.

The Qualified Persons responsibilities were to assure that this NI 43-101 Technical Report met the stipulated guidelines and standards considering that the designs, engineering, and costing in this Report were contributed by Hatch, Cementation, Golder, Halyard, Airfinders, Alamos, or other Alamos consultants.

The information, conclusions, opinions, and estimates contained herein are also based on data, reports, and other information supplied by Alamos and the other party sources.

4 PROPERTY LOCATION AND MINING TITLES

4.1 Location

The Island Gold Property is situated 43 km northeast of Wawa, Ontario within the Ontario Ministry of Energy, Northern Development and Mines (MENDM) Sault Ste. Marie Mining Division. The town of Dubreuilville, a forestry center, is 10 km to the northwest of the mine site. Access to the area is provided by the TransCanada Highway (Highway 17), which continues north from Wawa for 35 km then following Highway 519 to Dubreuilville. The Goudreau Road, an all-weather road, extends east from Dubreuilville for 17 km to the mine site (Figure 4-1).

Figure 4-1 Island Gold Mine Location

4.2 Description of Mining Titles and Recorded Interests

The Island Gold Property (Figure 4-2), which is divided into nine (9) property areas, namely: Argonaut, Edwards, Ego, Goudreau, Goudreau Lake, Island Gold, Kremzar, Lochalsh and Salo is comprised of 831 tenures consisting of patented fee simple and/or patented leasehold mining rights and surface rights claims, mining licences of occupation and unpatented cell claims covering approximately 9,511 hectares. Alamos holds 100% of the title and/or interest in the afore mentioned tenures, with the exception of:

- Part of one (1) mining lease, for which it holds 100% below 100 m in elevation, on the Lochalsh property;
- Six (6) patented fee simple claims, for which it owns 100% below 400 m in elevation, and part of one patented fee simple claim for which it owns 100% below 100 m in elevation, both situated on the Goudreau property; and,

- Three (3) patented fee simple claims, for which it owns 100% below 400 m in elevation, on the Argonaut property.

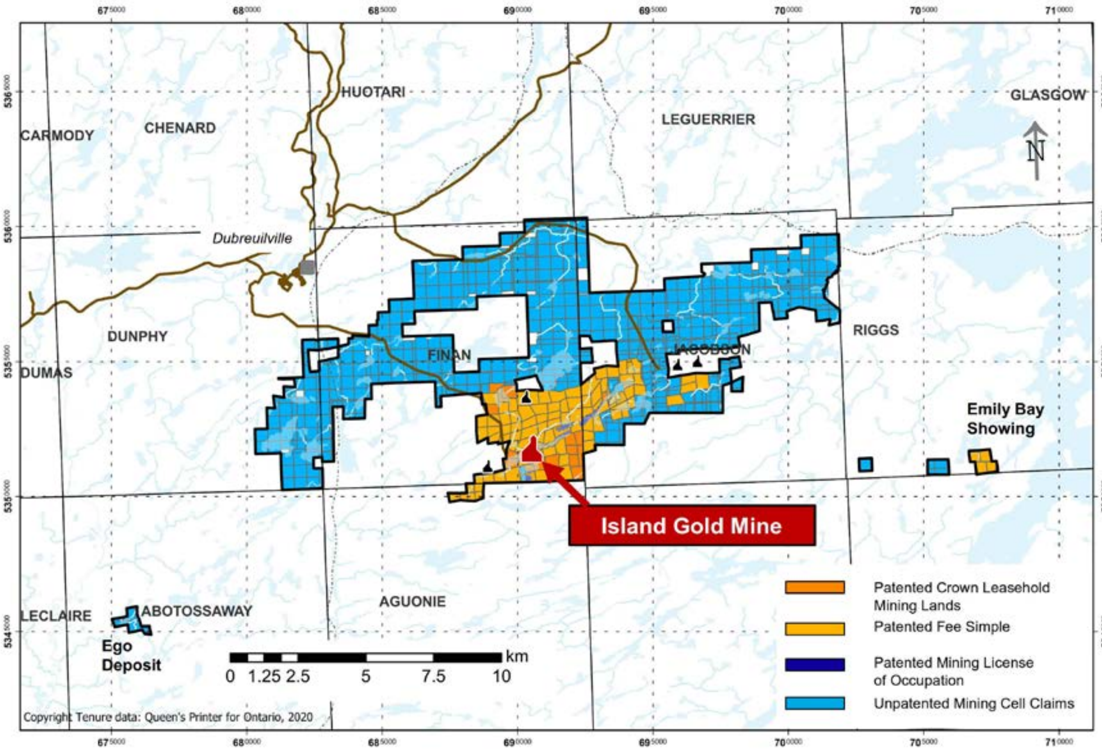


Figure 4-2 Mining Titles Map – Island Gold Mine Property

Notwithstanding the foregoing, while the Company has carried out reviews of the registered title and recorded interests to its patented fee simple and/or patented leasehold mining rights and surface rights claims, mining licences of occupation and unpatented cell claims, this should not be construed as a guarantee that such title and/or such interests will not be challenged or impugned. Said patented fee simple and/or patented leasehold mining rights and surface rights claims, mining licences of occupation and unpatented cell claims may be subject to prior unregistered agreements or transfers or native land claims, and therefore title and/or interests may be affected by undetected defects.

Collectively, the Island Gold Property is subject to eleven (11) separate agreements with different obligations and royalties for each agreement.

Each of the Patented Claims are surveyed and do not have annual assessment work obligations. Taxes covering provincial land tax levies and MENDM mining land taxes, along with Crown rents are paid annually to the provincial government to keep the Patented Claims in good standing. While Cell Claims are not surveyed but are staked, said Cell Claims do require that minimum assessment work be completed annually either by conducting exploration work or by distributing banked assessment work credit available from contiguous Patented Claims and/or Cell Claims, to facilitate renewal of the expiring Cell Claim on or before its anniversary date.

Alamos has a dedicated land and tenure manager, along with internal procedures and measure to ensure compliance, validity and good standing of its Patented Claims and Cell Claims.

The mineralized zones, including those containing the Mineral Resources and Mineral Reserves, are located on patented Crown leasehold claims SSM724370, SSM825287, SSM825288,

SSM825290, SSM837118, SSM991852, SSM991853, SSM991854, SSM991855, SSM991856, and SSM991857, and on patented fee simple claims SSM2264, SSM2490, SSM2491, SSM2666, SSM2667, and SSM3817. The ramp and waste pad are on patented fee simple claims SSM1776 and SSM1710.

4.3 Ownership of Mineral Rights

All titles and interest pertaining to the patented fee simple claim, the patented leasehold claims, mining licences of occupation, and Cell Claims relating to the Island Gold Property are owned and/or held by Alamos.

4.4 Mining Royalties

The following royalties apply to the currently defined Mineral Reserves and Mineral Resources:

- The Lochalsh property is subject to a 3% net smelter returns (NSR) payable to Osisko Gold Royalties Ltd. ("Osisko");
- The Goudreau Lake property is subject to a 1.38% NSR royalty payable to Osisko and a 0.62% NSR royalty payable to Franco-Nevada Corporation, and a 10.35% net profit interest (NPI) royalty in favour of a private company; and
- The Goudreau property is subject to a 2% NSR royalty payable to Osisko and a 15% NPI royalty payable to a private company.

4.5 Other Mineral Royalties

In addition to the above-mentioned Mining Royalties set out in Section 4.4, the Island Gold Property is also subject to property specific royalties and financial contractual obligations. None of these following property areas currently contain a defined Mineral Resources or Mineral Reserves.

- The Kremzar property is subject to a 4% NSR royalty payable to a private company pursuant to the underlying NSR royalty agreement;
- The Kremzar property is also subject to a 3% NSR royalty payable to Osisko, which is payable until such time as the private company's NSR royalty becomes payable. In the event that the private company's NSR royalty becomes payable and is reduced below 4%, Osisko will then be entitled to receive a NSR royalty equal to 50% of the amount by which the private company's NSR royalty is reduced, payable on the same terms as the private company's NSR royalty;
- The Salo property is subject to a 2% NSR royalty in favour of private individuals, as to their specified individual percentage interest;
- The Edwards property is subject to a 2% NSR royalty in favour of Franco Nevada Corporation, and a 1.5% NSR royalty in favour of Skead Holdings Ltd.; and
- There is a 10% NPI royalty in favour of Cavendish Investing Ltd. ("Cavendish") on four claims comprising the Argonaut property.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Access

Access to the area is provided by the TransCanada Highway (Highway 17), which continues north from Wawa for 35 km then following Highway 519 to Dubreuilville which is 10 km to the northwest of the mine site. The Goudreau Road, an all-weather road, extends from east Dubreuilville for 17 km to the mine site.

5.2 Climate

The Island Gold Property is contained within the Lake Superior Regional climatic zone. This area borders the north shore of Lake Superior from Sault Ste. Marie to Thunder Bay and extends inland approximately 40 to 80 km. The climate is described as "modified continental", the modification being due to impacts of Lake Superior. Climatologic records for temperature, precipitation and wind obtained from the Wawa weather station are considered to be representative of the actual conditions at the Island Gold Mine site.

The mean annual temperature is about 10C, with extremes of –51˚ C and 38˚ C being recorded. January is the coldest month and July the warmest.

Precipitation is in the range of 980 mm per year, with about 600 mm as rainfall and evaporation at 517mm/year principally during the summer months. Peak months for rainfall are August and September, with over 100 mm typically in September. Snow cover generally persists from late October to early May, with 50 to 60 mm (water equivalent) occurring monthly.

Approximately 45% of the annual precipitation is lost as runoff, with 50 to 60% of the total annual runoff occurring in April and May in association with spring melt and spring rains.

Average annual wind speeds are in the range of 7 to 15 km/hr. Winds from the northwest through north are most prevalent during the winter, while winds from the southwest through west dominate in the summer months. East winds are infrequent in all months. The percentage of calm is high at 21 to 36 %.

5.3 Local Resources

Wawa has a population of approximately 3,500 inhabitants and, Dubreuilville, originally a forestry community, has a population of approximately 900 permanent residents and contains accommodations for mine personnel. The Island Gold Mine is also within a few kilometres of railway lines operated by Canadian National and Algoma Central Railways. Sidings for each of these railway lines are in the villages of Goudreau and Lochalsh.

A hydro-electric power substation, water supply, gravel roads, offices, maintenance buildings, and living accommodations are all available within the mine’s general area. Power is connected to the provincial power grid and is supplied by Algoma Power Inc. “API”).

Island Gold offers temporary living accommodations and flexible schedules to its non-local employees. Training is offered to maintain a local qualified workforce.

5.4 Surface Infrastructure

The Island Gold Mine infrastructure includes a primary tailings pond, a secondary settling pond, the mill, the Lochalsh ramp and portal, a mine access road, power lines, and an electrical substation. Offices, core logging and storage facilities, a fire hall and separate mine drys for men and women are also located on the mine site.

The mill, which was originally built in 1988, was designed to process 650 tpd. Since then, the milling capacity has been increased to 850 tpd in 2010, to 900 tpd in 2015, to 1100 tpd in 2018 and to 1200 tpd in 2020. The fully permitted tailings area is located at Miller Lake, west of the Kremzar Mine. The tailings and waste rock have been tested for acid mine drainage and are not acid generating. All permits for mining and milling operations are in good standing.

5.5 Physiography

The Project lies in the Superior Province of the Canadian Shield. Topography within the mine area varies from a high of 488 metres above sea level (masl) in the vicinity of Miller and Maskinonge Lakes to a low of 381 masl at Goudreau Creek. Land topographic variation is most strongly developed west and north of Miller Lake in an area of rock knob-controlled terrain. Extreme slopes in the area measure 30-49%. Elsewhere, particularly the south end east of Maskinonge Lake, the terrain is relatively flat.

Periods of intense glacial activity have contributed to the hummocky, rock knelled and largely bedrock-controlled topography, characteristic of the region. Glacial advance from the north deposited a thin mantle of stony sand till over a scoured rock surface (Boissonneau, 1966). The till is generally less than 1 metre thick on the crest of hills but can exceed 5 metres on some slopes and valleys (Gartner and McQuay, 1979).

Water depths in Goudreau Lake vary substantially. The deepest areas, up to 13 metres, occur in the northern portion of the lake, upstream of the first narrows. Downstream of the narrows, lake depths are shallow, generally being less than 2-3 metres. Considerable areas of marginal swamp are associated with the lower portions of Goudreau Lake.

6 HISTORY

The Goudreau – Lochalsh Gold Camp area has been the subject of interest dating back to the early 1900's and has attracted prospectors and mining companies in search of iron ore, gold, and base metal deposits. The Wawa – Michipicoten area has been recognized for its long history of iron exploration which has resulted in the development and production of several iron ore mining operations.

Gold exploration followed shortly thereafter, resulting in several gold discoveries which were subsequently developed and brought into commercial production in the area which would later become the Island Gold Property.

6.1 Work History

Five distinct periods of exploration (Table 6-1) have been identified including:

- Period 1: 1901 to 1954;
- Period 2: 1974 to 1990;
- Period 3: 1996 to 2002;
- Period 4: 2003 to 2014; and
- Period 5: 2015 to the present.

6.1.1 Period 1: 1901 to 1954

The initial discovery of gold was made by a group of prospectors at Emily Bay on Dog Lake in Riggs Township in 1900. Up to approximately 1944, prospecting, geological mapping, trenching, shaft sinking, and 1,732 m of diamond drilling were completed to explore various gold prospects. From 1916 to 1954, Algoma Ore Properties Limited carried out extensive exploration work on the Morrison No. 1 iron sulphide property in Finan Township, defining a sizable iron-bearing deposit. In the later years of this period the deposit was further explored for gold to define 491,000 tonnes grading 1.59 g/t Au. Ultimately this period is marked principally by various exploration efforts by several companies carrying out surface trenching and diamond drilling on several gold prospects. A total of 4,917 m of drilling was carried out to explore the various prospects. In the overall area during this period, a total of 12,065 m of diamond drilling was carried out, exploring for gold and iron.

6.1.2 Period 2: 1974 to 1990

After an extended period of relatively little interest and activity in the area, exploration was resumed by Amax Inc. and its Canadian division, Canamax. Canamax carried out assorted exploration efforts in Finan and Jacobson Townships, consisting of various types of geophysical and geological surveys followed up with diamond drilling.

In 1985, drilling approximately two kilometers south of the Kremzar Mine intersected a series of sub-parallel lenses containing gold mineralization within deformed rocks of the Goudreau Lake Deformation Zone (GLDZ). These lenses are known as the Lochalsh, Island Gold, Shore, and Goudreau Lake Zones.

In December 1988, Canamax's Kremzar project began commercial production. From 1988 to 1990, production from the Kremzar mine was 306,000 tonnes grading 4.80 g/t Au.

Over 1989 and 1990, underground access was established into the Island Gold deposit with an adit from the north shore of Goudreau Lake. A 4,167 tonne bulk sample was extracted and processed at the Kremzar Mill. At the end of 1990, Canamax suspended all operations at both the Kremzar and Island Gold projects.

During this period, a total of 96,143 m of diamond drilling was completed on various parts of the Canamax property.

6.1.3 Period 3: 1996 to 2002

The Island Gold Property was acquired from Canada Tungsten Inc. by Patricia. From 1996 to 2002, various exploration activities on the property included prospecting, surface trenching, geological and geophysical surveys, and diamond drilling was carried out to explore for both Island Gold and Kremzar styles of gold bearing prospects and zones.

During this period of exploration, 26,685 m of coring was completed at various locations on the property.

In 2003, Patricia and Richmont Mines Inc. (“Richmont”), entered into a joint venture agreement. Work completed during the joint venture included 72,984 m of surface and underground diamond drilling to test the various zones. On January 1, 2005, Richmont became the operator of the project.

6.1.4 Period 4: 2003 to 2014

Commercial production at Island Gold began on October 1, 2007. Richmont acquired Patricia’s 45% interest in December 2008, becoming 100% owner of the property and operations. Subsequently Richmont completed an assortment of ground and airborne geophysical surveys, extensive exploration drilling, which included numerous surface and underground exploration holes, delineation, and definition diamond drilling with a total of 566,498 m of coring completed.

Exploration activities ramped up in 2009 with a minimum of 30,000 metres of drilling completed in each of the next several years, increasing sharply to more than 80,000 metres in 2012. This included drilling below the 400 metre level as part of the Island Gold Deep exploration program which was successful in extending the main C Zone at depth with initial Inferred Mineral Resource being calculated on the high-grade deep C Zone in January 2013. Over the next year, drilling in the Island Gold Deep sectors from the west, below Lochalsh, to the east and below Extension 1 confirmed the presence and continuity of the deep C Zone and some parallel zones. This drove a substantial increase in Inferred Mineral Resources to 3.6 million tonnes grading 9.07 g/t for 1.04 million ounces of gold as of April 2014. This represented an increase of nearly one million ounces at a 46% higher grade from the end of 2012.

6.1.5 Period 5: 2015 to Present

A large exploration program commenced at the end of 2015 to explore beneath the Island Gold Mine. Directional diamond drilling was used to reach targets at depth with allowed greater accuracy than conventional drilling techniques. As a result of this program, Mineral Resources were added in the C zone at depth and to the east in the E1E zone in Extension 2 area. A total of 161,446 m of directional drilling was completed between 2015-2019.

In 2016-2018 a drill program totalling 9,669 m was conducted to explore the Kremzar Mine. Further exploration was carried out along the GLDZ east and west of the Island Gold Mine along strike to test the extent of mineralization between 2016 and 2018. In addition to this exploration in 2017 a 3,302 m condemnation program was completed beneath the claims held by Argonaut Gold at the Magino Mine on the west of the Island Gold Mine to facilitate a claim trade.

Two master theses on Island Gold geology were completed in 2019 from the University of Waterloo focussing on structural geology (Jellicoe, 2019) and alteration (Cuifo, 2019).

Other exploration activities undertaken during this period include stripping a 145 m long trench along the GLDZ and 185 soil and gas hydrocarbon samples over the Island Gold property in 3 transects. Geophysical surveys and remote sensing such as LIDAR and VLF surveys were conducted as well.

In 2018, a 2,200 line-kilometre high-sensitivity aeromagnetic and HeliFALCON Airborne Gravity Gradiometer survey was completed over the Island Gold Property by CGG Canada Services Ltd.

A geological modelling project was recently initiated and is on-going. The project comprises targeted re-logging of drill core, collection and analysis of geochemical, spectral, and structural data sets, and 3D modelling. Project goals include generating a comprehensive understanding of the geological setting of the Island Gold deposit with emphasis on the controls on gold mineralization, a robust 3D geological model, and a property wide targeting framework for ongoing exploration.

In 2019 a regional mapping program on the Island Gold Property surrounding the mine mapped approximately 35 km^2. During mapping 883 samples were collected of which 141 were sent for lithogeochemical analysis, 402 were sent for gold and metal assaying and 41 were sent for thin sections analysis.

Table 6-1 Work History

	Year	Company	Area	Drilling, Other Work	Quantity	Comment
Period 1	1916	Algoma Ore Properties	Morrison #1	23 trenches, 19 holes	1524 m	277,000 tons pyrite 35% sulphur
	1925	Patrice Kremzar	Kremzar Property	Prospecting and staking		Staking part of present mine property, first gold discovery
	1925-1930	Algoma Exploration & Development	Kremzar Property	6 holes	203 m	#2, #7, #8 zone work
	1930	M.J. O'Brien Lmt.	Kremzar Property	10 holes	1476 m	#1, #2 zones, Tent vein
	1935	Cockshutt and Hopkins	Kremzar Property	12 holes	611 m	Local high grade Tent vein result
	1940	O'Brien Gold Mines	Kremzar Property	24 holes	1648 m	#2, #7, and Tent veins, discovered New Vn = Kremzar deposit
	1940	O'Brien Gold Mines	Kremzar Property	17 holes	979 m	Delineation of New Vein or present Kremzar deposit
	1944	Algoma Ore Properties	Emily Bay	38 Holes	1732 m	Gold bearing iron formation
	1953-1954	Algoma Ore Properties	Morrison #1	32 holes	3892 m	Up to 3.8 g/t over 30 meters intersected, BP series
	TOTAL			139	12066 m	
Period 2	1976-1979	Amax	Finan, Jacobson, Riggs	Drilling 10 holes	n/a	Regional targets
	1983	Canamax-Algoma	Algoma property	Joint venture		117 patent claims
	1983-1989		Pine Zone area	50 holes	6500 m	Small tonnage sub economic resource
	1987	Canamax	Kremzar deposit	27 holes	14,779 m	Inferred resource calculation 1.1 mil tons @ .235 opt Au.
	1985-1986	Canamax-Kremzar Gold Mines	Kremzar Property	Ramp driven and mill constructed		Ramp to 240L
	1987	Canamax	Goudreau Lake	54 holes	17,256 m	Island zone discovery
	1987	Canamax	Goudreau Lake	33 holes	9,218 m	Breccia zone, #2, #8, Tent Vein, Pine Zone, Morrison #1, Portage Showing, Portal Zone
	1987-1988	Canamax	Morrison 1, Spring Lake	4 holes	791 m	Indicated the continuance of the GLDZ
	1988	Canamax	Pine Lake	2 holes	801 m	No encouraging results for gold
	1988	Canamax	Kremzar Mine	Production commenced		Production began in the 4th quarter
	1988-1990	Canamax	Kremzar Mine	Production	46,798 oz.	Mine shutdown 4th quarter 1990
	1989-1990	Canamax	Island Gold Zone	Ramp & drifts development	1280 m, 782 m	125L and 140L
	1990	Canamax	Island zone	Bulk sample	4,167 tons	6.5 g/t
	TOTAL			180 DH's	49,345 m	
Period 3	1996	Patricia	Island Property	Acquisition from Canamax-Canada Tungsten / Aur Resources		Acquired Kremzar, Lochalsh, Goudreau claim groups
	1996-1997	Patricia	Island, Lochalsh zones	42 holes	15,545 m	Exploration drilling, surface holes, exploration, PL series
	1997	Patricia	Kremzar property	Trenching	15 areas	To expand previously trenched historic showings
	2000-2001	Patricia	Island Gold project	Stripping, mapping, sampling, mag, IP, 6 holes	2,059 m	Zone 8, 3, 2, NW extension, Pine, Breccia, Portal zones
	2000-2001	Patricia	North Shear	Drilling 5 holes	1,027 m	Confirmed that North shear a major structure, PL-01 series
	2002	Patricia	Island Gold project	Re-logging 24 holes	8,054m	Expand previous drilling data
	TOTAL			77 DH's	26,685 m	

Table 6-1 Work History (Cont.)

	Year	Company	Area	Drilling, Other Work	Quantity	Comment
Period 4	2003	Richmont-Patricia	Island Gold project	Joint venture agreement		Acquired 55% interest
	2004	Richmont-Patricia	Island Gold project	Development, exploration, U/G-surface drilling, 10 holes		3 million $ program
	2004	Richmont-Patricia	Island Gold project	10 holes	6,119 m	Testing North Shear zone, PR-04 series
	2005-2008	Richmont-Patricia	Island Gold project/Mine	U/G and surface drilling, 423 holes	56,312 m	E1E and CD zone work
	2006	Richmont-Patricia	Island Gold project/Mine	25 holes	10,553 m	Surface exploration, PRS series
	2007	Richmont-Patricia	Island Gold Mine	Commercial production began		
	2008	Richmont	Island Gold Mine	Acquisition of Patricia's 45%		
	2009	Richmont	Island Gold Mine	U/G & surface drilling, 213 holes	32,061 m	Definition, delineation, and exploration
	2010	Richmont	Island Gold Mine	U/G & surface drilling, 271 holes	66,049 m	Definition, delineation, and exploration
	2011	Richmont	Island Gold Mine	U/G & surface drilling, 322 holes	64,675 m	Definition, delineation and deep drilling the Island zone and peripheral areas
	2012	Richmont	Island Gold Mine	U/G & surface drilling, 440 holes	96,074 m	Definition, delineation, and exploration
	2013	Richmont	Island Gold Mine	U/G & surface drilling, 390 holes	98,882 m	Definition, delineation, and exploration
	2014	Richmont	Island Gold Mine	U/G & surface drilling, 349 holes	42,035m	Definition, delineation, and exploration
	TOTAL			2124 DH's	472,760	
Period 5	2015	Richmont	Island Gold Mine	534 holes	87,500 m	80% of lower C resources converted to reserves
	2016	Richmont	Island Gold Mine	UG drilling, 643 holes	98,467 m	Exploration drilling 26,311 m, definition/delineation 72,156 m
	2016	Richmont	Island Gold Mine	Surface drilling, 79 holes	49,556 m	25,070 m surface exploration, 24,486 exploration directional drilling
	2017	Richmont	Island Gold Mine	UG drilling, 756 holes	87,392 m	Exploration drilling 31,347 m, definition/delineation 56,045 m
	2017	Richmont	Island Gold Mine	Trenching	1 trench	145m long trench
	2018	Richmont	Island Gold Mine	Lidar survey	~270 km2	Lidar survey of the mine and surrounding area
	2017	Richmont	Island Gold Mine	Surface drilling, 79 holes	43,259 m	23,448 m surface exploration, 19,811 exploration directional drilling
	2017	Alamos Gold	Island Gold/Kremzar	Acquisition		Alamos Gold acquired Island Gold & Kremzar November 2017
	2018	Alamos Gold	Island Gold Mine	VLF survey	4 lines	4 transects over IGM were surveyed
	2018	Alamos Gold	Island Gold Mine	UG drilling, 649 holes	83,198 m	Exploration drilling 28,013 m, definition/delineation 55,185 m
	2018	Alamos Gold	Island Gold Mine	Surface drilling, 66 holes	57,725 m	11,722 m surface exploration, 46,003 m exploration directional drilling
	2018	Alamos Gold	Island Gold Mine	Geologic modelling project		Relogging and analysis of IGM to create 3D geologic model; on going
	2019	Alamos Gold	Island Gold Mine	Soil and gas hydrocarbon sampling	185 samples	3 transects of samples on the IGM property
	2019	Alamos Gold	Island Gold Mine	UG drilling, 445 holes	72,385 m	Exploration drilling 23,742 m, definition/delineation 48,643 m
	2019	Alamos Gold	Island Gold Mine	UG drilling directional drilling, 2 holes	1,476 m	Trialling directional drilling UG
	2019	Alamos Gold	Island Gold Mine	Surface drilling, 55 holes	47,608 m	Directional drilling only
	2019	Alamos Gold	Island Gold Mine	2 Masters theses		University of Waterloo thesis topic: IGM geology
	2019	Alamos Gold	Island Gold Mine	Mapping	~35 km2	Regional mapping surrounding IGM and GLDZ
	TOTAL			3308 DH's	541,066 m	

6.2 Historical and Island Gold Mine Mineral Resource Estimates

Several Mineral Resource and Mineral Reserve estimates were prepared over the years within the Island Gold Mine area. They are summarized in Table 6-2.

Table 6-2 Historical and Existing Island Gold Mine Mineral Resource Estimates

Year End	Company	Type of Mineral Resource and Reserve	Tonnage (t)	Grade (g/t)	Gold (oz)
2001	Kallio	Inferred	20,610,000	2.35	1,557,173
		Inferred	4,210,000	6.00	812,128
		Inferred	2,034,000	8.30	542,775
2003	RPA/Hubacheck Consulting Geologists (HCG)	Measured and Indicated	72,000	12.30	108,000
2006	Genivar/HCG	Proven and Probable	1,013,854	8.55	278,697
		Measured and Indicated	454,705	10.26	149,992
		Inferred	610,728	9.96	195,568
2007	Genivar	Proven and Probable	831,423	799.00	213,492
		Measured and Indicated	227,458	9.85	72,044
		Inferred	1,058,881	8.39	285,535
2008	Genivar	Proven and Probable	1,031,187	8.72	289,098
		Measured and Indicated	422,197	10.77	146,191
		Inferred	676,608	9.65	209,921
2009	Richmont	Proven and Probable	991,087	7.90	251,848
		Measured and Indicated	456,353	10.55	154,813
		Inferred	640,614	9.69	199,569
2010	Richmont	Proven and Probable	818,066	6.13	161,197
		Measured and Indicated	796,475	7.36	188,511
		Inferred	604,729	7.14	138,732
2011	Richmont	Proven and Probable	959,523	5.57	171,814
		Measured and Indicated	679,359	7.05	153,920
		Inferred	344,382	6.07	67,238
2012	Richmont	Proven and Probable	785,221	5.60	141,456
		Measured and Indicated	502,910	6.86	110,958
		Inferred	279,569	6.20	55,744
2013	Richmont	Proven and Probable	733,347	6.09	143,506
		Measured and Indicated	739,700	9.81	233,330
		Inferred	3,558,972	9.07	1,037,327
2014	Richmont	Proven and Probable	895,000	6.39	183,750
		Measured and Indicated	733,500	9.29	219,050
		Inferred	3,547,500	8.79	1,002,750
2015	Richmont	Proven and Probable	2,115,600	8.26	561,700
		Measured and Indicated	348,200	6.40	71,700
		Inferred	2,814,700	8.49	768,000
2016	Richmont	Proven and Probable	2,551,006	9.17	752,209
		Measured and Indicated	478,811	5.94	91,427
		Inferred	3,041,836	10.18	995,717
2017	Alamos Gold	Proven and Probable	2,702,858	10.20	886,773
		Measured and Indicated	590,596	5.86	111,253
		Inferred	2,958,204	9.55	908,478
July 2018	Alamos Gold	Proven and Probable	2,789,731	10.69	958,842
		Measured and Indicated	841,244	8.18	221,156
		Inferred	3,673,426	9.99	1,179,810
2018	Alamos Gold	Proven and Probable	3,047,249	10.28	1,007,274
		Measured and Indicated	696,233	8.77	196,213
		Inferred	4,178,079	11.71	1,573,133

These "Mineral Resources" are historical in nature and should not be relied upon. Additionally, assumptions used to determine cut-off grades are likely to have changed since they were done. Consequently, these "Mineral Resources" cannot be considered as current. They are included in this section for illustrative purposes only and should not be disclosed out of context.

6.3 Historical Production from the Island Gold Mine

Since the beginning of underground mining in 2006, and up to December 31, 2019, the Island Gold Mine has produced 812,188 ounces of gold. Commercial production started in October 2007 and since then approximately 787,950 ounces of gold were produced. Details per year are given in Table 6-3.

Table 6-3 Island Gold Mine Production per year

Year	Tonnes	Head grade (g/t Au)	Gold Recovery (%)	Ounces Produced
2006[1]	41,521	4.79	93.45	3,255
2007[2]	159,493	6.02	94.36	29,281
2008	162,158	7.74	95.83	39,224
2009	223,345	5.85	94.52	39,794
2010	246,712	6.03	95.49	43,761
2011	255,103	6.05	95.91	49,443
2012	247,833	5.47	96.45	41,951
2013	239,766	4.57	96.06	34,690
2014	230,828	5.91	96.26	42,042
2015	242,137	7.31	96.75	52,835
2016	297,757	9.02	96.52	81,798
2017	338,603	9.35	96.82	97,931
2018	369,767	9.20	96.16	105,822
2019	401,276	11.85	97.05	150,355
Total	**3,456,299**	**7.62**	**96.26**	**812,188**

Notes

1. *Bulk sample.*
2. *20,983 ounces produced prior to commercial production (October 2007).*

7 GEOLOGICAL SETTING

7.1 Regional Geology

The Island Gold Property is located in the Michipicoten Greenstone Belt ("MGB") which is part of the Wawa Subprovince within the Archaean Superior Province (Figure 7-1). The MGB is approximately 140 km long and up to 45 km wide. The metamorphic grade of the subprovince is greenschist but amphibolite facies can be seen locally or proximal to intrusions.

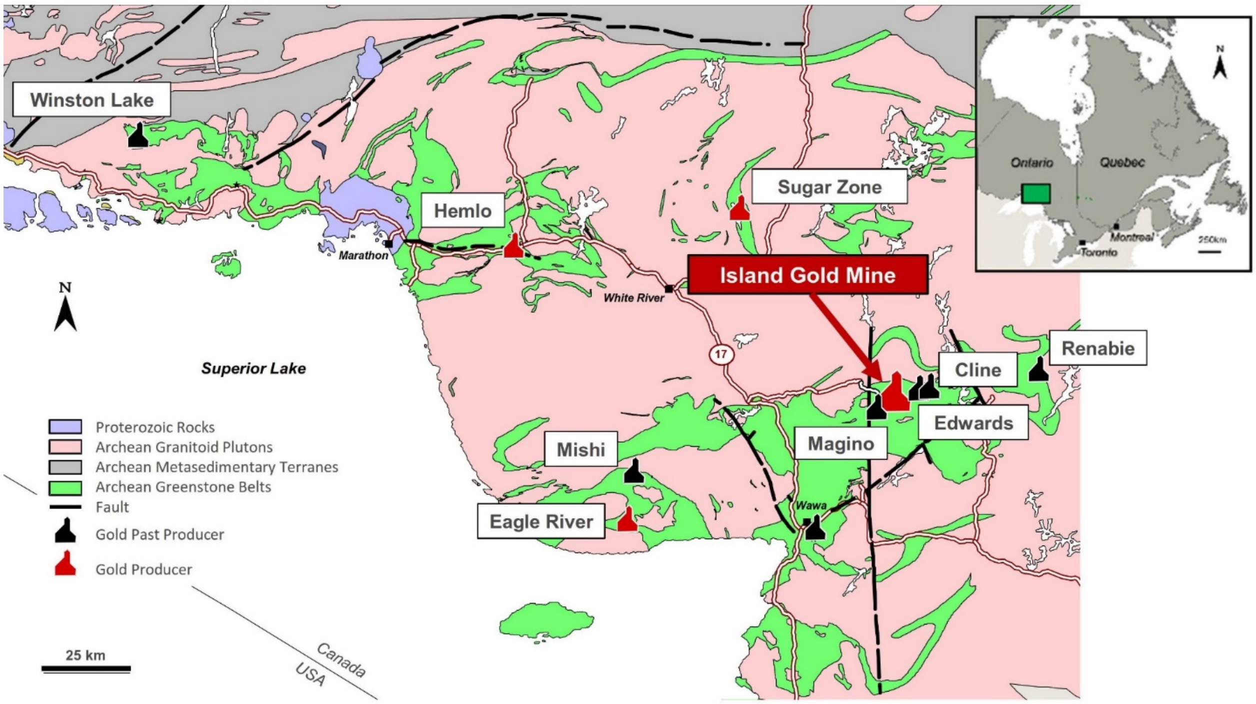


Figure 7-1 Geological Map of the Western Part of the Wawa Subprovince

The MGB comprises three bimodal (rhyolite-basalt) volcanic cycles capped by iron formations. Rocks vary in age from 2,889 Ma for the Hawk Assemblage (Cycle 1), to 2,750 Ma for the Wawa Assemblage (Cycle 2), and to 2,700 Ma for the Catfish Assemblage (Cycle 3). Shearing along contacts has obscured the original relationship between the cycles.

A major regional deformation zone called the Goudreau Lake Deformation Zone ("GLDZ") is situated throughout the area at the interface of the Wawa and Catfish Assemblage cycles. It is a north-easterly trending structure which has been traced along strike for 30 km with a width of 4.5 km and believed to be the main control of gold mineralization for the Project area. It is a high angle oblique-slip fault zone with an overall dextral movement cutting stratigraphy at a shallow angle.

There are three main splays to the GLDZ in the area, the southernmost of which hosts the Island Gold Mine structure which contains a stacked sequence of east-northeast striking, steeply dipping, and subparallel zones of gold mineralization.

7.2 Geology of the Island Gold Mine Area

Lithologies appear to form a conformable homoclinal volcano-stratigraphic sequence, facing and younging to the north in the project area. Tight to isoclinal folds and local attenuation or boudinage of units along fold limbs appear to occur regionally. Fold axes are subparallel to the regional foliation at N070°E to N095°E.

The Island Gold Mine is stratigraphically positioned in the upper portion of the Wawa Assemblage, on the northern limb of the Goudreau Anticline. The hinge is south of the area displayed in Figure 7-2. This assemblage is mostly composed of felsic volcanic rocks of various facies of tuffs and lavas.

Around the periphery of the Island Gold Property area are felsic intrusions ranging in size from one to several kilometres across. The Webb Lake Stock lies to the north of the deposit (Figure 7-2). Narrow quartz-feldspar porphyry dykes and minor mafic volcanic rocks are present within the dominantly felsic volcanic sequence. North-trending diabase dykes crosscut all stratigraphy (in purple in Figure 7-2). The volcanic units generally strike at N70°E to N90°E strike with a subvertical dip.

The past producing Kremzar mine is hosted in the lower portion of the Catfish Assemblage (Figure 7-2), within a sequence of massive and pillowed magnesium and iron-rich tholeiitic flows. The mafic flows of the Catfish Assemblage face north and are cut by the Herman Lake nepheline-syenite intrusive complex in orange and the Maskinonge Lake granite in pink in Figure 7-2.

7.3 Alteration and Mineralization

Alteration within the Island Gold deposit is characterized by the presence of silicification, sericitization and carbonatization. Alteration minerals associated with the auriferous quartz veins are white mica, sulphides, quartz, plagioclase, chlorite, Ca-Mg-Fe carbonates, and biotite (Cuifo, 2019). Pyrite content ranges from 1% to 11% in disseminated form and less commonly as millimeter scale discontinuous stringers. Pyrrhotite and chalcopyrite can be present but is uncommon. Alteration minerals which are not associated with the ore body may include tourmaline, apatite, epidote, chloritoid and local garnets in the deeper levels. The alteration occurs primarily in linear south dipping envelopes which can pinch, swell, and vary in thickness between decimeter scale to over 15 m in thickness. There appears to be a gradual change in alteration with depth as silicification becomes more dominant. The alteration envelopes are termed Alteration Package Island in mine geology nomenclature.

The alteration envelopes generally possess a strong degree of deformation. Structural elements such as a deposit-wide strong penetrative foliation, schistosity-shear shear fabrics, boudinaged structures, crenulation cleavage, mylonitization and smaller scale thrust faults are noted to be present throughout the Island Gold Mine.

Quartz veins commonly bear visible gold in the form of aggregates, disseminated fine grains or along chlorite-sericite slickensides within the veins (Jellicoe, 2019). Metallurgical studies indicate that free gold flakes are typically less than 25 microns in diameter. The quartz veins host most of the gold however, the surrounding altered rock within the zone can also host gold mineralization. The degree of veining appears to change at depth, transitioning from a stringer style quartz-carbonate vein on scales between millimeter to larger scale veins which can be over 4 metres in width.

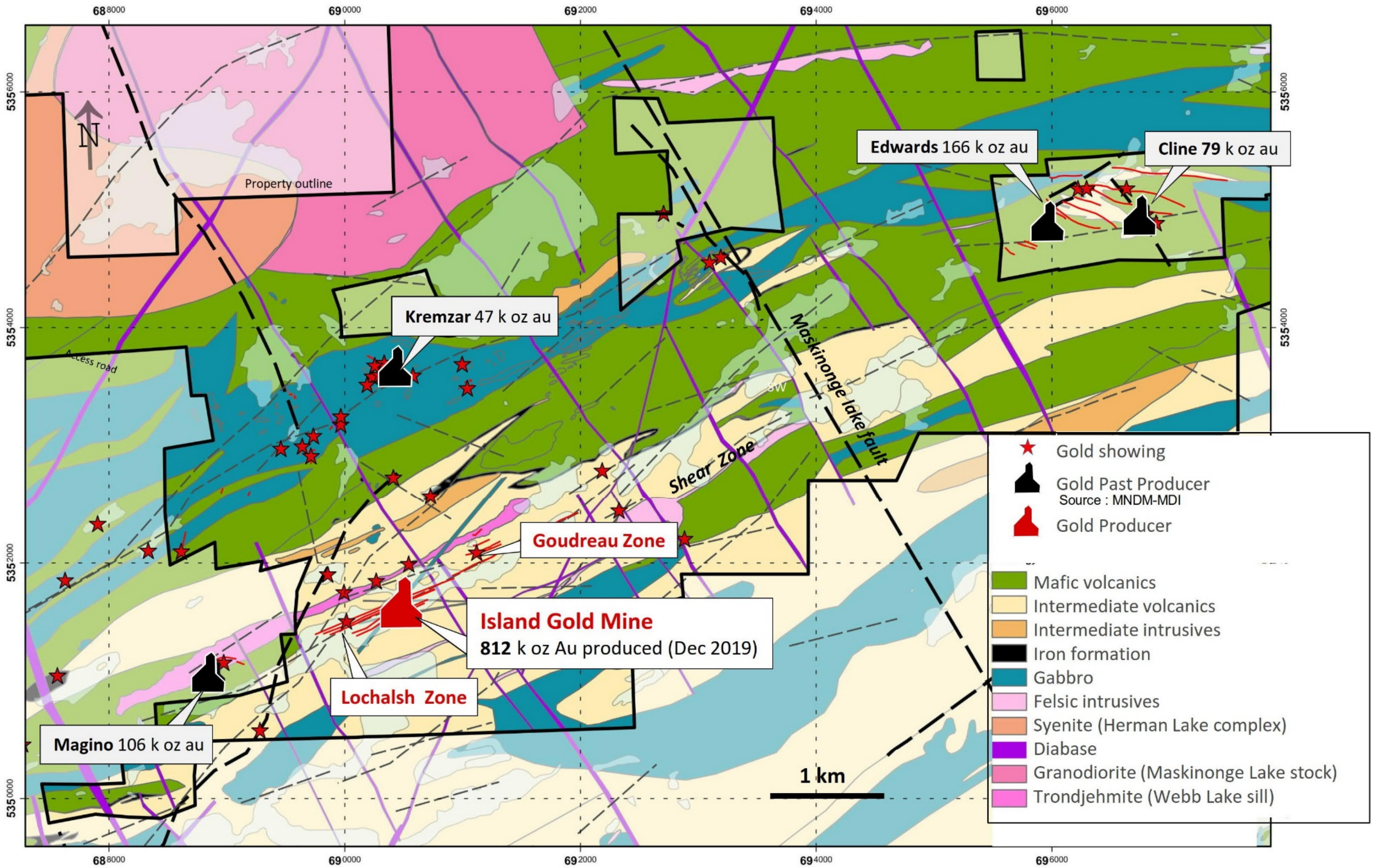


Figure 7-2 Geological Map of the Island Gold Mine Area

Five main types of quartz veining have been observed (Jellicoe, 2019) and are listed below in order of timing from oldest to youngest.

- V_{GD} veins occur exclusively in the Goudreau Domain and their timing relationship to the V1 - V4 veins is unknown. They are subhorizontal extensional veins composed of quartz-carbonate with minor sericite and frequently have tourmaline cores. The veins are often extremely folded and vary in thickness from 1 cm to 40 cm. Visible gold is common and is in the form of nuggets. The gold grade can be discontinuous and varies dramatically through out the vein. The very high grades produced in the Goudreau Domain are derived from the fold noses where the gold is concentrated. These veins have been found to crosscut all units in the Island Gold deposit.
- V1 veins are parallel to foliation and are the dominant auriferous veins. They are smoky grey to milky white in colour and are most often laminated but can be massive. Wall rock strongly altered by sericite, silica and chlorite define the lamination within the quartz veins. The V1 veins are the primary host of visible gold. These veins can be folded, boudinaged or brittlely deformed.
- V2 veins are found with the altered wall rock and range from millimeters to centimeters in thickness. They are discontinuous crack-seal veinlets closely spaced together. Most often they are parallel to the foliation of the ore body and host minor gold associated with pyrite.
- V3 veins occur as boudin necks, extensional veins that crosscut the ore zones and as en echelon veins. They are most often noted within the V1 veins forming a "ladder appearance" within the vein but they may also extend past the vein boundary. The V3 veins are composed of white quartz, tourmaline and carbonate. Typically, they are unmineralized but in some rare cases have produced low grade gold values.
- V4 veins crosscut all other vein sets and established fabrics. They are primarily composed of euhedral tourmaline needles with white quartz. These veins are always barren of gold.

7.4 Island Gold Deposit

The Island Gold deposit is composed of multiple, stacked, south dipping lenses. The mineralized corridor expands from 50 m wide in the upper levels to over 150 m wide at depth. The zone's dip varies from sub-vertical to vertical from -50° to -90° south. Locally, north dip reversals occur but are not common. Rare instances of offset or folding have been seen. Around the 400 metre level there is a shallow dipping southern inflection of the mineralized zones. It is not yet clear if this inflection is related to a fault, a shear zone, or a fold. This inflection point is the division of what is locally referred to as the Upper Island Gold Mine and the Lower Island Gold Mine.

7.4.1 Upper Island Gold Mine

Three main domains are found in the Upper Island Gold Mine, the Upper Island Domain, the Lochalsh Domain, and the Goudreau Domain.

7.4.1.1 *Upper Island Domain*

Five mineralized zones have been recognized in the Upper Island Domain which include, from north to south; E2, E1E, D1, D and C. The relationship between the different zones in their respective domains can be complex, they pinch and swell, merge, and anastomose. The complexities of the zones are well documented by sill development and drilling. Most of the Upper Island Domain has been mined out. This domain also includes part of what is often referred to as Extension 1. A diabase dyke crosscuts the mineralized zones however, there is no offset therefore both sides of the dyke are grouped into the same domain.

7.4.1.2 *Lochalsh Domain*

The Lochalsh Domain has a 450 m strike length between depths of 100 m to 450 m below surface). The geology, mineralization and alteration of the Lochalsh Domain are similar to the Upper Island Domain. Four mineralized zones have been recognized in the Lochalsh Domain which include, from north to south, E2, E1E, D and C.

Drilling between the Upper Island Domain and Lochalsh Domain has shown that the zones reduce in thickness and in grade toward the west of the Island Gold deposit. Drilling at the same easting, lower in elevation, indicates economic mineralization in the area but at deeper levels that fall within the Lower Island Domain.

7.4.1.3 *Goudreau Domain*

The Goudreau Domain is situated between 15,600E and 15,900E approximately 200 m north of the main mine structure which hosts the other domains. There are seven zones in the Goudreau Domain GD2, GD3, GD6, GD7 and GD9 are vertical and GP2 and GP5 are horizontal. The vertical zones are stacked, steeply-dipping to vertical mineralized lenses consisting of quartz-sericite-carbonate-pyrite alteration envelopes and contain high-grade gold in quartz veining.

GP2 and GP5 are interpreted to be very folded flat lying gently east dipping zones which may link the vertical zones. The majority of the gold comes from decametric gold-bearing quartz veins. Alteration surrounding these flat lying zones is limited to a maximum of 0.5 m surrounding the quartz vein or is altogether absent. These veins are hosted within volcanics or a quartz diorite intrusion which they crosscut. The horizontal nature of GP2 and GP5 have been confirmed by mining development.

7.4.2 Lower Island Gold Mine

The majority of the Mineral Resource and Mineral Reserves are within the Lower Island Gold Mine in the Lower Island Domain and Extension 2 Domain.

7.4.2.1 *Lower Island Domain*

Nine mineralized zones have been recognized in the Lower Island Domain, they are, from north to south, E1E, D, D1, C, B, G, GNW, G1 and STH. The Lower Island Domain also includes the lower part of what was often referred to as Extension 1. A diabase dyke crosscuts the mineralized zones however, there is no offset, therefore both sides of the dyke are grouped into the same domain. It is bounded by a north-south trending vertical diabase dyke in the east and is open on the west.

The C zone is the most laterally and vertically continuous of the nine different zones of the Lower Island Domain. It contains by far the most Mineral Resources and Mineral Reserves in this domain and has been successfully mined since 2014. Other zones have been mined with some success but demonstrate significantly less lateral and vertical continuity. Only small portions of the other eight zones form part of the Mineral Reserves, with the remainder categorized as Inferred and Indicated Mineral Resources. The C Zone Mineral Resource currently being mined below the 450 metre level has a larger average width and a higher average grade than what was previously mined in the upper part of the mine. From the 760 metre level to 900 metre level the zone dramatically increases in width and grade. The width reaches a maximum of approximately 15 m with smoky grey quartz veins as large as approximately 5 m in width.

Within the domain is a thick assemblage of intermediate volcanic rocks (crystal tuff, lapilli tuff, ash tuff and possible flows) and often mineralized zones follow the contacts between these units. Mafic dykes/plutons emplaced pre-mineralization are found throughout the mine and can be mineralized but it is rare. Several later mafic dykes of a different composition are present, usually between 0.1 m and 1 m wide and can conform to the stratigraphy and proliferate within the mineralized corridor. A dyke of uncertain composition ranging from 0.3 m to 2 m in width is observed in several locations in the mine and crosscuts the zone but does not seem to offset it.

7.4.2.2 *Extension 2 Domain*

Extension 2 Domain is composed of only one defined zone, the E1E. Other potential zones have been noted in this domain but have yet to demonstrate the continuity laterally or in elevation to be able to confirm their presence. The zone is open at depth and reaches as high as the 100 metre level. On the western limit of this domain is a north-south trending vertical diabase dyke however, it is still open to the east. Extension 2 domain is considered a different domain because the zone is offset approximately 10 to 30 m north from the Lower Island Domain across the diabase dyke. The zone also has differing geological characteristics, such as zone width and grade, from the Island C zone, which affirms the domain division. The E1E zone in Extension 2 Domain host the most Mineral Reserves and Mineral Resources at the Island Gold Mine and it is where most of the underground and surface diamond drilling is focused.

The extent of the E1E is confirmed for 1 km laterally. Above the 840 metre level the economically viable areas of the E1E are concentrated into corridors similar to the Lower Island domain that extend vertically but are rather short laterally. Below the 840 metre level the zone opens to become more laterally extensive and continuous as can be seen by the Mineral Reserve and Mineral Resource block shapes (Figure 7-3).

Alteration is similar between the Lower Island Domain and Extension 2 Domain however, in general there are fewer large veins. Veining above the 840 metre level remains at less than 1 m and more frequently centimeter to decimeter width. Below the 840 metre level in the E1E zone, the mineralized corridor increases in width and increases in the amount of visible gold, grade and quartz veining are observed.

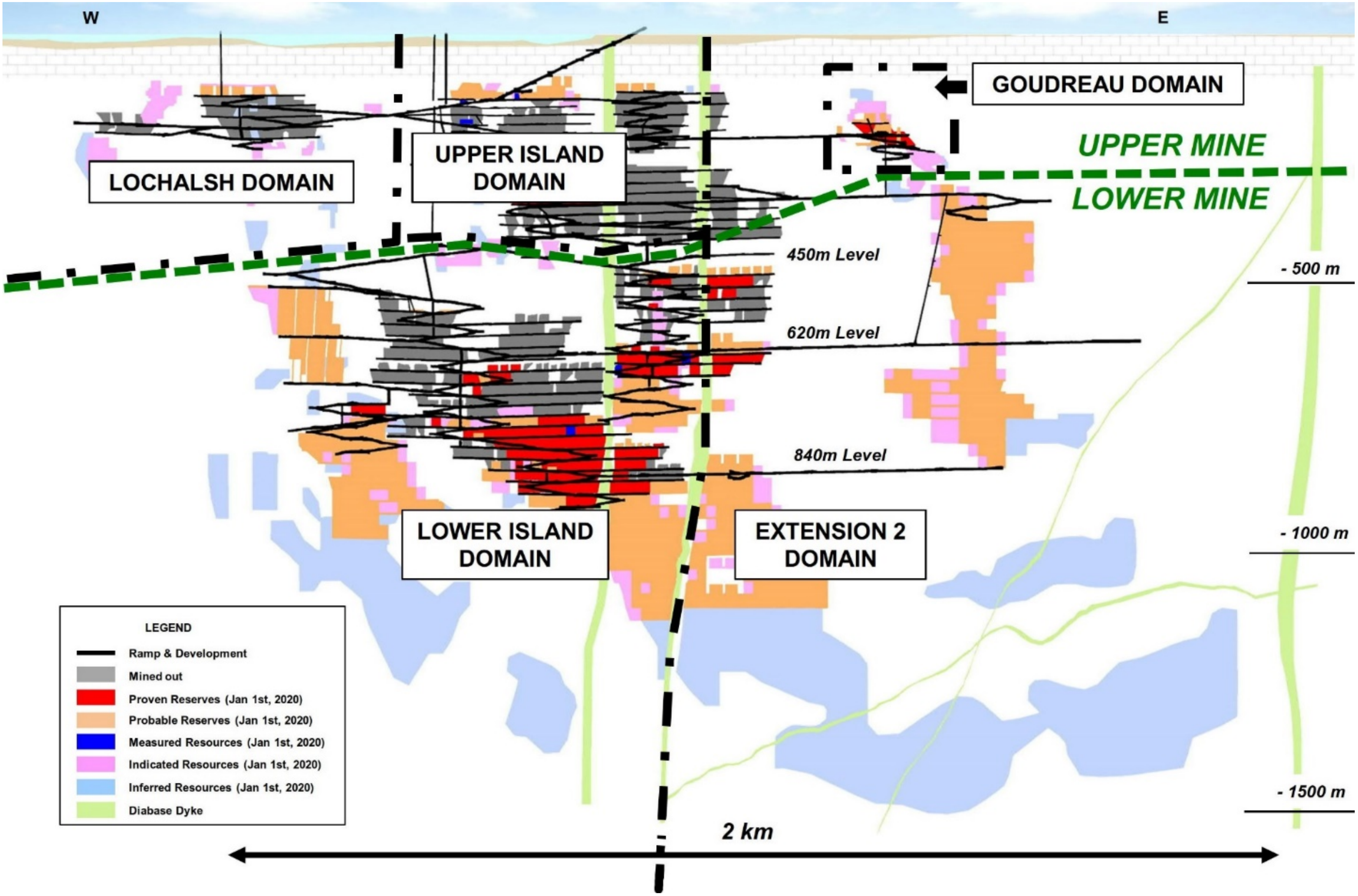


Figure 7-3 View of Domains and Mineral Resources and Reserves with Existing Infrastructure

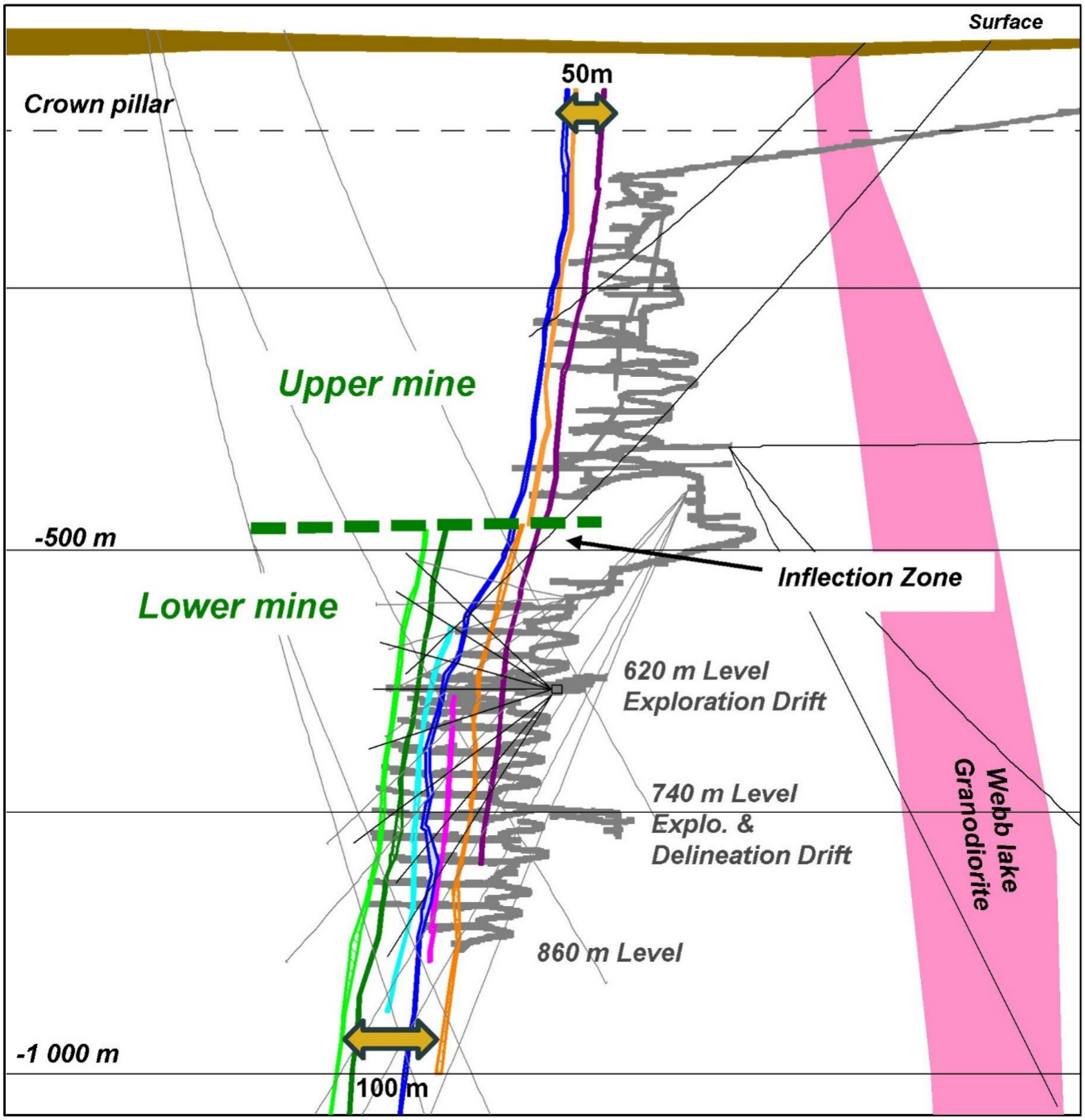


Figure 7-4 Section Showing the Inflection to the South of Mineralized Zones

7.5 Other Gold Zones

Several other gold zones and occurrences are the property area. These are described below.

7.5.1 North Shear Zone

The North Shear Zone is generally located along the northern contact of the Webb Lake Granodiorite Sill and has been traced over a 1 km strike length between sections 14,200E and 15,300E and continuing to a depth of 350 m below surface. The North Shear structure is marked by a persistent brittle to ductile deformation which dips from -75° to -80° north. The zone contains en-echelon quartz-tourmaline stringer veining, stockwork quartz which occurs within highly strained and crenulated felsic volcanic and Webb Lake granodiorite sill host rocks. Alteration is characterized by strong silicification, sericitization and pyritization. The gold mineralization is hosted in chlorite-quartz-tourmaline stringer and stockwork veining containing visible gold, minor pyrite, and trace chalcopyrite. Mineralized zones can be up to 25 m wide in places. In 2005, the 140 Level vent drift development cut through the North Shear. The shear is observed dipping 65° to 70° north and is believed to follow the contact between the Webb Lake Granodiorite Sill and a massive feldspar porphyry unit.

In 2004, the Mineral Resource estimate of the North Shear zone is sited as 229,000 tonnes at 6.57 g/t Au totaling 48,429 ounces of gold (5 g/t Au cut-off) in the NI 43-101 RPA technical report on the Island Deposit (RPA, 2004).

7.5.2 Zone 21

In April 1997, Patricia intersected a series of gold-bearing, white quartz veins in drill hole PL-21 at a vertical depth of 250 m. The intersection averaged 52.2 g/t Au over 19 m with erratically distributed values and visible gold within a highly schisted chloritized dioritic intrusive rock. The veins exhibit a low core angle and may trend northeast. The drill hole is located approximately 300 m north of the Lochalsh Zone. The very high-grade results were followed up by additional drilling nearby, which did not succeed in defining the structure geometry of the high-grade veins.

7.5.3 Kremzar Mine Property

The Kremzar Deposit occurs 1,200 m to the north of the GLDZ on a northwest-trending fault structure at 120° azimuth that dips at -75° to the southwest in what has previously been termed the northern splay of the GLDZ on the mine property. The Kremzar Mine, which was in production from 1988 to 1990, produced 306,000 tonnes at a grade of 4.8 g/t totaling 47,000 ounces of gold. A historic Mineral Reserve at the time of mine closing estimated a Proven and Probable Mineral Reserve of 181,944 tonnes at a grade of 6.27 g/t Au (non NI 43-101 compliant). *These "Mineral Resources" are historical in nature and should not be relied upon. Additionally, assumptions used to determine cut-off grades are likely to have changed since the estimate was done. Consequently, these "Mineral Resources" cannot be considered as current. They are included in this section for illustrative purposes only and should not be disclosed out of context.*

The alteration style of the Kremzar zones is characterized by strong envelopes of biotitization, carbonatization and silicification in widths from 1 m to 3 m. Mineralization within the envelopes ranges generally from 2% to 5% disseminated pyrite/pyrrhotite. Quartz carbonate vein development is present as grey blueish cherty bands, sinuous lenses and broad pervasive silicification. The cherty bands can also extend into the footwall and hanging wall. Fourteen other historic mineralized zones (circa 1930) occur along this trend developing at or near the southern contact of an east-west trending gabbroic sill. Drilling in 2016 indicated that gold extends at deeper levels below the Kremzar Mine as a zone grading 9.71 g/t Au over 8 m was intersected in drill hole KZ-16-02 approximately 600 m below surface.

7.5.4 Portal Zone

In the collar of the Island Gold ramp, a series of east-west-striking quartz-ankerite veins were encountered in 2017. This area was named the Portal Zone. Locally, these veins assayed up to 20 g/t Au over 1 m and averaged 4.0 g/t Au over 11 m in ramp wall samples. A series of four short holes totaling 1,227 m were drilled along strike to the east and west of the ramp portal without extending the zone.

7.5.5 Portage Showing

The Portage showing occurs along the Bearpaw Lake portage and consists of a series of quartz veins which occur within deformed sericitic altered felsic tuffs. Quartz veins are present along the stream bed as well as in nearby trenches dating back to the 1920's and 1930's. Grab samples have averaged 2.3 g/t Au in past sampling. Limited shallow drilling to the north and northeast of the zone under Pine Lake encountered only weak alteration structures and negligible gold values. Canamax drilling encountered gold in the immediate area. Drill hole 061-02-23 east of north Bearpaw Lake intersected 95.9 g/t Au over 1.4 m, drill hole 061-03-24 intersected 9.9 g/t Au over 0.6 m north of Pine Lake in Jacobson Township and drill hole 061-02-66 intersected 1.7 g/t Au over 0.7 m.

7.5.6 Pine Zone and Breccia Zone

The Pine Zone and the Breccia Zone are located north-east of Bearpaw Lake in Jacobson Township and adjacent and east of the Maskinonge Lake Fault (MLF). The MLF a major structure trending north to northwest at 320˚ azimuth with a geophysical inferred sinistral strike slip movement of over a kilometer.

The Pine Zone is a folded sulphide-oxide iron formation which is part of the Goudreau Iron Range. It contains gold proximal to the MLF. Surface trenching and a 21 drill hole program have defined a small tonnage of sub-economic gold mineralization. Estimates in an internal Patricia report that the Pine zone contains a Mineral Resource of 70,000 tonnes at a grade of 7 g/t Au for a total of 14,293 ounces. *These "Mineral Resources" are historical in nature and should not be relied upon. Additionally, assumptions used to determine cut-off grades are likely to have changed since they were done. Consequently, these "Mineral Resources" cannot be considered as current. They are included in this section for illustrative purposes only and should not be disclosed out of context.*

The Breccia Zone is a silicic fault breccia to quartz stockwork zone which crosscuts the stratigraphy at right angles and can be traced over several kilometres along the MLF. Limited drilling on the showing has encountered 6.0 g/t Au over 1 m.

7.5.7 Morrison Number One Zone

The Morrison #1 iron deposit is an oxide-sulphide-carbonate iron formation which is part of the larger Goudreau Iron Range. In 1985, Canamax drilled a short four hole program totaling 375 m with the best gold value being 18.7 g/t Au over 1 m. In 1954, Algoma drilled a hole that returned 2.7 g/t Au over 30.5 m. Gold mineralization is related to quartz-carbonate fracture fillings within the carbonate facies of the iron formation in a hinge zone of a tight Z fold. An historic Algoma Mineral Resource calculation estimated the Morrison #1 zone to contain 541,000 tonnes at a grade of 1.59 g/t Au for a total of 30,360 ounces. *These "Mineral Resources" are historical in nature and should not be relied upon. Additionally, assumptions used to determine cut-off grades are likely to have changed since they were done. Consequently, these "Mineral Resources" cannot be considered as current. They are included in this section for illustrative purposes only and should not be disclosed out of context.*

8 DEPOSIT TYPES

The Island Gold Mine is an Archean orogenic lode gold deposit. It is a structurally hosted quartz-carbonate vein system situated within the Goudreau Lake Deformation Zone ("GLDZ"), a major regional brittle-ductile structure. The host terrane is a sequence of felsic to intermediate volcanic rocks of the Wawa Assemblage which are in the greenschist metamorphic range as is common for this type of deposit. High strain zones associated with the GLDZ have the tendency to develop at variable scales along lithologic unit contacts where complex geology and related competency contrasts can control stress patterns and facilitate shearing and the consequent development of dilatancy zones and concomitant quartz carbonate vein formation. It is generally accepted that these Archean orogenic lode gold deposits are related to compressional and transpressional tectonics and the associated metamorphic dewatering and devolatization of magma processes from which the gold bearing fluids are derived.

Gold mineralization in the Goudreau-Lochalsh area is not restricted to any rock type with the general exception of the late intruding north-west trending Matachewan diabase dykes which show no evidence of mineralization. Deposits may be hosted by one or several rock types, with past-producing mines and numerous other gold occurrences in the area exhibiting a close spatial association with felsic, intermediate, and even mafic intrusive rocks. East of the Island Gold Mine, in Jacobson Township, the past producing Edwards and Cline Lake gold mines are associated with felsic intrusive complexes and dykes. The past producing Magino Mine to the immediate west of the Island Gold property is hosted by the Webb Lake stock, a trondhjemite intrusive. The past producing Kremzar Mine, located on the Island Gold property, is hosted by a regional gabbroic sill.

Mineralization in the Goudreau Camp occurs along a 30 kilometre strike length of the GLDZ which transects the Island Gold property area in a roughly east-west direction. The GLDZ is a major regional deformation structure and it is believed to be the main control on gold mineralization for the area. The GLDZ and subsidiary splays have been subdivided into four structural domains (Southern, Northern, Eastern and Western) based on the style of deformation, lineation patterns, and the orientation and sense of shear displacement on sets of shear zones. The Island Gold mine mineralized zones are within the Southern domain of the GLDZ (Heather and Arias 1992). Most mineralization in this domain is hosted by quartz veining and/or shear zones with an orientation of 075°. The zones with this orientation are roughly parallel with the overall deformation zone and are considered to have formed along shear planes related to the dextral oblique slip movement of the GLDZ.

Typical alteration mineralogy associated with gold deposits of the Goudreau Camp includes variable amounts of carbonatization (Fe-carbonate ± calcite), silicification, sulphidization, biotitization, sericitization, feldspathization, and chloritization. Deposits and gold occurrences with a felsic rock association are generally associated with a quartz-sericite-pyrite ± pyrrhotite alteration package. Deposits and occurrences hosted by mafic host rocks, such as the Kremzar Mine and the historic showings along this trend are generally altered to biotite, Fe-carbonate, pyrrhotite ± pyrite, quartz, and minor K-feldspar. Chloritization is common throughout the belt. Gold presence in the Goudreau-Lochalsh area is primarily associated quartz stringers, fracture fillings and veins. Gold can be associated with pyrite disseminated in alteration envelopes but generally only in low grade levels.

9 EXPLORATION

9.1 Introduction

The deep directional diamond drilling program started in October 2015 and, at the end of 2019, a total of 132,917 metres were completed from underground diamond drilling and 225,190 metres were completed from surface diamond drilling (Table 9-1).

The underground and surface exploration programs have added since 2015 close to 2.3 million ounces of gold to the mineral inventory, net of depletion. Measured and Indicated Mineral Resources increased by 112,000 ounces of gold, Inferred Mineral Resources increased by 1,530,000 ounces of gold and Mineral Reserves increase by 653,000 ounces of gold in the five year period. This includes the addition of nearly one million ounces of Mineral Reserves and Mineral Resources through the 2019 exploration program. The exploration cost has been approximately $25 per ounce during this period.

The results of these programs up to December 31st, 2019 were used in the December 31, 2019 Mineral Resources estimate and have been incorporated into the Phase III Expansion Study. Drilling results have also been published on a regular basis since 2016 in press releases available on SEDAR.

Table 9-1 2015 – 2019 Summary of Diamond Drilling

Type of Diamond Drilling	2015 (metres)	2016 (metres)	2017 (metres)	2018 (metres)	2019 (metres)	Total (metres)
U/G Exploration	23,552	28,712	30,813	25,378	24,462	**132,917**
Surface Exploration	14,306	54,399	51,152	57,725	47,608	**225,190**
TOTAL	**37,858**	**83,111**	**81,965**	**83,103**	**72,070**	**358,107**

9.2 2020 Exploration Drilling program

Exploration activities at Island Gold remain focused on continuing to define new near mine Mineral Resources. Exploration drilling programs at Island Gold were temporarily suspended on March 25, 2020 given the COVID-19 pandemic; however, drilling began ramping back up in May, with four underground diamond drill rigs in operating including two focused on underground directional drilling. The surface directional diamond drilling program resumed in early June with three drill rigs in operation.

A total of 11,886 m of surface directional diamond drilling and 9,169 m of underground exploration diamond drilling, from 620 and 840 Level exploration drifts, has been completed as of June 30, 2020 (Alamos Press Release, dated July 13th, 2020). Highlights from the 2020 exploration drilling program (Figure 9-1and Table 9-2) include:

- 44.30 g/t Au (44.30 g/t cut) over 2.25 m (MH21-04);
- 25.41 g/t Au (23.07 g/t cut) over 5.58 m (MH22-04);
- 29.05 g/t Au (26.67 g/t cut) over 4.86 m (620-MH2-01);
- 21.30 g/t Au (15.52 g/t cut) over 2.24 m (620-616-02);
- 18.72 g/t Au (16.44 g/t cut) over 3.64 m (620-616-07);
- 52.10 g/t Au (22.54 g/t cut) over 10.31 m (840-566-01);
- 21.01 g/t Au (21.01 g/t cut) over 4.26 m (840-566-06); and

- 31.19 g/t Au (31.19 g/t cut) over 2.22 m (840-572-02).

This continues to confirm the E1E Zone extends vertically over 1.2 km, between a depth of 300 m and 1,500 m in the eastern part of the Island Gold deposit.

The results of the 2020 diamond drilling exploration program were not included to the Mineral Resources used for the Phase III Expansion Study.

Table 9-2 Diamond Drilling Highlights Results – 2020 Exploration Program

Hole ID	Zone	Domain	From (m)	To (m)	Core Length (m)	True Width (m)	Au Uncut (g/t)	Au Cut (g/t)	Vertical Depth (m)
MH22-04	C	Lower Island	1531.50	1546.40	14.90	5.58	25.41	23.07	1377
MH21-04	D1	Lower Island	1299.00	1311.50	12.50	11.26	4.03	3.10	1120
MH25-01	D1	Lower Island	1570.20	1576.50	6.30	6.08	3.82	3.82	1296
MH20-04	E1E	Lower Island	1174.70	1180.72	6.02	4.45	3.33	3.33	1111
MH20-05	E1E	Extension 2	1141.80	1145.80	4.00	3.73	4.22	4.22	1056
MH21-04	E1E	Lower Island	1288.70	1291.20	2.50	2.25	44.30	44.30	1108
MH21-05	E1E	Lower Island	1280.60	1283.85	3.25	3.19	3.90	3.90	1079
MH23-01	E1E	Extension 2	1077.00	1079.40	2.40	2.09	10.98	10.98	1000
620-610-26	E1E	Extension 2	318.60	333.70	15.10	6.30	8.41	8.41	808
620-616-01	E1E	Extension 2	143.00	148.00	5.00	2.94	6.28	6.28	641
620-616-02	E1E	Extension 2	267.00	273.40	6.40	2.24	21.30	15.52	751
620-616-04	E1E	Extension 2	79.06	83.10	4.04	3.83	8.15	8.15	561
620-616-07	E1E	Extension 2	79.40	83.32	3.92	3.64	18.72	16.44	532
620-MH2-01	E1E	Extension 2	806.20	812.20	6.00	4.86	29.05	26.67	1177
840-566-01	E1E	Lower Island	291.75	310.20	18.45	10.31	52.10	22.54	1041
840-566-02	E1E	Extension 2	260.35	264.75	4.40	2.36	13.53	13.53	1002
840-566-05	E1E	Extension 2	176.10	185.50	9.40	7.96	4.48	4.48	880
840-566-06	E1E	Lower Island	154.20	159.90	5.70	4.26	21.01	21.01	842
840-566-07	E1E	Lower Island	283.50	292.60	9.10	3.73	6.90	6.90	1028
840-572-02	E1E	Lower Island	293.30	297.65	4.35	2.22	31.19	31.19	1032
620-610-26	Unknown	Extension 2	101.60	110.20	8.60	?	3.90	3.90	664
620-MH2-01	Unknown	Extension 2	759.90	762.65	2.75	?	40.34	40.34	1164
840-572-03	Unknown	Lower Island	200.00	202.20	2.20	?	6.33	6.33	915

Notes:

- *Composite intervals greater than 3 g/t Au weighted average, capping values:*
  - *Lower Island Domain@ 225 g/t Au;*
  - *Extenson 2 Domain @ 160 g/t Au.*
- *Unknown zone corresponds to gold intercepts outside known ore zones and for which continuity is not yet established and therefore true width has not been calculated.*
- *These exploitation results were not included in Mineral Resources used for the Phase III Expansion Study.*

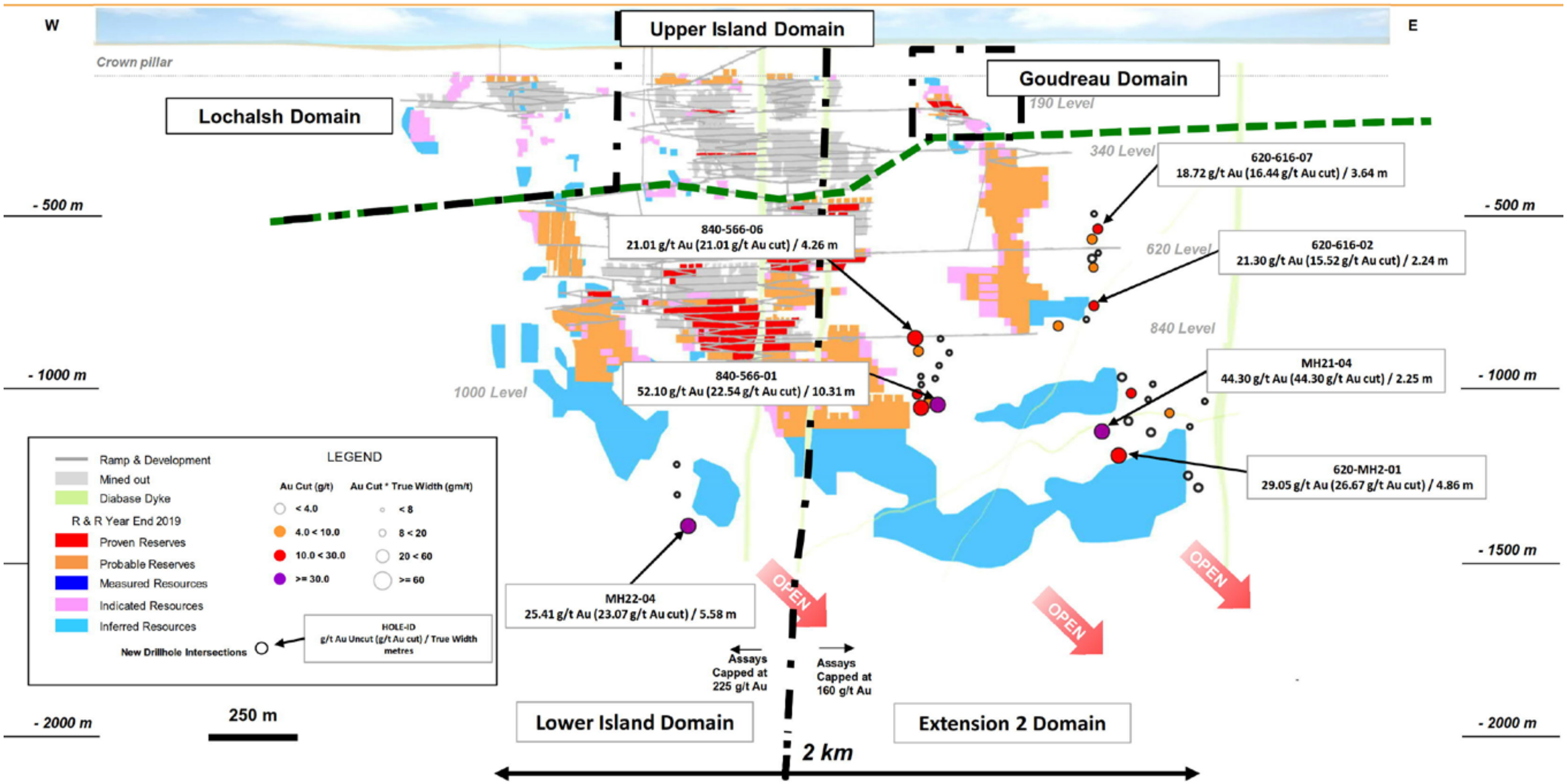


Figure 9-1 **Diamond Drilling Highlights Results – 2020 Exploration Program**

10 DRILLING

10.1 Methodology and Planning

Drill hole planning begins by marking targets on longitudinal sections of the targeted zone. Cross sections are used to confirm the positioning of the drill targets and to ensure that the drilling can be executed safely without intersecting mine infrastructure.

An optimal drilling pattern of 20 m by 20 m hole spacing is sought during the planning of the delineation-definition drilling. The pattern can be decreased to 10 m by 15 m in geologically complex areas. A 50 m to 100 m spacing pattern is used for the first phase of exploration drilling in new sectors. Diamond drill holes are planned to intersect all the known zones. Holes are stopped 20 m to 30 m after the last mineralized zone are crossed.

10.2 Drill Hole Mark Up

For underground drill holes, back and foresight marks are indicated on drift walls by using a Leica Total Station surveying instrument. The drilling contractor sets the diamond drill onto the collar and aligns the drill along a string tied taut between the front and back sight pads. The dip of the drill is determined with an inclinometer. Surface drill hole locations are found and marked by using a GPS. The drill is aligned by using a compass or the Leica GPS.

10.3 Collar Surveying

Island Gold employees use a Leica Global Positioning System to survey surface collar locations. Drill hole coordinates are recorded in the local grid system of the Island Gold Mine which is rotated 22° to the west from the geographic north.

Most of the underground diamond drill holes from 2005 to 2009, and all the drill holes since 2009 have had their collar surveyed. Surveying of underground drill holes was performed by Island Gold surveyors using a Leica Total Station. The drill hole collar surveys are recorded in the drill hole database.

10.4 Down-Hole Surveying

Since 2009, underground drilling uses a 3-m hexagonal core barrel in combination with a 10-inch or 18-inch stabilizing shell. Single shot Reflex down-hole survey measurements start at 15 m from the collar and are carried out at every 30 m thereafter along the hole. An additional Reflex multi-shot survey is carried out upon completion of the hole over the entire length of the hole. All measurements are converted to the Island Gold Mine grid.

In 2013, down-hole surveys for a series of holes drilled into the Island Lower C Zone between the two major dykes had to be carried out with a gyroscope, because the high magnetism encountered in one of the two dykes disrupted the Reflex survey.

Surface exploration holes have used Reflex or a gyro to survey the hole. Surface directional drilling holes use a north seeking gyro and a PeeWee survey tool when drilling the cut. Measurements are taken every 30 m in surface holes.

10.5 Cementing of Drill Holes

Diamond drill holes are grouted at the collar once they are completed or abandoned. Cementation of drill holes is recorded in the database. Fifteen sticks of cement are used to cement the collar of underground holes. If the hole has intersected water, then a grout pump is used to pump cement into the hole until the water stops. Surface drill holes for the exploration directional drilling program are cemented from the bottom of the hole until 100 m above the expected zone. Many surface exploration holes which are not immediately adjacent to the mine were left uncemented to provide an option for re-entry if desired or to complete downhole televiewer or geophysical surveys.

10.6 Drill Core Logging

Core logging is carried out by professional geologists or geologists in training under the supervision of the Qualified Person. Geovia's Gemcom DDH Logger data entry software was used from 2004 to 2019. Island Gold transitioned to Acquire Logging in April 2019. Older paper logs were entered into the digital database manually and the old Patricia database was merged with the current one. The data entries follow a pre-established structure with consistent lithology codes and structural descriptions, creating uniformity in the geological description. With the Acquire logging program mandatory data such as lithology, sample lengths etc. are required fields that if not completed will alert the user and halt any further progress until the mandatory information is entered.

The drill hole database is managed using Acquire GIM Suite 4.0.3. All the Island Gold Mine drill holes are contained within one database. As of December 31, 2019, the database contained 6,411 holes totaling 1,363,350 m of surface and underground diamond drilling. Several surface holes were drilled prior to 1985 in programs coordinated by Canamax and previous owners. The remainder were drilled in later programs managed by Patricia, Richmont, and lastly by Alamos.

A total of 831 holes representing 549,287 m have been drilled from surface and 5,580 holes totaling 814,063 m have been drilled from underground at the Island Gold Mine. Underground drill holes are drilled from north to south because the mine infrastructure is in the footwall of the mineralized zone. Surface drill holes are drilled from south to north to drill perpendicular to the south dipping zones.

10.7 Geology and Analysis

Under the direct supervision of Qualified Persons, geologists prepare a detailed description of the drill core. A computerized log is entered for each drill hole with the following basic information:

- collar location;
- down hole surveys;
- rock quality designation (RQD);
- main and secondary geological units;
- texture and structure;
- mineralization and alteration: mineralogy, thickness, type;
- sample location; and
- core photos.

The length and limits of core samples are defined by the geology: (*i.e.*, geological unit, alteration package, mineralized zone and deformation zone). In the case of exploration holes, the sampled intervals are sawed in two along the core length to keep half of the core on site as a reference sample. Since 2016, several definition and delineation holes are drilled from the same drill bays, one in five holes of these holes is sawn in two, with one half being kept as reference. For the four other holes, the entire core of mineralized zones is sent to the laboratory and the remaining non-mineralized core is discarded.

Assay results are plotted on sections and level plans at the appropriate scale. Nomenclature and symbols for the geological units follow an in-house legend which is modified from the legend prepared by the *Ministère de l'Énergie et des Ressources naturelles du Québec*. Horizontal thickness and true thickness of drill hole intercepts (composites) are computed in the GEMS software. True thickness and grade of composites are plotted on the vertical longitudinal sections.

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

The Mineral Resource and Mineral Reserve estimates as of December 31, 2019 are supported by both diamond drill hole samples and underground chip sampling. Other sample types, including muck samples (rock fragments collected after an underground blast) and test holes (sludge from jack-leg drilling), help guide production decisions, but are not used in Mineral Resource estimates. The assays for these sample types are not discussed further in this report as the results do not impact Mineral Resource estimates.

Diamond drilling samples are sent to Laboratoire Expert Inc. ("Lab Expert") located in Rouyn-Noranda, Quebec, and a small portion to the Wesdome Gold Mines Inc. ("Wesdome") laboratory in Wawa, Ontario. All production samples (chip, mucks, and test-holes) were sent exclusively to the Wesdome laboratory. Sample volumes for 2019 are summarized in Table 11-1. Activation Laboratories Ltd. ("Actlabs") is only utilized for QA-QC pulp check assays.

Table 11-1 Island Gold Mine – 2019 Sample Volume

Sample Type	**Lab Expert**	**Actlabs** (Pulps)	**Wesdome**
Drill Core	45,302	698	78
Underground Chips		361	2,642
Mucks			12,538
Test Hole Sludges			487

Notes:

- *Assays that were added since the last Mineral Resource estimation December 1st, 2018 to December 1st, 2019.*
- *Includes pulps and rejects submitted for check assays.*

11.1 Core Sampling and Collection

11.1.1 Drill Core Sampling

Intervals of core to be sampled for analysis are marked by the geologist. Sampling is done over the mineralized section along regular intervals. The sample lengths vary from 0.3 m to 1.5 m. When present, lithological boundaries such as geological units or alterations limit the sample intervals. Sample positions are identified on the core by the geologist while logging and sample tags are placed under the core in the core boxes at the end of each sample. Sample intervals, sample numbers, standards and blanks are manually entered into the database by Island Gold personnel.

Core recovery is considered excellent and is generally close to 100%. Very minor isolated centimetre-scale fault gouge and blocky core can be identified but do not impact the reliability of the analytical results of drill core samples.

The core is cut into two halves by the core shack technician using an electrical core saw equipped with a diamond tipped blade. For all of the surface drilling and approximately 20% of the definition and delineation drilling one half of the core is placed into a sample plastic bag for assaying, and the remaining half of the core is returned to the core box for future reference. For approximately 80% of the combined definition and delineation drill holes, the entire core is placed in the sample plastic bag. Island Gold routinely inserts quality control samples and tracks sample shipments to the commercial laboratories.

11.1.2 Core Size

The majority of the underground diamond drill holes were carried out using either BQ size coring with a small proportion being NQ or AQTK size. NQ size core is used for all surface drilling except when steering the directional drill holes, this is BQ size.

11.1.3 Core Storage

The core is stored outdoors in covered racks or as separate cross-piles on the mine site. The reference portions of the drill core were stored and catalogued for future reference purposes in the core library located at the Island Gold Mine site.

11.2 Chip Sample Collection

The chip sampling method consists of taking horizontal representative samples of the exposed ore zone either from the drift face or from the adjacent walls. The geological technician or the geologist takes a 1.5 to 2 kg sample which is chipped with a hammer horizontally across geological units on a 0.3 m to 1.0 m distance. The sampler notes the location and the lithology of each chip sample. Assays are then entered into a Promine module on the AutoCAD Software, and then transferred into the Gemcom software.

11.3 Laboratory Procedures

Most drill core samples are prepared and assayed by Lab Expert in Rouyn-Noranda, Quebec, which has been operating a fire assay laboratory for over 20 years. A small portion of the definition drill core as well as all underground production samples are assayed at the Wesdome laboratory, in Wawa, Ontario. This laboratory also processes assay samples from Wesdome’s Eagle River Mine.

Pulps and occasionally drill core are sent to Actlabs in Thunder Bay, Ontario. Actlabs is headquartered in Ancaster, Ontario. Actlabs is ISO/IEC 17025 accredited and has maintained its Certificate of Laboratory Proficiency for over 10 years.

The laboratories use industry-standard sample preparation and assay methods that are summarized in Table 11-2.

Table 11-2 Summary of Preparation and Assay Methods

Analyses	Lab Expert	Actlabs	Wesdome
Crushing	80% - 2mm	80% -2mm	Approx. 1/4 inch
Splitting	300 g	350 g	150 to 300 g
Pulverizing	90% -200 mesh	95% -105 microns	~90% at 200 mesh (not measured)
Gold by Fire Assay -sample weight	1 assay-ton (29.16 g)	30 g	30 g
-finish	AA to 10 g/t; Detection limit: 5 ppb	AA to 3.75 g/t; Detection limit: 5 ppb	-
	Gravimetric finish > 6.8 g/t Au[1]	Gravimetric finish >3.75 g/t Au	Gravimetric finish; detection limit 0.04 g/t Au
Internal Quality Control	Rigorous (>10%)	Rigorous (>10%; to ISO standards)	5 to 10% (reliance on duplicates)

Notes:

1. *Lab Expert prepared a second pulp of high grade samples and assayed by FA with a gravimetric finish.*

All the laboratories mentioned have internal quality control (QC) programs that include insertion of reagent blanks, reference materials, and pulp duplicates. Actlabs also routinely participates in international round robins, monitors preparation of duplicates and maintains measurement systems as required by ISO 17025 accreditation. As typical of mining laboratories, Wesdome does not include QC materials with muck and test hole samples, and in general their QC protocols are less rigorous than those of commercial laboratories.

11.4 Security

Security personnel control access to the mine site at all times. Individual sample bags are sealed with zip ties. The samples are placed in large Fabrene bags identified and sealed before being placed on pallets. The core samples are picked-up and delivered to Lab Expert via transportation companies. The samples being sent to Wesdome Lab are bagged in the same manner and are delivered to the lab daily by an Island Gold employee. Both labs provide a letter upon reception of the samples detailing the shipment they received.

11.5 Database Security

The database which contains all diamond drilling assays, logging and surveys is stored on the Alamos private network which can only be accessed by employees. In 2016 the database was changed from a Microsoft Access database to a structured query language database (SQL) for improved security. Additional restrictions were put in place to limit the number of employees who have access to the database. Security groups are used to limit individuals to parts of the database that is needed for their work. Access must be granted by a supervisor in the Geology Department.

Sample intervals, sample numbers, standards and blanks are manually entered into the database by Island Gold Mine personnel. Once the assays are completed, they are sent via email to a list of Island Gold Mine personnel. They are received in an excel sheet directly from the lab and are uploaded electronically into the database by an in-house program. Automatically the assays are matched to the sample numbers in the database with no manual entry required. Standards and blanks are checked by the program and alert the user if they fall outside the 10% allowed variation. The user then must choose how to proceed with the batch of assays in one of several ways: ask to re-assay the batch, accept the batch after speaking to the lab or accept it. All actions taken are recorded in the database.

11.6 2019 Island Gold Internal Quality Assurance and Quality Control Program (QA-QC)

Alamos maintains an internal QA-QC program at the Island Gold Mine which is used to validate core and production chip assay analyses. Certified Reference Materials (CRMs) are purchased from Rocklabs (New Zealand) or from Ore Research & Exploration ("Oreas") (Australia) and inserted with diamond drill core samples at a rate of 1 in 25 samples. In-house blank material is inserted in the core sample stream at a rate of 1 in 25 samples. The blanks consist of washed and cleaned diabase dyke core which is drilled from the Island Gold property.

Visible gold diamond drill core samples are shipped separately from the regular samples. One high grade standard and one blank are added to the shipment. This is done with the intent of minimizing the contamination by the visible gold samples to the other samples if they were kept in the same sample stream. The separate visible gold batch also indicates to the lab to take extra care to clean the crushers, pulverisers, and splitters diligently between samples.

In spring of 2019, the Island Gold QA/QC used for the Wesdome laboratory was improved based on the recommendations of ASL. Improvements include the insertion of blank material after high grade samples with an elevated tolerance, a minimum of 1 CRM every 25 chips or every outgoing shipment of chip samples, CRMs must have a grade higher than 4g/t which is the economic cut-off and flagging the sample bags containing visible gold. The insertion of blanks after high grade chip samples was implemented to determine if the lab was cleaning the machines adequately between samples. These changes have been an overall improvement of the QA/QC program which previously required only 1 CRM inserted in every shipment regardless of how many samples were being shipped.

In 2019, twelve CRMs with different gold grades were used for the QA-QC program. The CRMs' grades range from 1.58 g/t Au to 30.87 g/t Au and reflect expected gold grades within the mineralization found at the Island Gold deposit. The CRM used by Island Gold from Rocklabs consists of feldspar, basalt and iron pyrite mixed with fine gold. The CRM from Oreas is from orogenic lode gold deposits with primary gold and the matrix is greenstone. These CRMs have a similar composition to Island Gold mineralized zones that are mostly siliceous and pyritic rocks.

The criteria used by Island Gold to consider whether results are acceptable are based on a 5% standard deviation from the expected value.

A summary of results from the graphic data is presented in Table 11-3 for all labs used by Island Gold in 2019.

11.6.1 Laboratory Performance Based on Certified Reference Materials (2019)

During 2019 a total of 1,725 CRMs were analyzed by Lab Expert and used for statistics. Mislabelled samples have been excluded. Lab Expert assays demonstrated good accuracy with the weighted average of the observed values of the 12 different CRM values falling between 98.3% and 101.5% of the expected value, with an average of 99.8%. A small number of QC failures triggered requests for re-assaying of the affected sample batch. Based on the insertion of CRMs as part of the QA-QC program, Lab Expert's accuracy provided acceptable results for the Mineral Resource and Mineral Reserve estimates prepared for 2019.

A total of 202 CRMs were submitted to Wesdome in 2019 and retained for statistics. Ten different CRMs were analyzed by Wesdome with the weighted average of the observed values being between 97.0% and 107.5% of the expected value, with an average of 101.6%. The Wesdome Lab demonstrated some deficiencies in their assaying with a failure rate at 20%. However, there is no strong bias identified and the values of assays for chip samples are judged suitable for purposes of production and considered acceptable for grade interpolation.

In 2019 a total of 19 CRMs were submitted and analyzed by Actlabs or about 1% of the total number of CRMs submitted to Island Gold laboratories. CRM performance at Actlabs indicates a good degree of accuracy with the weighted average of the observed values, being between 99.3% and 100.8% of the expected value, with an average of 99.9%.

Actlabs has been used as a secondary laboratory to do pulp check assays and has provided reliable assay data for the rechecking program.

11.6.2 Blanks

Field blanks were included in the 2019 Island Gold drill program to monitor possible contamination during the sample preparation and analytical process. The field blank material used by Island Gold is made with drill core that has transected the Matachewan diabase dyke located on the mine property. Testing of the diabase dyke has indicated that the material is suitable as blank material. The blank is carefully selected to not include any veins, mineralization, or inclusions. Each submitted blank of cut core is washed and bagged before use. When new batches of blanks are prepared several samples are taken for assay to ensure the material is still acceptable. A blank is inserted at a rate of 1 in 25 samples. Assays higher than 10% the laboratory's detection limit are considered as failures.

The 2019 Island Gold chip program has been improved with inserting same diabase dyke unit as field blanks. These blanks are chip samples from underground exposures of the diabase dyke. Blank assays with a value between 0.5ppm and 1ppm should be evaluated before being accepted or re-assayed. Every blank higher than 1 ppm is considered as failure and the rejects are automatically re-assayed.

Lab Expert tested 1,704 blanks and has a 0.12% failure rate. During Lab Expert's pulverization process, the ring-and-puck crusher is cleaned with compressed air and undergoes a cycle of sand cleaning. A total of 99.88% of the blank assays returned less than 0.05 g/t Au and 100% reported values less than 0.10 g/t Au. Only two samples were higher than the tolerance with grades of 0.05g/t and 0.06g/t. Considering that these values are low and that Island Gold is using its own blanks, it there is no impact the Mineral Resource and Mineral Reserve estimates.

Wesdome tested only 159 blanks and saw 15.1% failure rate. 5.7% of the blanks re-assayed passed, no action was been taken for 4.4% and, 3.8% of the blanks could have been contaminated. This contamination was mainly due to outdated pulveriser equipment which is known for sample cross -contamination problems. In July 2019, Wesdome changed out the older pulverisers to the new style Essa LM2 Vibratory ones and only one contaminated blank has been determined after this change. A total of 84.9% of the blank assays returned less than 0.5 g/t Au and 93.1% reported values less than 1.0 g/t Au. From the 11 blanks with analytical values greater than 1.0g/t, five showed results greater than 1.4 g/t Au. There is evidence of a low-level sample cross-contamination in sample preparation. The mine operates with a cut-off grade of 4.03 g/t Au, an average Mineral Resource and Mineral Reserve grade of close to 12 g/t Au and the rare instances of contamination are not considered material. However, to further control the possibility of sample cross-contamination, Island Gold started to flag in the sample bags which contain visible gold to notify the laboratory about expected high grade.

Table 11-3 Island Gold Mine - QA-QC Program, Certified Reference Material Results (2019)

Lab Expert Reference Material Results 2019

Standard	Number of Samples	Expected Values			Observed Values for the Year						
		Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Within 3 SD	Within 2 SD	Within 1 SD	Failure
SQ87	110	30.87	1.544	5%	30.64	0.262	1%	100%	100%	100%	0
OREAS239	127	3.55	0.178	5%	3.60	0.445	12%	99%	99%	99%	1
OREAS229b	33	11.95	0.598	5%	11.97	0.096	1%	100%	100%	100%	0
OREAS229	203	12.11	0.606	5%	11.96	0.395	3%	100%	100%	100%	1
OREAS228b	124	8.57	0.429	5%	8.54	0.545	6%	98%	98%	98%	2
OREAS228	10	8.73	0.437	5%	8.58	0.059	1%	100%	100%	100%	0
OREAS226	56	5.45	0.273	5%	5.46	0.034	1%	100%	100%	100%	0
OREAS216b	40	6.66	0.333	5%	6.60	0.041	1%	100%	100%	100%	0
OREAS216	232	6.66	0.333	5%	6.61	0.082	1%	100%	100%	100%	1
OREAS215	253	3.54	0.177	5%	3.56	0.024	1%	100%	100%	100%	0
OREAS210	198	5.49	0.275	5%	5.47	0.089	2%	99%	99%	99%	1
OREAS209	339	1.58	0.079	5%	1.58	0.015	1%	100%	100%	100%	0
Blank	1,704	0.00			0.00	0.003					2

Wesdome Reference Material Results 2019

Standard	Number of Samples	Expected Values			Observed Values for the Year						
		Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Within 3 SD	Within 2 SD	Within 1 SD	Failure
OREAS229b	31	11.95	0.598	5%	11.99	1.126	9%	97%	97%	77%	1
OREAS229	31	12.11	0.606	5%	12.09	0.873	7%	94%	84%	74%	5
OREAS228b	28	8.57	0.429	5%	8.31	0.939	11%	79%	75%	57%	7
OREAS228	1	8.73	0.437	5%	9.00	-		100%	100%	100%	0
OREAS226	6	5.45	0.273	5%	5.64	0.441	8%	100%	83%	33%	1
OREAS216b	28	6.66	0.333	5%	6.82	0.556	8%	86%	86%	75%	4
OREAS216	32	6.66	0.333	5%	6.87	0.693	10%	88%	81%	72%	6
OREAS215	10	3.54	0.177	5%	3.68	0.388	11%	70%	60%	40%	3
OREAS210	28	5.49	0.275	5%	5.72	0.809	14%	79%	71%	68%	8
OREAS209	7	1.58	0.079	5%	1.70	0.381	22%	29%	29%	14%	5
Blank	159	-			0.29	0.659					24

Actlabs Reference Material Results 2019

Standard	Number of Samples	Expected Values			Observed Values for the Year						
		Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Within 3 SD	Within 2 SD	Within 1 SD	Failure
OREAS229b	5	11.95	0.598	5%	12.04	0.378	3%	100%	100%	100%	0
OREAS228b	3	8.57	0.429	5%	8.56	0.296	3%	100%	100%	100%	0
OREAS226	3	5.45	0.273	5%	5.43	0.023	0%	100%	100%	100%	0
OREAS216b	7	6.66	0.333	5%	6.61	0.126	2%	100%	100%	100%	0
OREAS209	1	1.58	0.079	5%	1.59	-		100%	100%	100%	0

The number of drill core blanks submitted to each laboratory is summarized in Table 11-4.

Table 11-4 Summary of 2019 Blank Performance

Description	Lab Expert	Wesdome
Number of Blank Insertions	1,704	159
Maximum Grade for Failure	0.05 g/t Au	0.5 g/t Au
Number of Failures	2	24
Percent of Failures	0.12%	15.1%
Maximum Value	0.06 g/t Au	6.30 g/t Au

11.6.3 Long Term QA-QC

Over the course of Island Gold's drilling programs from 2017 to 2019, a total of 15 different CRMs were used. The grades of the CRMs ranged from 1.58 g/t Au to 30.87 g/t Au and reflected expected assay grades within the mineralization of the Island Gold deposit. During those years, a total of 7,262 CRMs were analyzed by three different laboratories and retained for statistics (mislabels are excluded). It is only in 2019 that CRMs started to be sent to the Actlabs Laboratory.

Table 11-5 shows the results of the statistical analysis for each CRM and for each laboratory. The results of the CRMs show relatively good consistency compared to the expected values, and the warning and failure rates are low.

The Wesdome laboratory shows the highest rate of failure with 14.5% of failures for CRM and 10.1% of failures for Blanks. Issues that cause outliers mainly include transcription and calculation errors. The Wesdome laboratory is generally used by Island Gold for underground production samples. An external third-party audit of the Wesdome lab was done in June 2019. The replacement of an unsuitable pulveriser in July 2019, and increased communication between the Wesdome mine laboratory personnel and the Island Gold employees in charge of the QA/QC were some of the recommended solutions implemented, and have been found to improve the quality of the assays.

11.6.4 Pulp Duplicate Analysis (Original vs Duplicate Values)

Both Lab Expert and Wesdome are routinely verified by fire assay method second 30-g pulp aliquots from the original pulp samples. Such re-assays are carried out at a rate of 6% for Lab Expert and 8% for Wesdome. Results are presented in Table 11-6. The mean grades of the re-assays are very close to the original assays with good correlation coefficients for both laboratories. These results demonstrate the ability of the labs to reproduce the global average of the first assays despite discrepancies in the individual assays. Means and standard deviations are high because of the presence of some very high grade samples and typically, the laboratories will re-assay high-grade samples.

Table 11-5 QA-QC Program, Certified Reference Material Results (2017-2019)

Lab Expert Reference Material Results 2017-2019

Standard	Number of Samples	Expected Values			Observed Values						
		Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Within 3 SD	Within 2 SD	Within 1 SD	Failure
SQ87	370	30.87	1.544	5%	30.61	0.329	1%	100%	100%	100%	0
SQ83	1	30.64	1.532	5%	31.20	-	-	100%	100%	100%	0
SQ71	2	30.81	1.541	5%	30.81	0.509	2%	100%	100%	100%	0
OREAS239	126	3.55	0.178	5%	3.56	0.023	1%	100%	100%	100%	0
OREAS229b	33	11.95	0.598	5%	11.97	0.096	1%	100%	100%	100%	0
OREAS229	233	12.11	0.606	5%	11.93	0.431	4%	99%	99%	98%	2
OREAS228b	124	8.57	0.429	5%	8.54	0.545	6%	98%	98%	98%	2
OREAS228	940	8.73	0.437	5%	8.73	0.191	2%	100%	100%	99%	1
OREAS226	56	5.45	0.273	5%	5.46	0.034	1%	100%	100%	100%	0
OREAS216b	40	6.66	0.333	5%	6.60	0.041	1%	100%	100%	100%	0
OREAS216	1,624	6.66	0.333	5%	6.63	0.074	1%	100%	100%	100%	1
OREAS215	1,693	3.54	0.177	5%	3.55	0.140	4%	100%	100%	100%	4
OREAS210	239	5.49	0.275	5%	5.47	0.083	2%	100%	100%	100%	1
OREAS209	596	1.58	0.079	5%	1.58	0.023	1%	100%	100%	98%	0
OREAS208	284	9.25	0.462	5%	9.28	0.080	1%	100%	100%	100%	0
Blank	6,131	0.00			0.01	0.120		-	-	-	17

Wesdome Reference Material Results 2017-2019

Standard	Number of Samples	Expected Values			Observed Values						
		Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Within 3 SD	Within 2 SD	Within 1 SD	Failure
SQ87	22	30.87	1.544	5%	31.04	0.780	3%	100%	100%	95%	0
OREAS229b	31	11.95	0.598	5%	11.99	1.126	9%	97%	97%	77%	1
OREAS229	43	12.11	0.606	5%	11.99	1.394	12%	93%	86%	74%	6
OREAS228b	28	8.57	0.429	5%	8.31	0.939	11%	79%	75%	57%	7
OREAS228	132	8.73	0.437	5%	9.03	0.457	5%	98%	95%	64%	6
OREAS226	6	5.45	0.273	5%	5.64	0.441	8%	100%	83%	33%	1
OREAS216b	28	6.66	0.333	5%	6.82	0.556	8%	86%	86%	75%	4
OREAS216	246	6.66	0.333	5%	6.83	0.383	6%	96%	90%	77%	24
OREAS215	238	3.54	0.177	5%	3.66	0.399	11%	90%	78%	57%	53
OREAS210	40	5.49	0.275	5%	5.73	0.680	12%	85%	78%	63%	9
OREAS209	36	1.58	0.079	5%	1.72	0.230	13%	64%	56%	22%	16
OREAS208	32	9.25	0.462	5%	9.40	0.456	5%	97%	97%	72%	1
Blank	238	0.00			0.29	0.659					24

Actlabs Reference Material Results 2019

Standard	Number of Samples	Expected Values			Observed Values						
		Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Mean (g/t Au)	Standard Deviation (g/t Au)	1 Relative Standard Dev.	Within 3 SD	Within 2 SD	Within 1 SD	Failure
OREAS229b	5	11.95	0.598	5%	12.04	0.378	3%	100%	100%	100%	0
OREAS228b	3	8.57	0.429	5%	8.56	0.296	3%	100%	100%	100%	0
OREAS226	3	5.45	0.273	5%	5.43	0.023	0%	100%	100%	100%	0
OREAS216b	7	6.66	0.333	5%	6.61	0.126	2%	100%	100%	100%	0
OREAS209	1	1.58	0.079	5%	1.59	-		100%	100%	100%	0

Table 11-6 2019 Statistics of Duplicate Assays (Internal QA-QC)

	Lab Expert		Wesdome	
	First Assay	Duplicate	First Assay	Duplicate
Number of Pairs	4769		205	
Minimum (g/t)	0.000	0.0025	0.002	0.002
Maximum (g/t)	2280.19	2094.84	1130.53	1403.33
Mean (g/t)	13.272	13.220	42.414	43.494
Median (g/t)	0.058	0.059	1.60	1.67
Standard Deviation	73.722	72.208	135.335	146.319
Coefficient Correlation	0.999		0.993	
Avg Absolute Value of Relative Difference	9.53%		10.68%	

Figure 11-1 and Figure 11-2 are scatterplots of the two labs showing the duplicate assays plotted against the original assays for the year 2019. Results are reasonably distributed on both sides of the x=y line. Globally, the result does not show evidence of bias between the two assays.

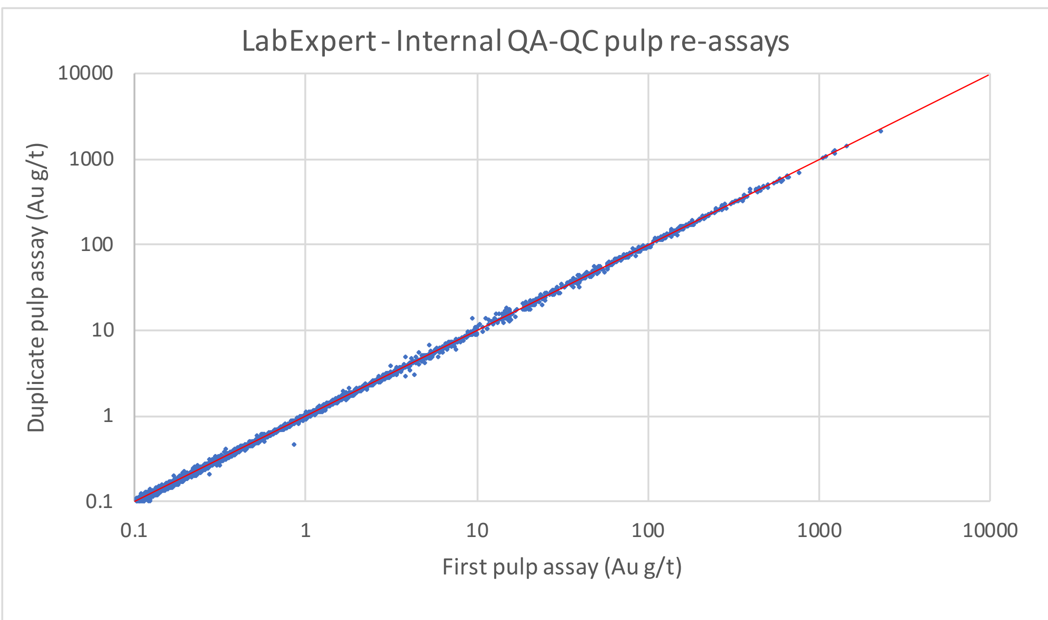


Figure 11-1 Scatter Plot of Duplicate Assays vs Original Assays (Lab Expert)

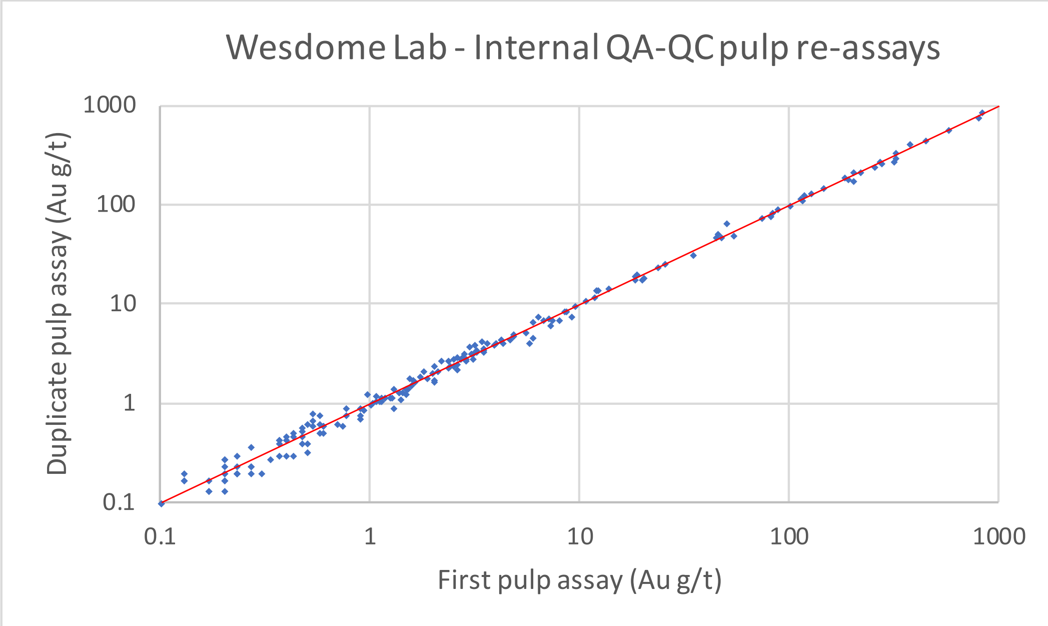


Figure 11-2 Scatter Plot of Duplicate Assays vs Original Assays (Wesdome Lab)

11.7 Laboratory Cross Check Sampling (Pulp Samples)

Additional testing for accuracy is performed at a secondary or umpire laboratory. The CRMs monitor analytical accuracy but are not blind to the laboratory. To ensure that the laboratory gold assaying technique presents no problem or bias, a series of pulps from the primary laboratory are resubmitted to another laboratory for re-assay.

In 2019, 357 pulps assayed at Wesdome and 619 pulps assayed at Lab Expert were sent to Actlabs to be re-assayed (Table 11-7). Scatterplots of the two labs showing the duplicate assays plotted against the original assays (Figure 11-3 and Figure 11-4). Ninety five percent of the pulps sent to Actlabs from Wesdome are from 2017-2018. Between Wesdome and Actlabs, only three outliers have been removed. These outliers were considered random errors, or blunders and not systematic in nature.

Results are reasonably distributed on both sides of the line of best fit. Globally, the statistics presented in the Table 11-7 show no evidence of strong bias between laboratories. The maximum assays of both labs are roughly within the same range. The mean of the Wesdome samples show a small tendency for over estimation likely because of singular use of gravimetric finish (Figure 11-4). The mean of Actlabs compared to Lab Expert is higher because of Lab Experts tendency to underestimates assays over 100g/t (Figure 11-3).

Sixty one percent of the samples analyzed by Lab Expert are slightly lower than the values reported by Actlabs, meaning there is no risk of over evaluating the Mineral Resource grade. Wesdome shows the opposite trend with 65% of the assays returning with higher grades in comparison to Actlabs, especially for assays below the 2 g/t Au threshold.

Table 11-7 2019 Statistics of Duplicate Assays (External QA-QC)

	Lab Expert vs Actlabs		Wesdome vs Actlabs	
	Lab Expert	Actlabs	Wesdome	Actlabs
Number of Pairs	619		357	
Minimum (g/t)	0.0025	0.000	0.002	0.0025
Maximum (g/t)	2784.33	3120	1610.36	1630
Mean (g/t)	84.00	88.22	21.43	21.29
Median (g/t)	20.98	21.2	1.28	1.11
Standard Deviation	207.100	215.890	99.218	101.135
Coefficient Correlation	0.990		0.997	

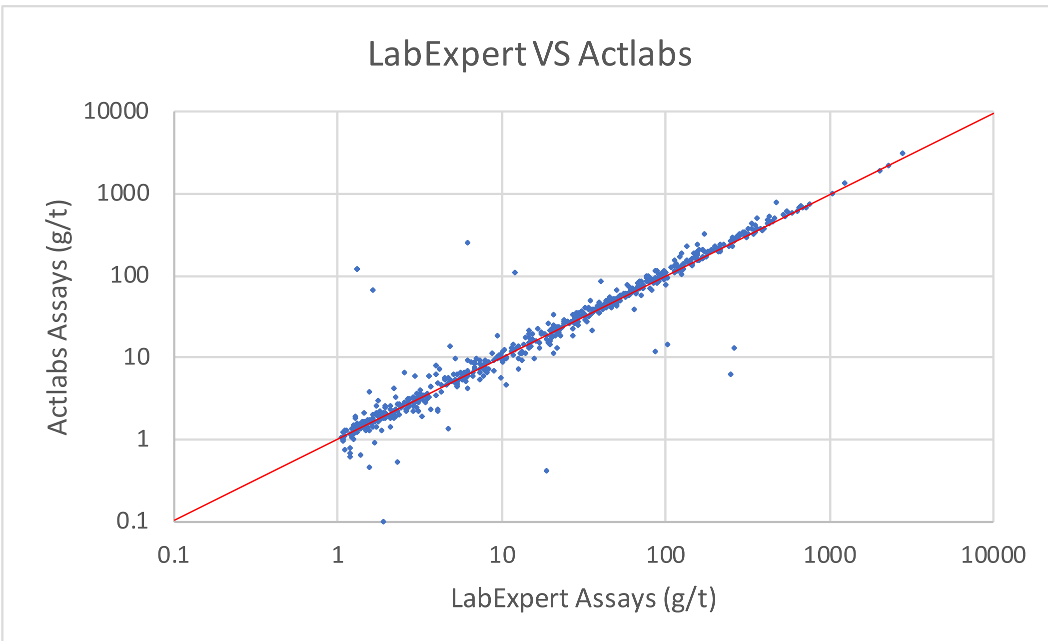


Figure 11-3 Scatter Plot of Duplicate Assays (Actlabs) vs Original Assays (Lab Expert)

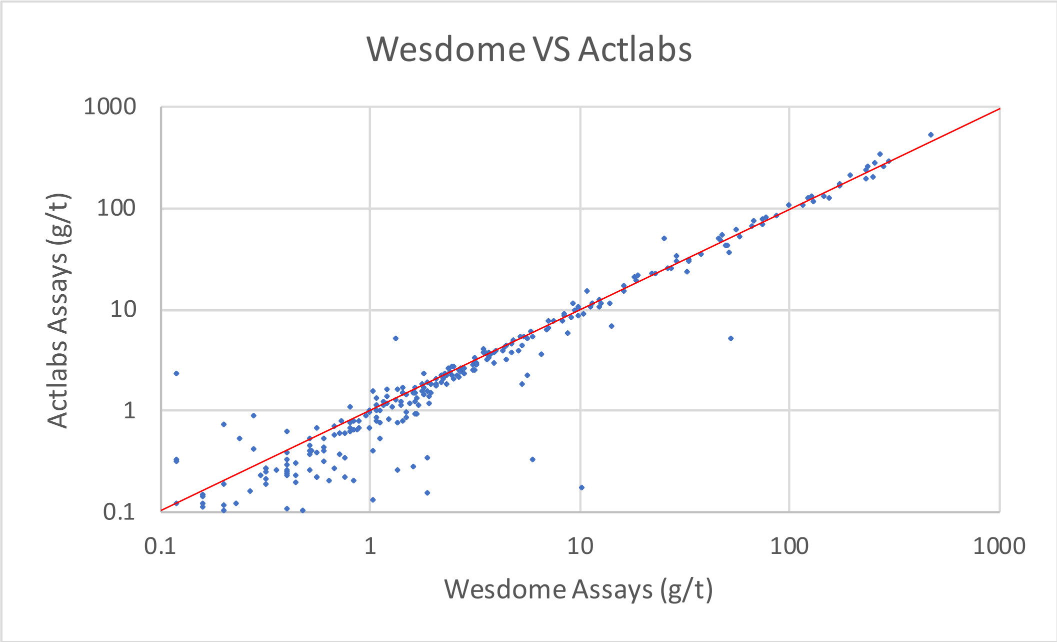


Figure 11-4 Scatter Plot of duplicate assays (Actlabs) vs original assays (Wesdome lab)

11.8 Core Duplicates

Until 2015, drill core duplicates were sent to Lab Expert and Actlabs to be assayed. The audit conducted by ASL in November 2015 (Bloom, 2015), demonstrated that the core duplicates exhibit poorer reproducibility than the pulp duplicates. This data can not be used to improve or monitor the sampling procedures or assay quality. The precision for core duplicates is within the expected range for the deposit style. Following the recommendation from the audit, Island Gold reviewed the assay quality control program and decided to no longer assay core duplicate.

11.9 Underground Muck Tracking

Internal tracking of broken material underground, either ore or waste, is done using machine monitoring systems installed on haul trucks, coordinated by an underground dispatcher. This system ensures that all daily underground muck movement is accounted for.

11.10 Summary and Comments

Lab Expert is Island Gold Mine's primary analytical laboratory for drill cores. The laboratory uses industry-standard sample preparation and assay methods to generate assays for the project. Island Gold has implemented a rigorous QA-QC program. The blanks and CRMs inserted with samples have not identified any systematic contamination or bias in assays. Check assays submitted to the accredited laboratory Actlabs showed good correspondence with Lab Expert assays.

The Island Gold Mine in house QA/QC program determined some contamination or systematic issues in the assaying process at Wesdome Lab during the first half of 2019. After the ASL audit and discussions with the chief assayer the lab performance has improved to be within acceptable limits. QA/QC is examined monthly to ensure assay quality issues are fixed rapidly as was demonstrated in 2019.

Island Gold Mine's QA-QC procedures were audited in 2019 by ASL Canada and it was concluded that Island Gold's assay quality control program meets or exceeds industry standards, and that the gold assays are considered to be reliable for the purpose of Mineral Resource estimates.

12 DATA VERIFICATION

The Qualified Person considers that the Island Gold Mine database is suitable for use in the Mineral Reserve and Mineral Resource estimation. The SQL database is adequate and acceptable for supporting Mineral Resource estimation. This database contains all the information related to drill holes, drift sampling, assay results and the laboratory certificates. Some verification of the original data was performed, and modifications were completed if needed prior to the calculation of any estimates. The verification of, and corrections to, the Island Gold database were done prior to the Mineral Resource and Mineral Reserve estimates of December 31, 2019.

An external Mineral Reserve and Mineral Resource audit (RPA, 2016) was completed in December 2016 by Roscoe Postle Associates Inc. (RPA) and based on a desktop review of the Island Gold Mine Mineral Resources, RPA was of the opinion that the Mineral Resource estimates were reasonable, had been adequately prepared using standard industry practices, and conformed to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (“CIM definitions”) as incorporated into National Instrument 43-101 (“NI 43-101”). Most of the methodologies and procedures utilized in the 2019 Mineral Resources and Mineral Reserves estimate are identical to those used in the 2016 estimate therefore, it is presumed that the methodologies used in 2019 are still adequate and acceptable.

In September 2019, the Lab Expert laboratory and the Wesdome laboratory were audited by Analytical Solutions LTD. (ASL). The audits were a thorough review of lab procedures, policies and methods which included on site observations and discussions of the processes involved in handling and processing the Island Gold Mine samples. ASL is under the opinion that Lab Experts sample processing, assaying and internal QA/QC is acceptable (Bloom 2019a). ASL’s audit of the Wesdome Lab (Bloom 2019b) demonstrated some deficiencies in their assaying of values lower than 2 g/t however, most samples sent to Wesdome are used for production only. Mineral Resource and Mineral Reserve cut off grade is over 4 g/t, therefore any inaccuracy below 2 g/t will not have an impact. The suggestions of ASL for both laboratories have been implemented or are in the process of being implemented.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

The mill has been processing Island Gold ore since 2008 and has consistently been achieving recoveries of greater than 96% (Figure 13-1). Since 2016, the ore feed has been almost exclusively from the Lower Island Gold Domain:

- 2016, 92% of the ore from Lower Zones, 8% Upper Zones;
- 2017, 97% of the ore from Lower Zones, 3% Upper Zones;
- 2018, 100% of the ore from Lower Zones; and
- 2019, 99% of the ore from Lower Zones (1% from reclaim the stockpile).

Historical data shows that the Lower Zone ore behaves similarly to ore from the other zones and therefore has no significant effect on mill gold recoveries, as presented in Figure 13-2.

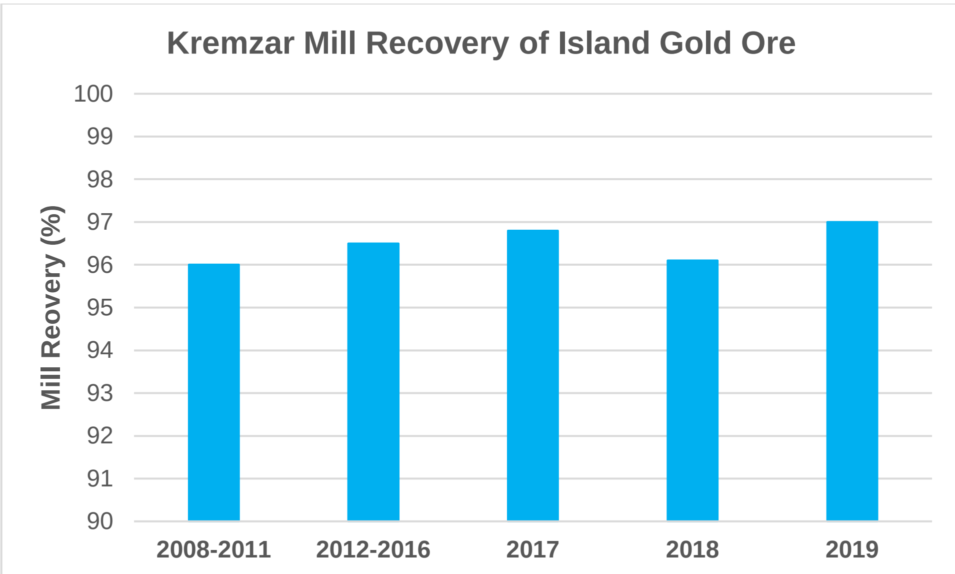


Figure 13-1 Mill Gold Recovery of Island Ore

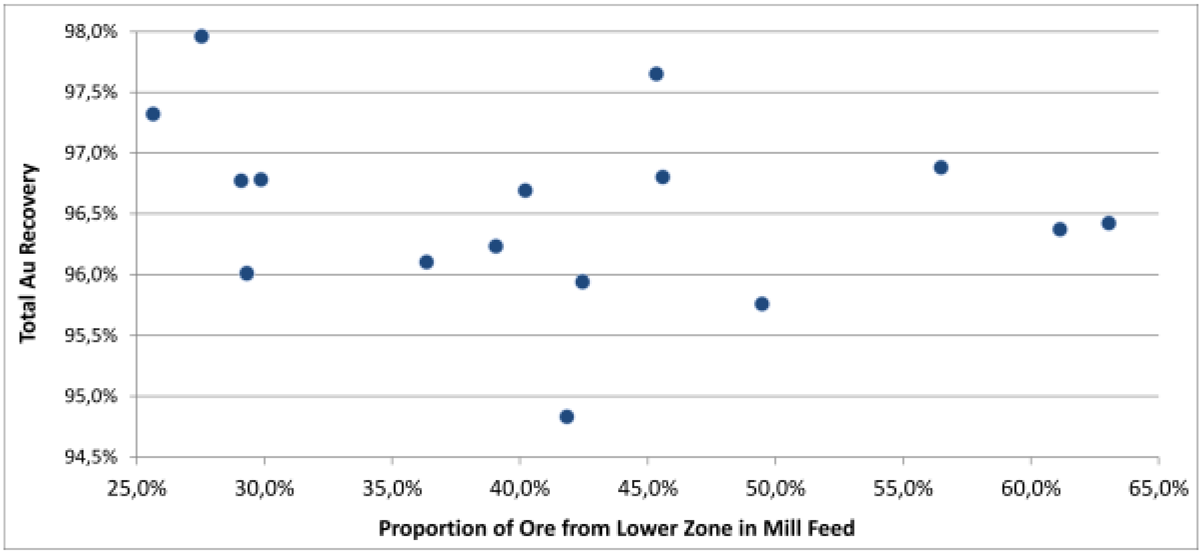


Figure 13-2 Mill Gold Recovery as a Function of Lower Zone Ore in the Feed

13.1 Historical Metallurgical Testwork

The Island Gold mine has been in production since October 2007. The metallurgy is well understood, and average gold recovery achieved over the last 5 years is consistently around 96%, with 97% achieved in 2019.

Mineralogical and metallurgical characterization studies were performed in 2013 by the Unité de Recherche et de Service en Technologie Minérale (URSTM), a research unit affiliated to the Université du Québec en Abitibi-Témiscamingue. One set of samples from four different drill cores was selected and shipped to URSTM. The average gold grade was determined for each core sample. The samples were thereafter combined into a composite that was sent for metallurgical testwork.

The composite was characterized using Inductively Coupled Plasma (ICP) chemical analysis, Bond Ball Mill Work Index (BWI) determination, free gold evaluation, and response to cyanidation.

13.1.1 Head Assays

The drill core sample grades as well as the composite sample grades for the URSTM testwork are summarized in Table 13-1. Significant grade variability within the sample set is noted, and this is typical of the deposit and others in the region. The composite head grade was roughly twice that of the average mill feed grade in 2019.

Table 13-1 Drill Holes Head Assays (URSTM)

Drill Hole Number	Au (g/t)
400-514-16A	17.24
GD-11-15	40.49
GD-497-01W1	46.68
425-487-02	3,93
Composite	**23.65**

An ICP multi-scan was performed on the composite sample. The ICP was conducted by Lab Expert and the results are presented in Table 13-2. The results show that the composite sample does not contain any elements in sufficient concentration to be problematic for gold cyanidation.

Table 13-2 ICP Analysis on Composite Head Sample (URSTM)

Code	Zone	Ag	As	Ca	Co	Cu	Fe	Hg	Ni	Pb	S	Sb	Zn
		ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm
S-24	Island Gold Composite Sample	1.3	99	2.7	16	74	3.4	0.026	2	2	2.1	<10	47

13.1.2 Grinding

The composite sample was tested at the Cégep de l'Abitibi-Témiscamingue for the BWI determination.

The BWI expresses the material's resistance to ball milling. A high index value means the material is more difficult to grind. The BWI result was 12.6 kWh/t using the standard test procedure. A 12.6 kWh/t value is in the low to mid-range of most Canadian gold ores.

13.1.3 Free Gold Content Evaluation

A gravimetric concentration evaluation was carried out in two steps using a Knelson concentrator, followed by a cleaning stage using a Mozley table. The experimental procedure for free gold evaluation is presented in Figure 13-3.

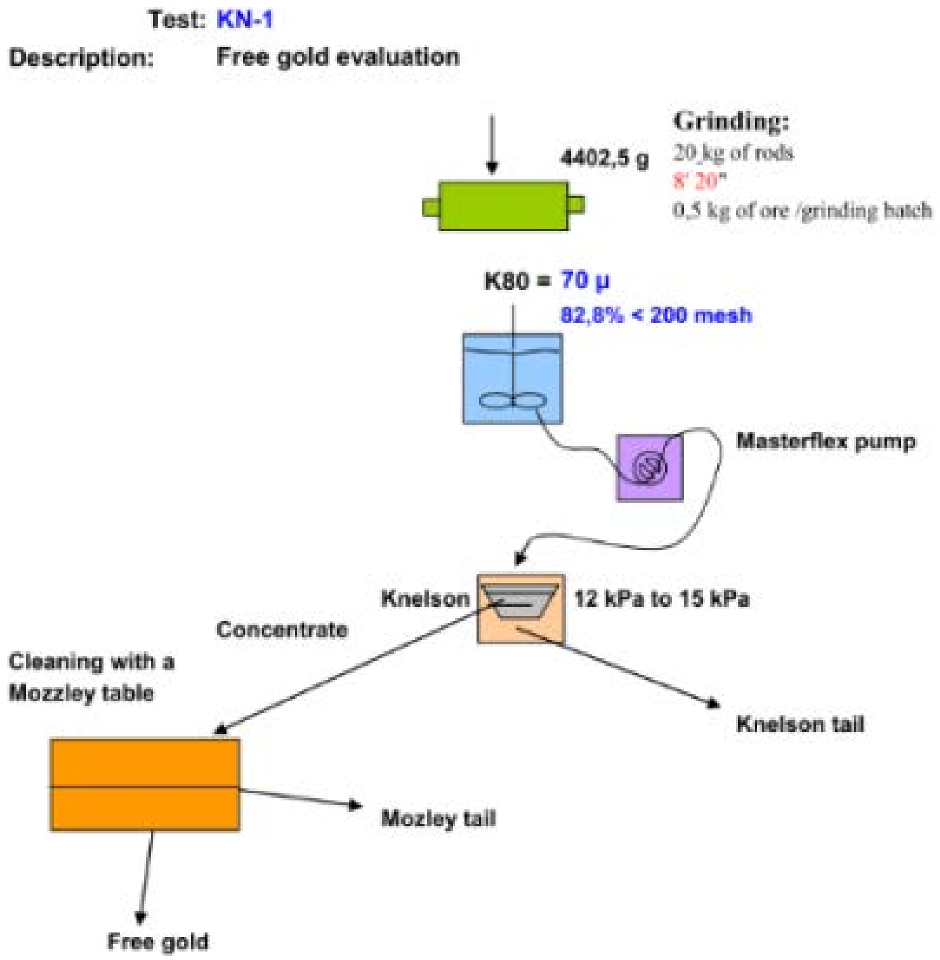


Figure 13-3 Free Gold Evaluation Protocol (URSTM)

The test results showed that the free gold content of the composite was estimated at 54.8 %. The coarsest gold particle was measured at 693 µm, but most of the free gold is in the finer fraction (< 25 µm).

13.1.4 Cyanidation

The standard method of recovering gold is through cyanidation and carbon absorption, where gold is dissolved in a cyanide solution and adsorbed onto activated carbon. Gold leaching of the composite sample was investigated at URSTM through a series of lab scale batch tests.

The tests were performed using standard baseline cyanidation conditions, with grinds varying from 80% passing minus 36 µm to 80% passing minus 101 µm being tested (Table 13-3).

The results indicate a common grind versus gold recovery relationship, with leaching performance of 99 % for the finer grind (80% passing minus 36µm) and 96.8 % for the coarser grind (80% passing minus 101µm). Cyanide consumptions were observed to be very low, which is typical for this type of gold ore.

Table 13-3 Cyanidation Test Results (URSTM)

Description	Test	Cyanide Duration (h)	K80 (µm)	% <200 Mesh	NaCN		Ca(OH)$_2$		Au		
					ppm NaCN (end of test)	kg NaCN/t of ore	pH Final	kg Ca(OH)$_2$/t of ore	Rec. Au (%)	Final Tail g/t	Calc. Feed g/t
Cyanidation Test at Different Grinds	CN-IG-1	24	101	68.2	639	0.11	11.2	1.60	96.8	0.84	26.62
	CN-IG-2	24	70	82.5	653	0.17	11.2	1.76	97.9	0.58	27.31
	CN-IG-3	24	49	82.5	731	0.17	11.4	1.86	98.4	0.42	25.16
	CN-IG-4	24	36	98.7	757	0.34	11.4	2.34	99.0	0.29	28.97

Average calc. feed: 27.02

13.2 Confirmatory Metallurgical Testwork

13.2.1 ALS Testwork Program

A testwork program was carried out at ALS in December 2015 on three (3) different samples. One sample was designated “Concentrator Feed” and the other two samples were identified as Upper Part (from the Upper Zone) and Lower Part (from the Lower Zone).

The Concentrator Feed sample was comprised of several daily composites which in turn were made up of hourly samples of the mill feed. The sample was collected between December 3 and December 7, 2015 by a mill technician. The Lower Part and Upper Part samples come from stored half drill cores. These samples were prepared to be representative of the Upper and Lower zones of the entire mineral deposit, from surface down to a vertical depth of 1,000 m.

The objective of the testwork was to determine the following:

- Composite Characterization:
  - Specific gravity;
  - BWI;
  - Chemical content of elements of interest; and
  - Mineral content, bulk mineral analysis and X-ray diffraction.
- Metallurgical Performance:
  - Cyanide leaching; and
  - Gravity recoverable gold.

13.2.1.1 *Composites Characterization*

BWI determination tests were conducted in triplicate on each sample. A summary of the results is presented in Table 13-4. The tests were conducted with a 106 µm closing screen.

Table 13-4 Bond Ball Mill Work Index Test Results Summary (ALS)

Sample ID	F80 (µm)	P80 (µm)	BWI (kWhr/t)
Upper Part	2,192	76	13.7
Lower Part	2,269	77	12.7
Concentrator Feed	2,107	72	11.0

The ball milling results show that the ore can be considered soft to moderately soft. The results were consistent throughout the triplicate tests. The average BWI for the three samples is 12.5 kWh/t, which is consistent with the value of 12.6 kWh/t established by URSTM in the previous campaign.

The chemical content and mineral content results are summarized in Table 13-5 and Table 13-6. The gold grade ranged from 9.0 g/t to 14.3 g/t.

Table 13-5 Chemical Content Summary (ALS)

Sample	Cu %	Fe %	Au g/t	Ag g/t	As %
Upper Part	0.005	3.0	8.99	2	0.006
Lower Part	0.004	3.2	14.3	2	0.007
Concentrator Feed	0.007	3.3	13.6	2	0.020

Table 13-6 Mineral Content Summary (ALS)

Mineral	Mineral Content (%)		
	Concentrator Feed	Lower Part	Upper Part
Chalcopyrite	<0.1	<0.1	<0.1
Pyrite	2.9	2.1	2.5
Quartz	48.4	40.3	39.1
Micas	15.2	18.3	18.0
Feldspars	18.9	26.8	27.5
Kaolinite	0.5	0.4	0.3
Chlorite	5.4	5.3	5.8
Carbonates	5.3	3.3	3.4
Other	3.4	3.5	3.5
Total	100	100	100

Most of the samples are silicate minerals (quartz, micas, feldspars, or chlorites). Carbonates and sulphides are also present. Minor amounts of copper in chalcopyrite were detected but at this concentration would not be expected to increase cyanide consumption in the leach process.

Given the fact that the Concentrator Feed composite appears from the ball mill work index tests to be less competent, or softer, than the upper and lower zone material, the mineral content results suggest that this may be attributable to the concentration of feldspar minerals (<19% in the Concentrator Feed comp, but >26% in the upper and lower zone comps).

13.2.1.2 *Metallurgical Performance*

Cyanidation bottle roll tests were conducted on the three samples at three different grind sizes (80% passing 65µm, 100µm and 130µm). Tests were carried out with a cyanide concentration of 300 ppm, a pH level of 11, and over a 48-hour period. Results are summarized in Figure 13-4.

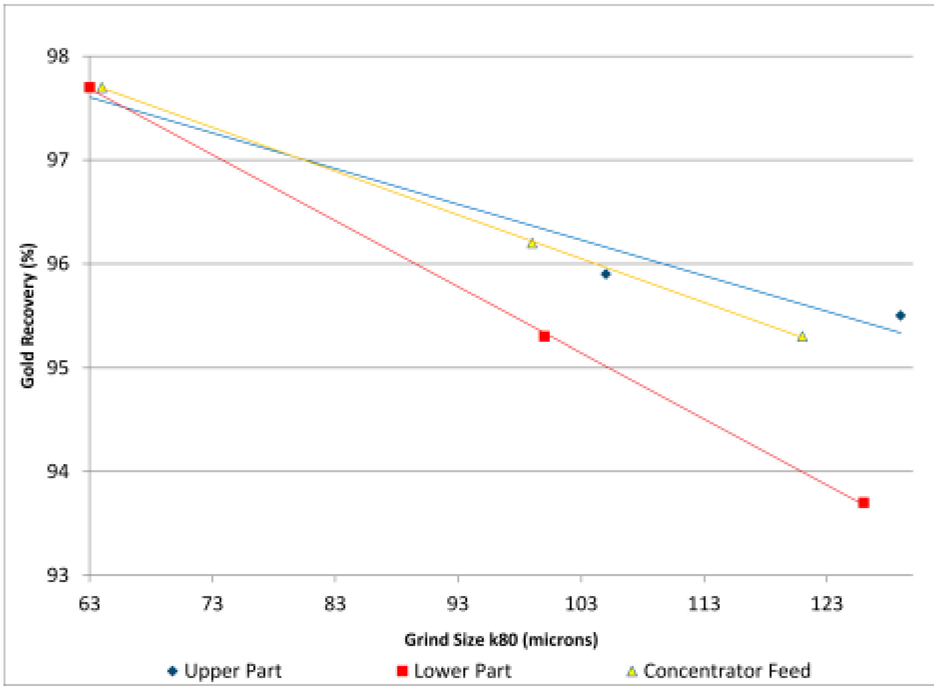


Figure 13-4 Gold Recovery versus Particle Size

Overall gold recoveries ranged from 94 to 98%, with higher recoveries obtained at finer grind sizes. Gold leach kinetics were seen to be quite rapid, with most of the extraction occurring in the first 24 hours. Cyanide consumption was notably higher at finer grinds while lime consumption was unchanged. A summary of the results is presented in Table 13-7. The leaching kinetics curve for the Lower Part sample tested at 63 microns is presented in Figure 13-5.

Table 13-7 Cyanidation Tests Summary (ALS)

Sample	Primary Grind µm K80	48 hour Extraction (%)		Grade g/t				Reagent Consumption kg/t	
				Feed	Residue	Feed	Residue		
		Au	Ag	Au	Ag	Au	Ag	NaCN	Lime
Upper Part	129	96.5	89.5	11.0	2.9	0.49	0.3	0.2	0.7
	105	95.9	92.3	9.74	2.6	0.40	0.2	0.1	0.8
	63	97.7	92.9	12.4	2.8	0.29	0.2	0.4	0.8
Lower Part	125	93.7	82.8	14.0	2.9	0.89	0.5	0.1	0.4
	100	95.3	89.2	13.7	2.8	0.64	0.3	0.2	0.4
	63	97.7	88.8	13.9	2.7	0.32	0.3	0.4	0.4
Concentrator Feed	121	96.3	81.6	11.9	2.7	0.56	0.5	0.1	0.4
	99	96.2	88.1	12.4	2.5	0.47	0.3	0.1	0.4
	64	97.7	92.1	12.4	2.5	0.29	0.2	0.3	0.4

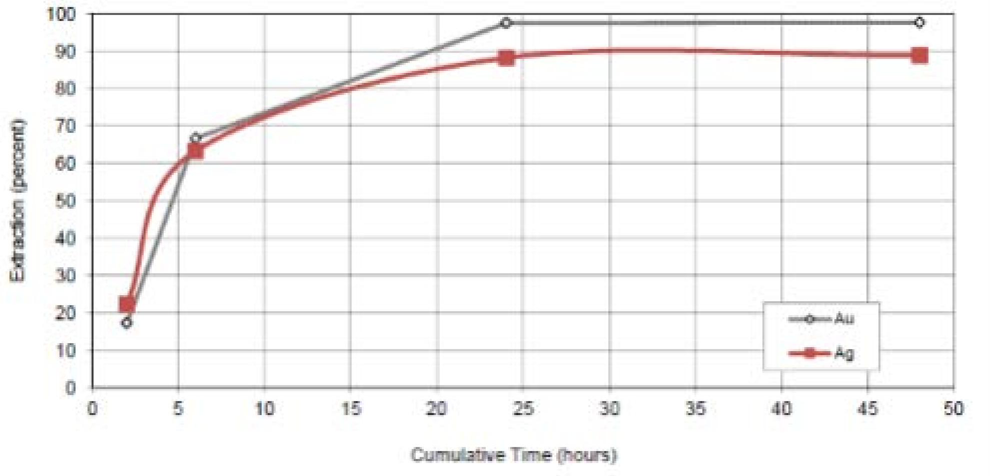


Figure 13-5 Cyanide Leach Kinetics Curve for Lower Part Sample Ground to 63 Microns (ALS)

A single gravity recoverable gold test was completed by ALS using 30 kg of Concentrator Feed sample. The test was conducted using a lab scale Knelson concentrator fitted with a 100 g cone and consisted of three runs at sequentially finer grinds. The sample was first ground to 80% -743 µm and was run through the Knelson. Approximately 30% of the gold was recovered to the concentrate at this stage. The Knelson tailing was then reground to 80% -336µm and the gravity concentration process repeated. A further 21 % of the gold was recovered at this intermediate stage. Finally, the Knelson tailing was ground to 80% -112µm and fed back to the Knelson. At this grind, another 19 % of the gold was recovered to the concentrate. Results are presented in Figure 13-6.

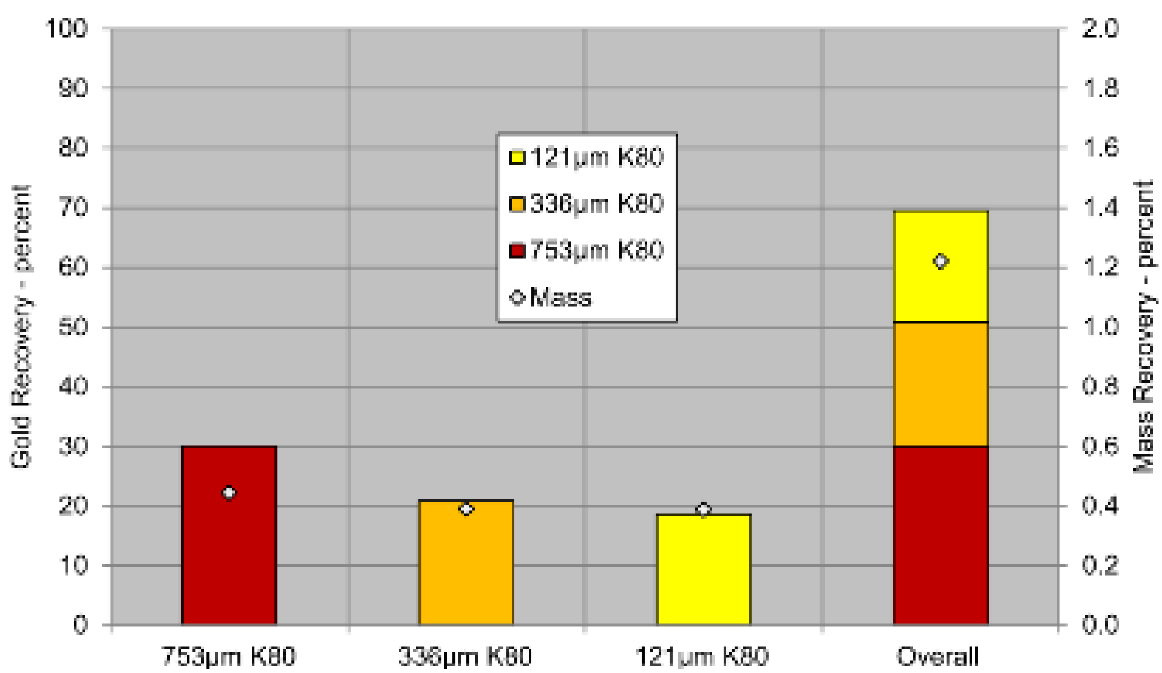


Figure 13-6 Gravity Recovery Performance (ALS)

The results indicate that the sample of Concentrator Feed was amenable to gravity separation as approximately 70% of the gold in the feed could be recovered to a low grade Knelson concentrate. The Island Gold processing operation does not currently have a gravity recovery circuit, but it may be considered in the future.

13.3 Thickening & Rheology Testing (2016)

FLSmith was contracted to conduct thickening and rheology testwork on cyclone overflow samples from the secondary mills at the Island Gold Mine. The objective of the testwork was to predict sizing and operating parameters for the pre-leach thickener, contemplated for the expansion to 1,100 tpd.. FLS carried out the testing in their Separation Laboratory located in Midvale, Utah in February 2016.

Flocculant screening tests evaluated the performance of five (5) flocculants with different characteristics (non-ionic, anionic, medium to high molecular weight and low to very high charge density). The best settling rate and supernatant clarity were obtained with the 913 VHM flocculant (anionic flocculant with high molecular weight and low charge density).

The results show that optimal flux rates should be achieved with a thickener feed solids density of about 10% (w/w). This feed density could be reached with the addition of an auto-dilution feedwell. Details are presented Figure 13-7.

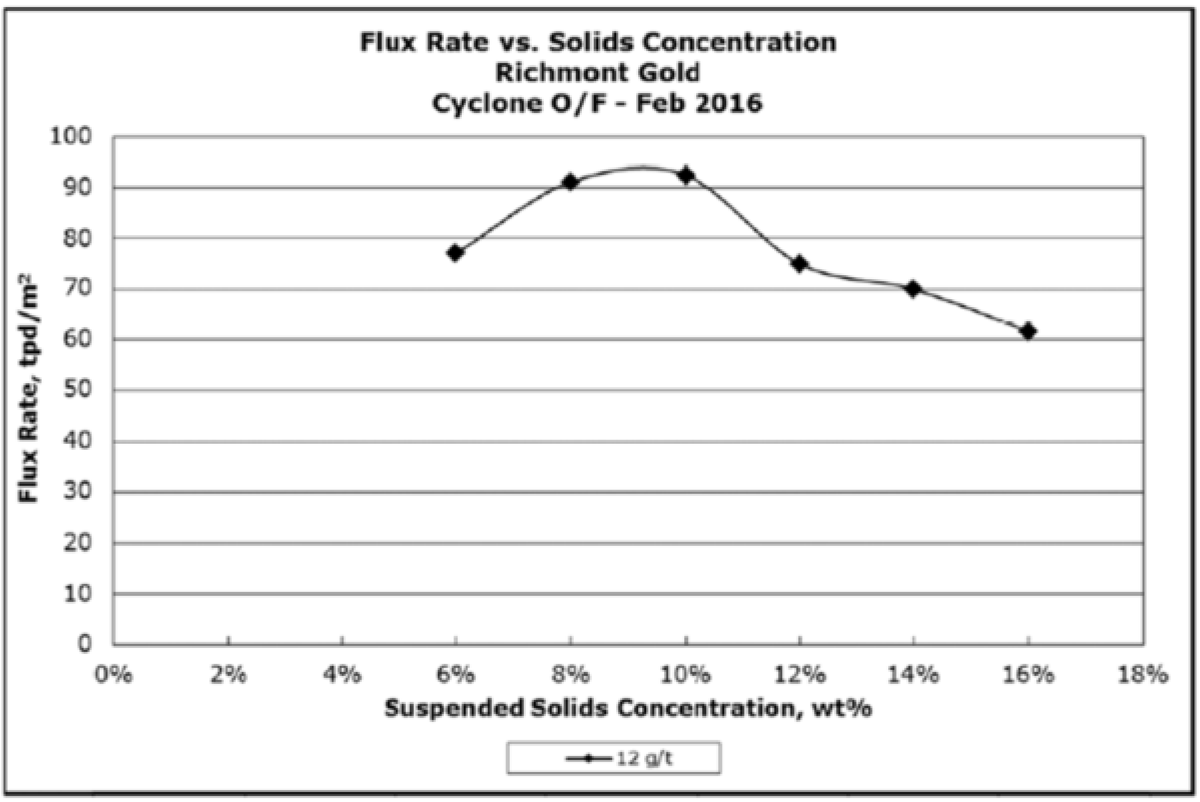


Figure 13-7 Flux Testing (FLSmith)

The underflow density achieved at various residence times is presented in Figure 13-8.

The target underflow density for the current operation is 55% solids (w/w). Based on the testwork results, this density is achievable in less than one (1) hour. At this target density, the slurry has a yield stress of less than 20 Pa, which can be managed with standard raking mechanism drives. The underflow slurry rheology testing results are presented in Figure 13-9.

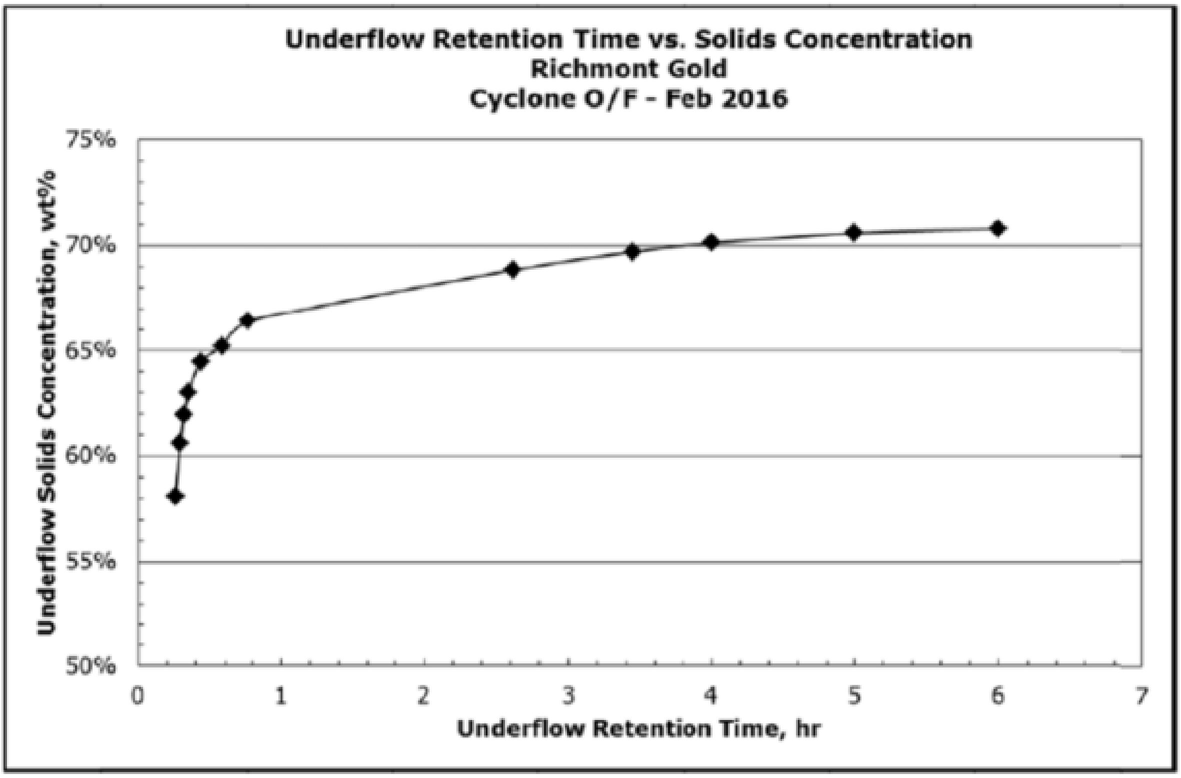


Figure 13-8 Underflow Retention Time versus Solids Concentration (FLSmith)

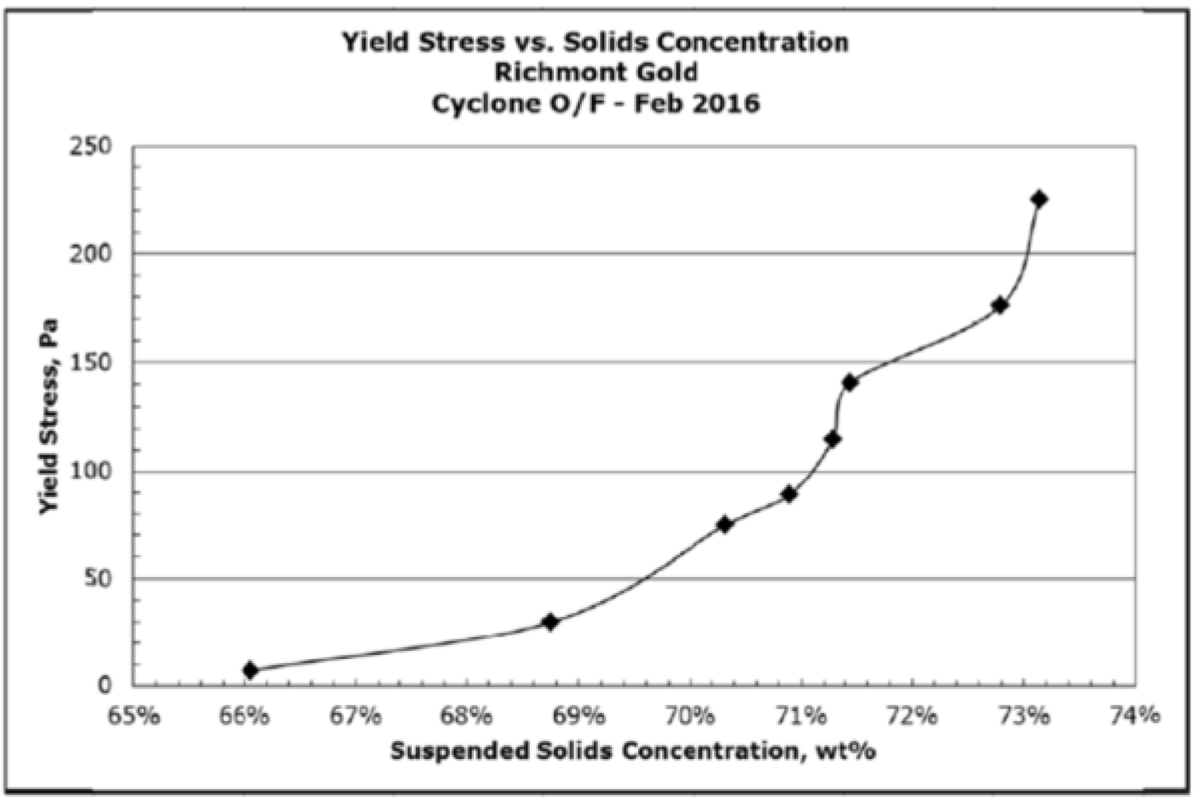


Figure 13-9 Thickener Underflow Rheology Results (FLSmith)

A summary of the thickener sizing and operating parameters is presented in Table 13-8 below.

Table 13-8 Thickener Sizing and Operating Parameters

Thickener Parameters	
Feedwell Suspended Solids Conc. (wt%)	10
Recommended Total Dose (g/t)	10-15
Design Unit Area (m^2/tpd)	0.050
Design Overflow Clarity (ppm)	<100
Rheological Characteristics	
Est. Bed Solids at 0.5 hr Retention Time (wt%)/Est. Yield Stress (Pa)	64.6/<20
Est. Bed Solids at 1 hr Retention Time (wt%)/Est. Yield Stress (Pa)	66.8/20
Est. Bed Solids at 2 hr Retention Time (wt%)/Est. Yield Stress (Pa)	68.0/25
Est. Bed Solids at 4 hr Retention Time (wt%)/Est. Yield Stress (Pa)	70.1/60
Est. Bed Solids at 6 hr Retention Time (wt%)/Est. Yield Stress (Pa)	70.8/90

14 MINERAL RESOURCE ESTIMATES

14.1 Introduction

The December 31, 2019 Mineral Resource and Mineral Reserve Estimation was carried out by the Island Gold Mine Technical Services department's staff under the supervision of Raynald Vincent, P.Eng., M.G.P., Chief Geologist and Nathan Bourgeault, P.Eng., Chief Engineer of the Island Gold Mine. Both are considered Qualified Persons within the meaning of Canadian Securities Administrators' National Instrument 43-101.

This section describes the Mineral Resource estimation methodology and summarizes the key assumptions considered by Island Gold personnel. In the opinion of the authors, the Mineral Resource evaluation reported herein is a reasonable representation of the gold Mineral Resources contained within the Island Gold property at the current level of sampling. The Mineral Resources have been estimated in conformity with generally accepted CIM Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines and are reported in accordance with the Canadian Securities Administrators' National Instrument 43-101. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the Mineral Resources will be converted into Mineral Reserves.

Island Gold's technical staff carried out geological interpretation of the mineralized zones according to local conventions used at the Island Gold Mine as follows:

- C, D, D1, E2 and E1E for the Island Domain (IG) and Lochalsh Domain (LC);
- GD2, GP2, GD3, GP5, GD6, GD7 and GD9 for the Goudreau Domain; and
- E1E, B, D, D1, C, G, G1, GNW and STH for the Lower Island Domain (EX) and Extension 2 Domain (X2).

The zones are clearly defined on longitudinal sections.

Prior to outlining Mineral Resources on vertical longitudinal sections, a global Mineral Resource model was carried out to identify mineralized zones that meet technical parameters. The Mineral Resources presented here are exclusive of Mineral Reserves.

14.2 Mineral Resources Classifications, Categories and Definitions

- Mineral Resources were classified according to the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards (May 10, 2014). A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated, or interpreted from specific geological evidence and knowledge, including sampling.
- An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated based on limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

- An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.
- A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.
- Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.

14.3 Methodology

The Mineral Resource evaluation methodology involves the following procedures:

- Database compilation and validation;
- Construction of wireframe models for the boundaries of the gold mineralization;
- Geostatistical analysis and variography;
- Block modelling and grade interpolation;
- Definition of Mineral Resource domains;
- Assessment of “reasonable prospects for economic extraction” and selection of appropriate cut -off grades; and
- Preparation of the Mineral Resource Statement.

The Qualified Person believe that the current drilling information is sufficiently reliable to interpret with confidence the boundaries for gold mineralization and that the assay data is sufficiently reliable to support Mineral Resource estimates. Gems software (version 6.8) was used to construct the geological solids, prepare assay data for geostatistical analysis, construct the block model, estimate metal grades, and tabulate Mineral Resources.

Mineralized intersections were determined for each drill hole and underground development face by the geology department. The diamond drill hole intersections were determined from interpretation on vertical cross-sections and horizontal plans while the development intersections were interpreted using face mapping and assay results of each development face. Each mineralized intersection is tagged in the database according to its respective zone name.

14.4 Databases

Within the Gems project, two different databases are used for Mineral Resource and Mineral Reserve estimates, through two different workspaces in Gems, one for surface and underground drill holes and a second one for channel sampling.

Table 14-1 summarizes the drilling completed near the Island Gold deposit or on the property and Table 14-2 the channel sampling.

Surface holes are usually oriented more or less perpendicular to the main trend of mineralization (Figure 14-1). Conversely, the underground drill holes have highly variable azimuths and dips, as they were drilled in series of fans from individual drill stations, which creates a multitude of angles between drill holes and mineralization (Figure 14-2). Some drill holes may then end up being more or less parallel to the mineralization and not be representative of true mineralized width. However, this impact is mitigated by the modeling technique limiting all intercepts within interpreted domains to those that comply with the true mineralized widths.

Table 14-1 Island Gold Drill Hole Database Summary (Dec 31, 2019)

Location	Number of Holes	Length (metres)
Surface	831	549,287
Underground	5,580	814,063
Total	6,411	1,363,350

In addition to the drill holes, underground channel samples of the Island Gold mine were also used in Mineral Resource estimation. The channel samples were taken from the 125 metre level (Upper Mine) to the 900 metre level (Lower Zone).

Table 14-2 Island Gold Channel Sample Database Summary (Dec 2019)

Sample type	Number of Channels	Length (metres)
Channel sampling	9,148	38,444

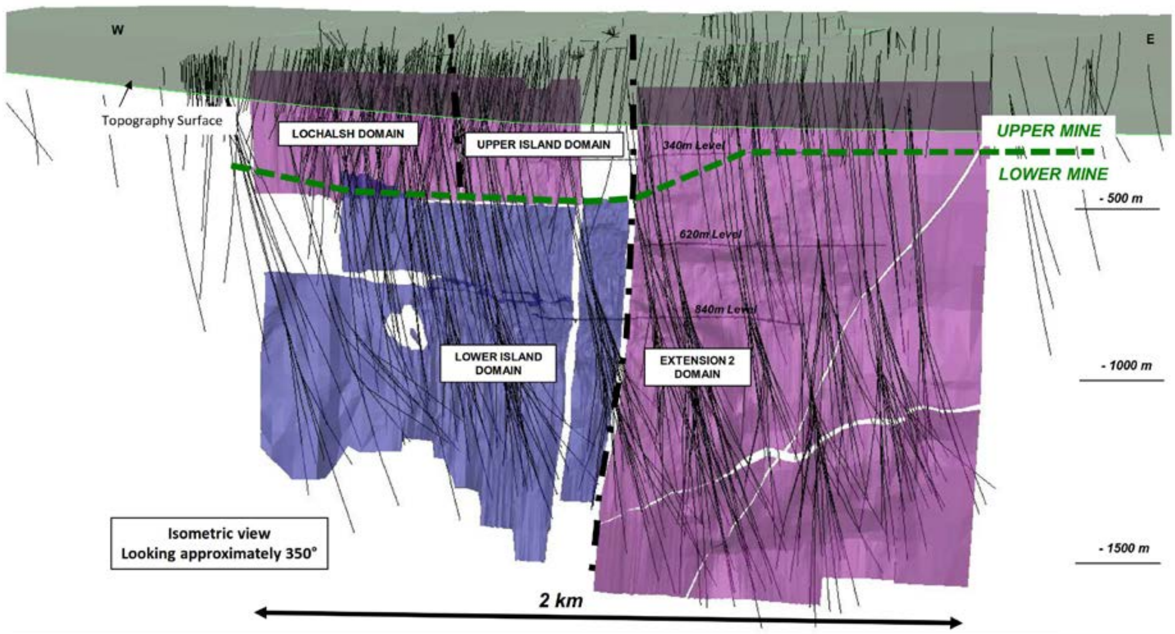


Figure 14-1 Surface Diamond Drilling – Island Gold Mine

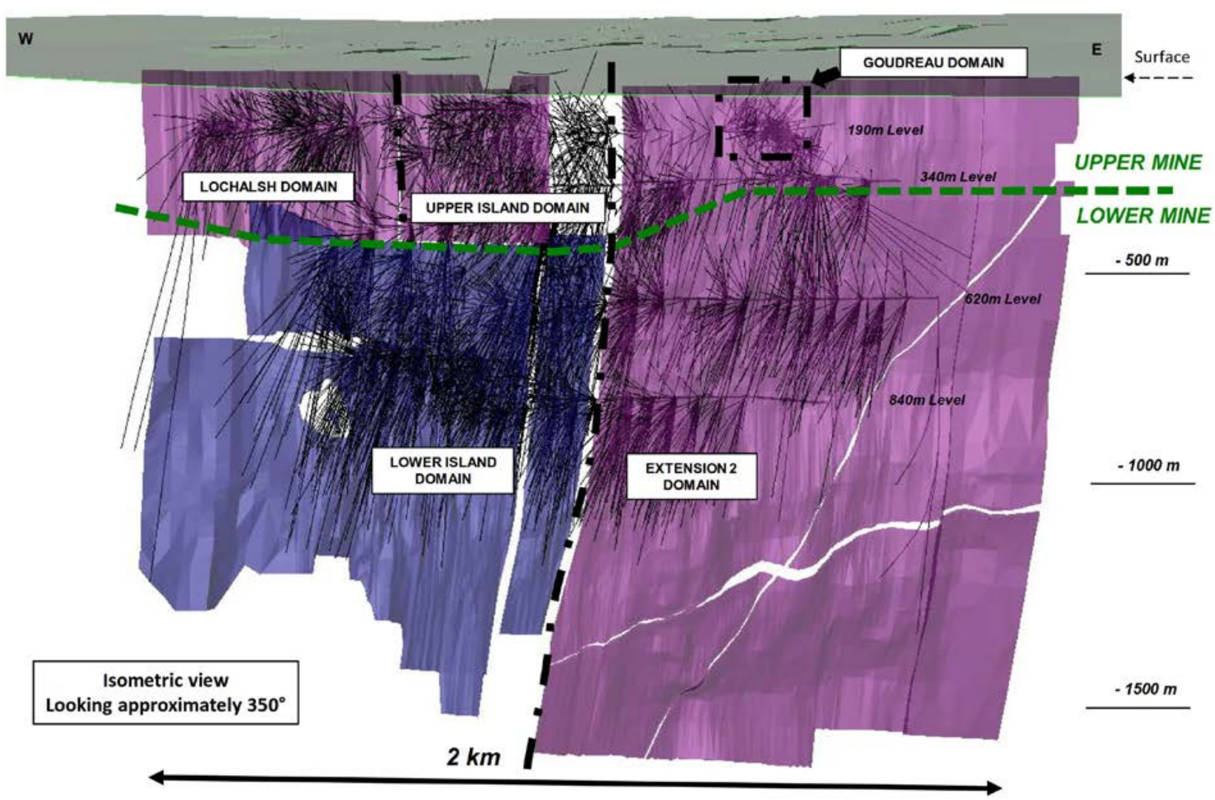


Figure 14-2 Underground Diamond Drilling – Island Gold Mine

14.5 Gold Modeling

Island Gold personnel modeled the gold mineralization by interpreting mineral-domain polylines on west looking cross -sections (azimuth 270°) that are oriented almost perpendicular to the general strike of the Island Gold API Zone (100-105°) and span over 2.4 km along the deposit. Distances between cross -sections vary from 10 m in the core of the deposit to 40 m in the extensions where the drilling pattern is wider. Polylines drawn on sections were then joined by tie lines to produce 3D mineralized solids for the different domains. The minimum width for interpreted zones is set to 2.0 m (true width). Solids were validated in Gems to estimate volumes.

Representative cross sections showing gold mineral-domain interpretations of Island Gold Zones are shown in Figure 14-3 and Figure 14-4. while Figure 14-5 shows the resulting 3D solids.

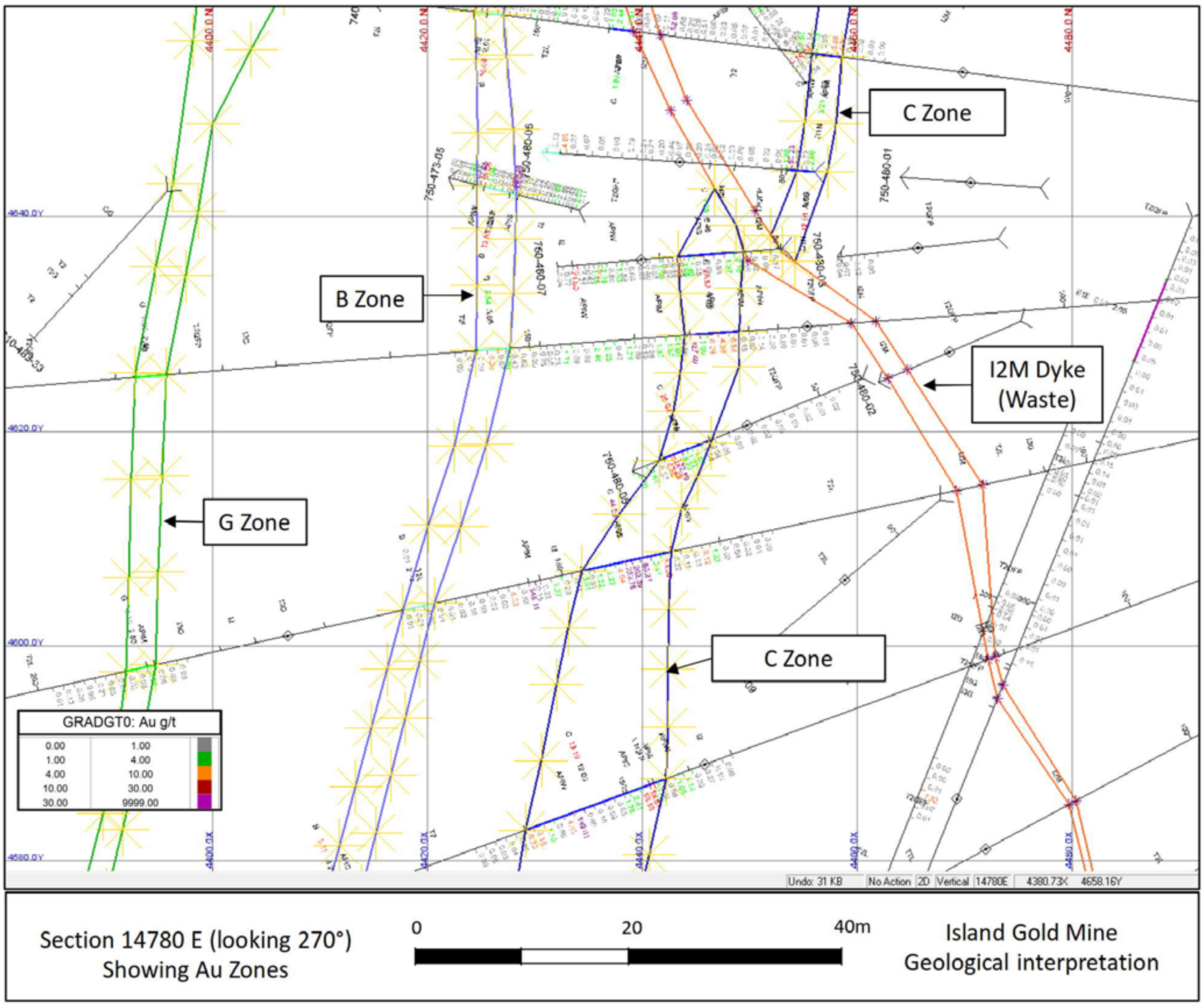


Figure 14-3 Cross-section 14780E Showing Island Gold Mineralized Zones

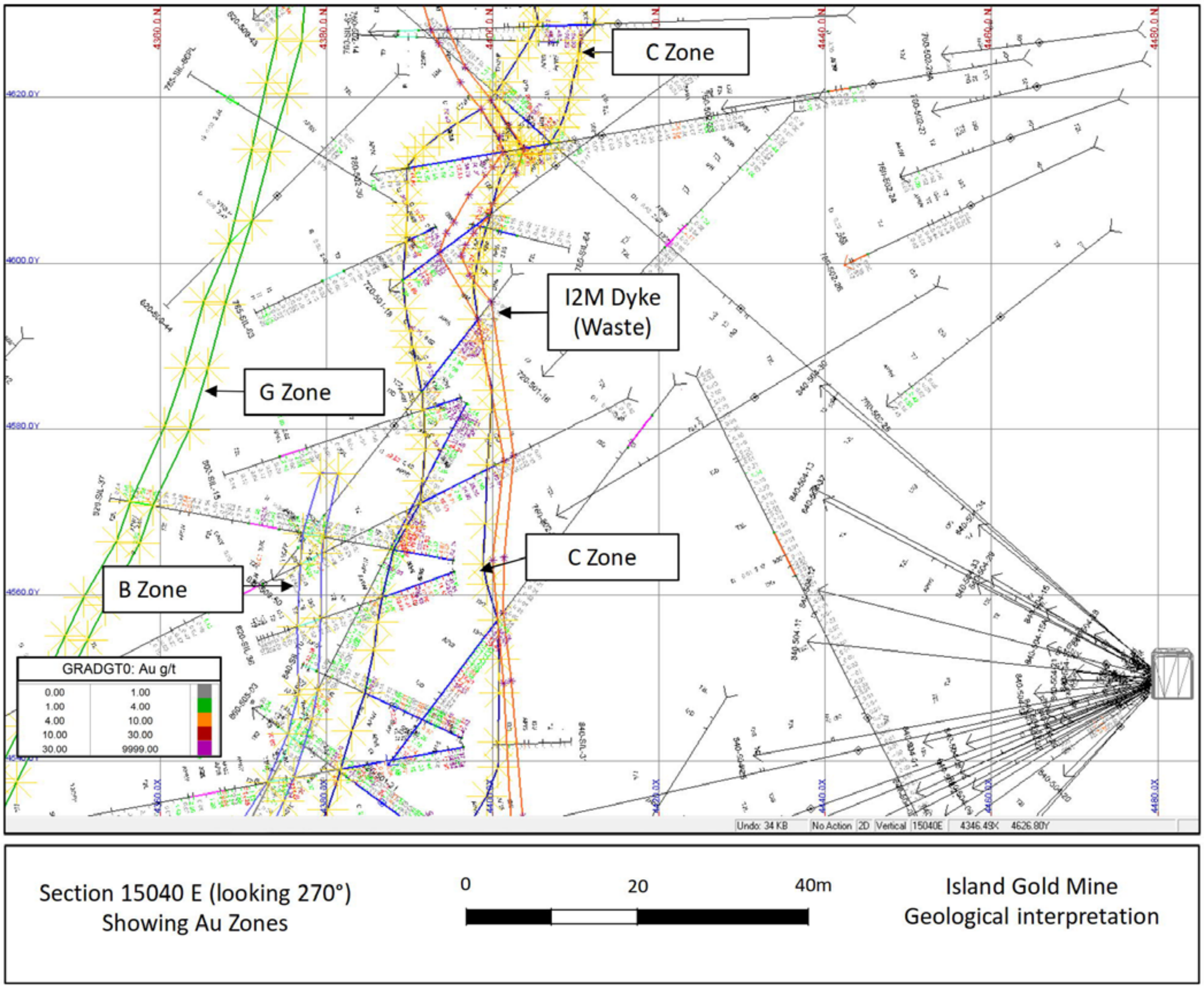


Figure 14-4 Cross-Section 15040E Showing Island Gold Mineralized Zones

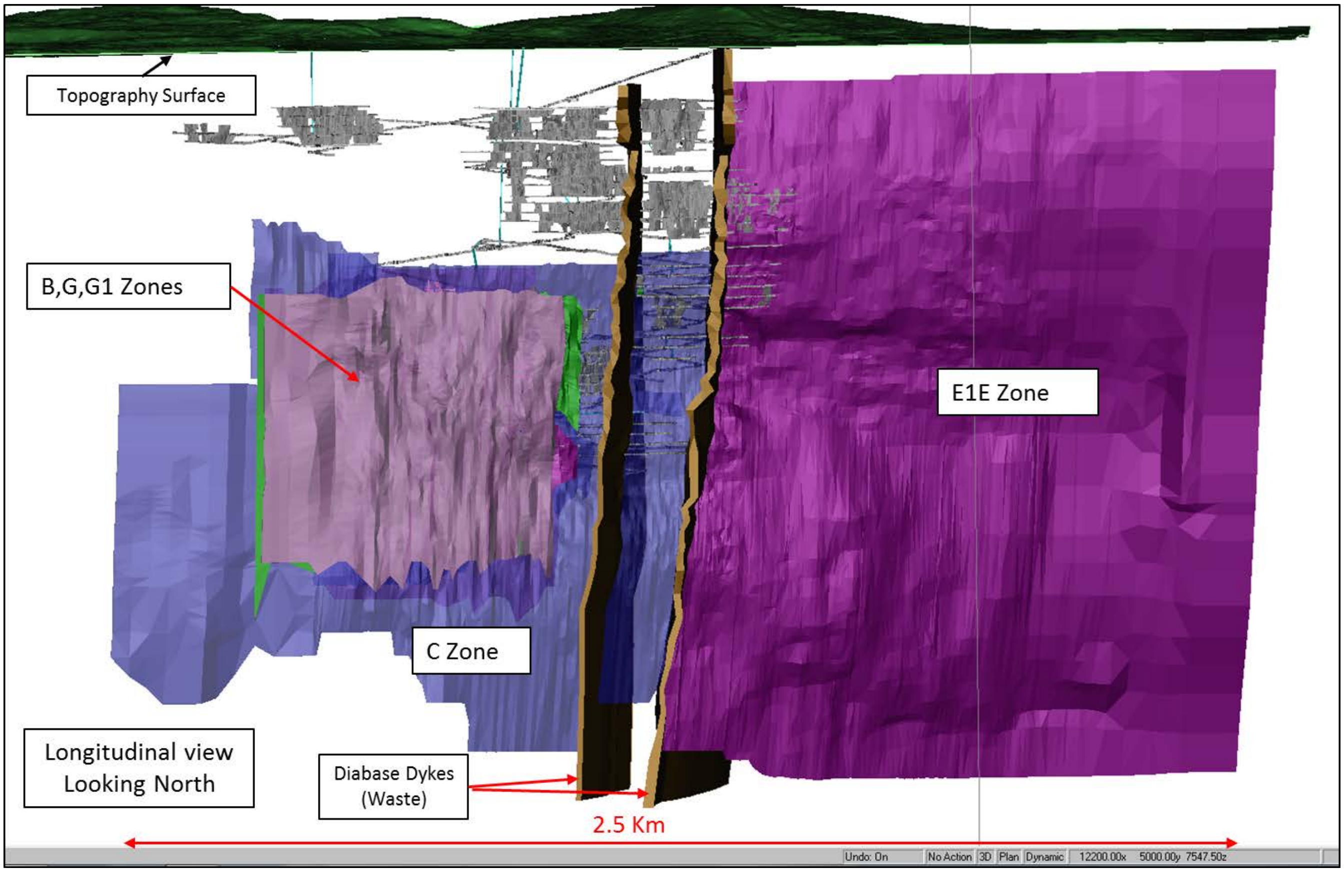


Figure 14-5 3D Mineralized Solid Island Gold Lower Zones

14.6 Statistical Analysis and Grade Capping

Drill hole assay intervals that intersect interpreted domains were coded in the database and were used to analyse sample lengths, generate statistics, and for compositing and variography. Table 14-3 summarizes some statistics drawn from the original (raw) assay data with the corresponding proposed grade capping value and the number of samples capped for the Island Gold Lower Zones. The statistics show that about 1.52% of the DDH samples and 3.66% of the chip samples were capped. All zone capping grades are displayed except for GP2, GP5, GD7 and GD9 which were not updated therefore, historic capping grades of 75g/t for DDH and Faces were used.

Table 14-3 Summary Statistics of Original Assay Samples from Diamond Drill Holes and Faces

Zone	Sample Type	Number Samples	Uncapped Mean	C.V.	Capping Value	Number Capped	Capped Mean	Capped C.V.	Apparent Loss	% Capped
EX-C (without HG)	730 DDH	13,648	13.34	7.36	225	122	10.42	2.93	-21.9%	0.89%
EX-C HG	730 DDH	3,619	33.33	2.75	300	84	28.93	2.16	-13.2%	2.32%
EX-D1	725 DDH	48	36.06	3.20	40	5	8.65	1.43	-76.0%	10.42%
EX-D	720 DDH	2,018	4.54	5.47	50	47	3.04	2.87	-33.0%	2.33%
EX-G	740 DDH	2,951	7.52	10.69	70	44	4.05	2.72	-46.1%	1.49%
EX-G1	745 DDH	1,433	7.24	7.55	45	28	3.35	2.47	-53.7%	1.95%
EX-GNW	742 DDH	522	8.28	2.88	70	10	6.96	2.06	-15.9%	1.92%
EX-B	760 DDH	3,934	12.07	10.69	90	99	6.22	2.67	-48.5%	2.52%
EX-SHT	750 DDH	25	17.56	2.57	50	2	10.34	1.41	-41.1%	8.00%
X2-E1E	310 DDH	9,878	11.29	4.33	160	122	8.96	2.77	-20.7%	1.24%
LC-E1E	410 DDH	3,207	6.45	4.98	75	51	4.71	2.55	-27.0%	1.59%
LC-D	420 DDH	1,687	2.28	4.76	45	14	1.84	3.00	-19.3%	0.83%
LC-C	430 DDH	1,485	4.98	8.49	60	21	2.89	3.03	-42.0%	1.41%
LC-E2	450 DDH	1,450	3.80	4.99	55	13	2.96	2.52	-22.1%	0.90%
IG-E1E	110 DDH	4,174	7.30	3.85	100	53	6.08	2.58	-16.7%	1.27%
IG-D	120 DDH	2,545	6.87	5.59	75	45	4.64	2.53	-32.5%	1.77%
IG-C	130 DDH	2,449	8.07	5.87	100	30	5.53	2.70	-31.5%	1.22%
IG-E2	150 DDH	546	9.05	7.02	75	23	3.74	1.87	-58.7%	4.21%
IG-D1	160 DDH	1,439	3.53	3.78	75	8	3.15	2.78	-10.8%	0.56%
X1-E1E	210 DDH	1,312	6.78	2.71	75	17	5.94	2.06	-12.4%	1.30%
GD-G2	620 DDH	488	16.72	3.55	100	22	9.96	2.43	-40.4%	4.51%
GD-G3	630 DDH	618	12.90	6.38	75	17	5.38	2.76	-58.3%	2.75%
GD-G6	660 DHH	434	29.95	2.88	100	34	16.66	1.79	-44.4%	7.83%
All zones	**DDH**	**59,910**	**11.07**			**911**	**8.25**		**-25.5%**	**1.52%**

Zone	Sample Type	Number Samples	Uncapped Mean	C.V.	Capping Value	Number Capped	Capped Mean	Capped C.V.	Apparent Loss	% Capped
EX-C (without HG)	730 Faces	8,553	12.99	3.52	125	199	10.01	2.39	-22.9%	2.33%
EX-C HG	730 Faces	2,203	43.14	2.93	190	126	30.27	1.74	-29.8%	5.72%
EX-D	720 Faces	99	10.78	5.64	20	6	3.13	1.77	-70.9%	6.06%
EX-G	740 Faces	53	6.10	1.83	30	3	5.33	1.51	-12.6%	5.66%
EX-GNW	742 Faces	134	12.63	3.13	30	11	6.03	1.61	-52.2%	8.21%
EX-B	760 Faces	511	17.28	3.95	60	32	8.49	1.93	-50.9%	6.26%
X2-E1E	310 Faces	2,843	12.10	4.75	75	93	7.76	2.11	-35.9%	3.27%
LC-E1E	410 Faces	2,464	11.77	3.68	75	96	7.69	2.23	-34.7%	3.90%
LC-D	420 Faces	72	4.34	3.31	45	2	3.48	2.77	-19.8%	2.78%
LC-C	430 Faces	102	8.23	7.74	60	1	2.47	2.83	-70.0%	0.98%
IG-E1E	110 Faces	6,990	12.83	3.59	75	273	8.57	2.04	-33.2%	3.91%
IG-D	120 Faces	4,018	12.69	3.76	75	139	8.09	2.03	-36.2%	3.46%
IG-C	130 Faces	4,537	14.28	5.23	75	157	8.61	1.98	-39.7%	3.46%
IG-E2	150 Faces	399	6.62	3.28	30	22	3.75	1.98	-43.4%	5.51%
IG-D1	160 Faces	1,328	6.48	3.22	75	27	5.40	2.45	-16.7%	2.03%
X1-E1E	210 Faces	3,216	18.17	3.49	75	136	9.52	1.87	-47.6%	4.23%
GD-G2	620 Faces	264	81.90	4.09	75	42	18.80	1.52	-77.0%	15.91%
GD-G3	630 Faces	264	18.32	3.95	75	18	8.13	2.46	-55.6%	6.82%
GD-G6	660 DHH	215	37.11	5.61	75	18	13.54	1.72	-63.5%	8.37%
All zones	**Faces**	**38,265**	**15.48**			**1401**	**9.94**		**-35.8%**	**3.66%**

Figure 14-6 and Figure 14-7 show an example of the histogram and the probability plot used for the grade capping study of the Zone EX-C (Island Lower C Zone – code 730).

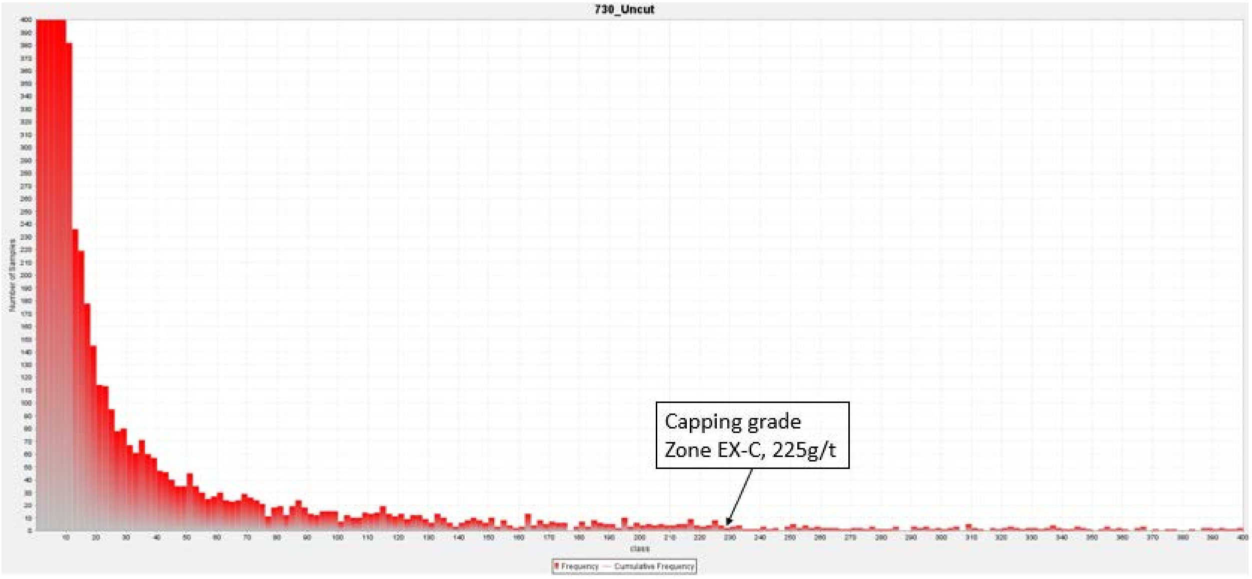


Figure 14-6 Histogram Plot Zone EX-C (Island Lower)

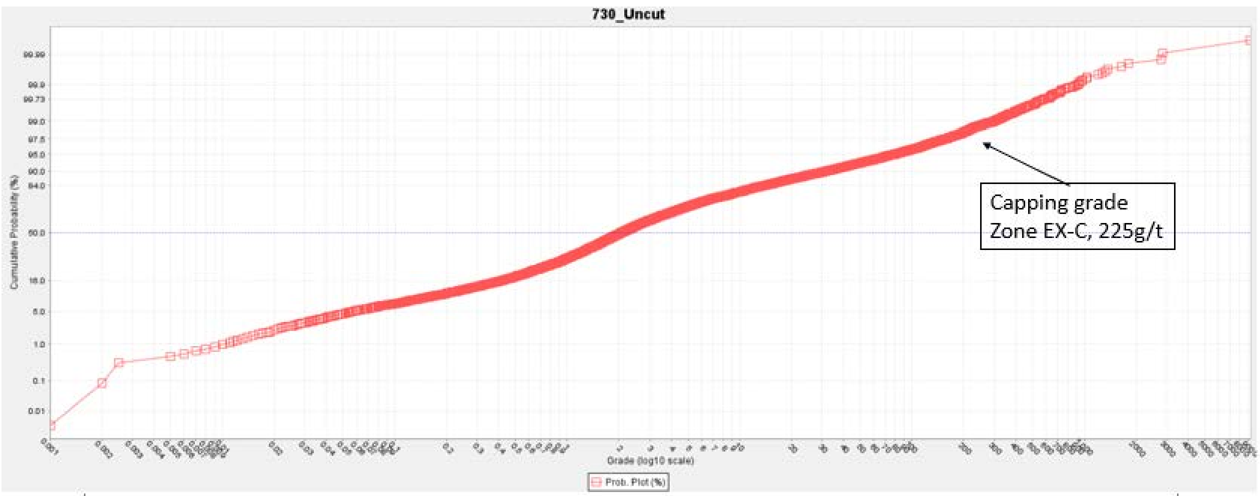


Figure 14-7 Probability Plot Zone EX-C (Island Lower)

14.7 Compositing

Intervals within each interpreted zone were assigned a zone code. Capped assays were composited to achieve a uniform sample support for grade interpolation. To determine the optimal composite length, many factors were taken into consideration. Considering the relatively narrow nature of many of the mineralized domains (3 m to 8 m), the proposed block size (10 m x 10 m x 4 m), the original sample length (between 0.3 m to 1.5 m), the capped assays were composited over two-metre lengths, from drill hole collar to toe, within the interpreted zones.

The composite length avoids de-compositing samples, which occurs when the sample length exceeds the composite length and provides a reasonable reconciliation to the raw data mean grade while sufficiently reducing the variation coefficient. All intervals within solids that have no assays were given a value of zero during compositing. Composites of less than 0.75 m were discarded for grade interpolation.

Zones in the upper part of the mine including the Lochalsh, Goudreau and Upper Island domains are composited differently than the lower zones. The zones are typically thinner and therefore, a smaller block size is used for the estimation (5 m x 5 m x 2m). As a result of these differences the drill holes are composited over one-metre lengths, from drill hole collar to toe, within the interpreted zones. Composites of less than 0.3 m were discarded for grade interpolation.

Descriptive statistics of the composites used for the zones in Lower Island (EX) and Extension 2 (X2) domains are shown in Table 14-4.

Table 14-4 Summary Statistic for 2 m Composites

Zone	Code	Number of Composites	Mean Au Grade g/t	Standard Deviation	Coefficient of Variation
EX-C	730 DDH	4943	8.69	17.73	2.04
EX-C HG	730 DDH	1221	25.14	39.21	1.56
EX-D1	725 DDH	1305	2.07	4.33	2.09
EX-D	720 DDH	1498	1.74	3.93	2.26
EX-G	740 DDH	1431	2.94	6.35	2.16
EX-G1	745 DDH	676	2.16	4.36	2.02
EX-GNW	742 DDH	223	5.54	8.47	1.53
EX-B	760 DDH	1730	4.52	9.67	2.14
EX-SHT	750 DDH	12	8.23	6.44	0.78
X2-E1E	310 DDH	3124	7.36	14.34	1.95
EX-C	730 Faces	3231	9.91	15.52	1.56
EX-C HG	730 Faces	863	30.91	36.14	1.17
EX-G	740 Faces	21	5.78	5.81	0.96
EX-D1	725 Faces	6	8.23	6.44	0.98
EX-GNW	742 Faces	50	6.16	6.98	1.07
EX-B	760 Faces	205	7.92	9.63	1.03
X2-E1E	310 Faces	1015	6.95	8.94	1.11

14.8 Density

A review of the zone density was conducted in 2016 for several different mineralized zones in the lower part of the mine. Results confirm figures that have been used in the past with density for ore zones established at 2.78 t/m³ (Table 14-5). These densities have been used for the December 2019, Mineral Resource estimates.

Table 14-5 Specific Gravity Measurements

Number of Measurements	Mean	Median	Standard Deviation	Coefficient of Variation
4,828	2.78	2.77	0.078	0.028

14.9 Variography

Gemcom software is used to model the spatial continuity of the Island Gold deposit. Experimental variograms are generated from the composites within the zones.

The variography models the nugget effect and the spherical structures representing the larger scale spatial variability of the datasets. The modeled variograms for domains 730 and 310 (EX-C and X2 zones) are summarized in Table 14-6. The resulting orientations were visualized in Gems to see if the directions of the axes were consistent with the solid orientations. The orientations usually fit well with the general orientations of the interpreted zones. Note that some reported rotations have been adjusted based on interpreted geological constraints. Search ellipse orientations are also shown overlain on a long section in Figure 14-8.

The nugget effect which is determined by variography is moderate to high, around ~40-50 % of the total variance for EX-C and X2-E1E. Variography provided information relevant to the estimation parameters used for ordinary kriging, as well as a guide for Mineral Resource classification.

Table 14-6 Island Gold Deposit Variography Study

Sector – Zone	Nugget	Ranges		Search Anisotropy		
		1st Structure	2nd Structure	Principal Azimuth	Principal Dip	Second Azimuth
Extension 2 Domain up Zone E1E (310) Above 4500/4600	77	X: 53	X: 85	155	-64	99
		Y: 47	Y: 76			
		Z: 4	Z: 7			
		Sill: 22	Sill: 77			
Extension 2 Domain East Zone E1E (310) East of 15700E	196	X: 5	X: 38	10	65	100
		Y: 5	Y: 37			
		Z: 5	Z: 38			
		Sill: 38	Sill: 40			
Extension 2 Domain Zone E1E (310) West of 15700E	336	X: 38		117	-59	91
		Y: 31				
		Z: 17				
		Sill: 407				
Lower Island Domain EX-C (730)	375	X: 38		117	-59	91
		Y: 29				
		Z: 17				
		Sill: 371				

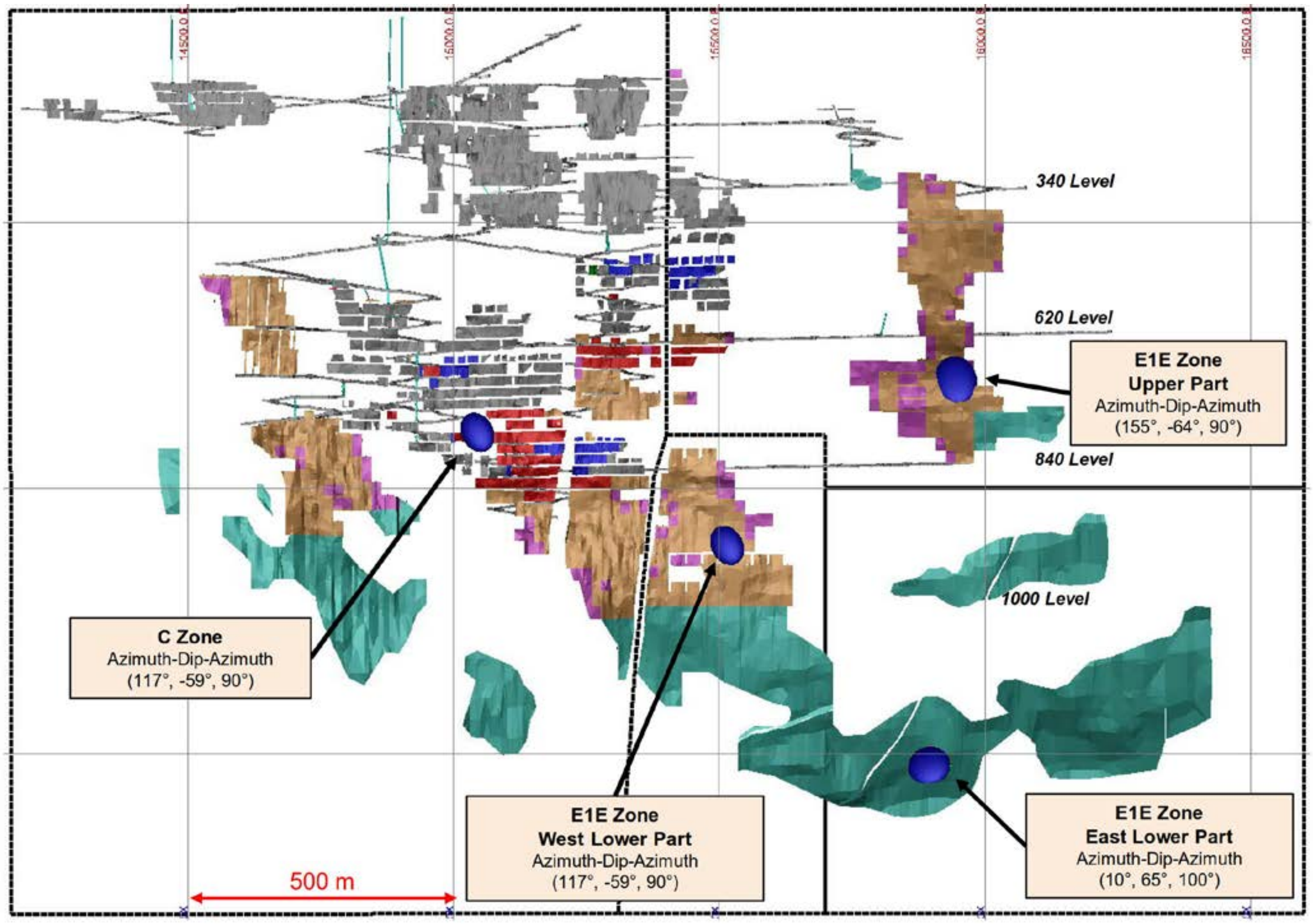


Figure 14-8 Search Ellipse Orientation Corresponding to Variography

14.10 Block Modelling

14.10.1 Upper Island Gold Mine

Block modelling consists of in a 3D array of cells (blocks) with specified dimensions and for which the grade of each block is determined by an interpolation method (algorithm). For the upper mine, four different models were produced between the 435 Level and the topographic surface. The models are for the Lochalsh, Island Gold, Extension 2, and Goudreau Domains.

The block dimensions for these sectors are 5 m along strike (east-west), 5 m in elevation, and 2 m across strike (north-south). The blocks are tagged to a specific rock code according to which mineralized zone they are fall within. A percentage inside the solid is given to each block.

Block grade interpolation was carried out using inverse distance squared (ID^2) for the Goudreau Domain and ordinary kriging (OK) for the three other Domains. A minimum of 9 composites for the first pass, a minimum of 5 for the second pass, and a minimum of 1 for the third pass and a maximum of 16 composites for all passes were used to interpolate the grade of each block. The search ellipse dimensions used for grade interpolation are different for each sector.

14.10.2 Lower Island Mine

Two block models were defined to estimate Mineral Resources for the lower mine. One for the west side in the Lower Island Domain (DEEPZONE model) for the C zone and parallel smaller structures and the second for the E1E zone in Extension 2 Domain (EXT2 model).

Mineral Resources for the Lower Island Domain were estimated by block modelling with 10 m block dimensions along strike, 10 m in elevation, and 4 m across-strike in the GEMS software using two-metre composites. Composites shorter than 0.75 m were discarded. Block model parameters for the Lower Island Domain models are given in Table 14-7.

Table 14-7 Block Model Parameters, DEEPZONE Model

	East (X)	North (Y)	Elevation (Z)
Origin	14,000	3,880	5,500
Block Size	10	4	10
Number of Blocks	260	190	172
Model Rotation		0°	

For the EXT2 model, block dimensions were changed to 10 m along strike, 5 m in elevation, and 2 m across-strike to reflect the thinner mineralized zone, and the shallower dip of approximately 65 degrees. Those dimensions fit better with the solids' orientation and dimensions. Block model parameters for the EXT2 zone model are given in Table 14-8.

Table 14-8 Block Model Parameters, EXT2 Model

	East (X)	North (Y)	Elevation (Z)
Origin	15,250	3,850	5,450
Block Size	10	2	5
Number of Blocks	140	400	325
Model Rotation		0°	

14.10.3 Grade Interpolation Methodology for Island Lower Zones

The grade interpolation for the Island Gold Lower Domain block models was completed using an ordinary kriging method. Anisotropic search ellipsoids were selected for the grade interpolation process based on the analysis of the spatial continuity of capped composites using variography (Table 14-9). Minimum and maximum numbers of composites are set for interpolation and restrictions are placed on the number of composites used from each drill hole.

The grade estimates were generated using the 2 m composites. The blocks included in a zone are estimated only with the composites coded within this zone (hard boundary). The block models were estimated using the following parameters for both block models and all zones, except for some minor differences in the C zone estimate.

A new sub-domain called the High Grade Domain has been implemented for the zone EX-C. Inside this domain the capping grade is 300 g/t for DDH and 190 g/t for the chips. Consequently, there are five passes in the EX-C zone. It uses the same criteria as the first pass but only estimates blocks within the HG Sub-Domain boundary and uses the higher capping grades.

In addition to the capping of high-grade outliers in the EX-C zone, the spatial influence of high-grade assays was restricted in the 4th and 5th pass in the grade interpolation process. Composites with grades higher than 125 g/t Au had their influence limited to a search ellipse of 15 m x 10 m x 5 m. This procedure is judged prudent to limit excessive smearing of high grade samples during interpolation of blocks in areas where drill spacing is wider for example, exploration holes beneath the mine.

- First Pass (**C zone only**): minimum of 9 and maximum of 16 composites found within a search ellipse that has the longest axis close to the range of the first structure identified by variography. A maximum of four samples per drill hole from a minimum of three different drill holes, can be used for any block estimate. Samples in the High Grade Sub-Domain in the C zone are used for this pass. Those blocks are classified as Measured Mineral Resources.
- Second Pass: minimum of 9 and maximum of 16 composites found within a search ellipse that has the longest axis close to the range of the first structure identified by variography. A maximum of four samples per drill hole from a minimum of three different drill holes, can be used for any block estimate. Samples from development are used for this pass; therefore, only blocks within 10 m of development are estimated. Those blocks are classified as Measured Mineral Resources.
- Third Pass: minimum of 5 and maximum of 16 composites within a search ellipse with the longest axis that corresponds to the range of the second structure identified by variography. A maximum of four composites per drill hole from a minimum of two different drill holes, can be used for block estimates. Samples from development are used for this pass; therefore, only blocks within 10 m from development are estimated (corresponds to the Measured Mineral Resources).
- Fourth Pass: minimum of 5 and maximum of 16 composites within a search ellipse with the longest axis that corresponds to the range of the second structure identified by variography. A maximum of four composites per drill hole from a minimum of two different drill holes, can be used for block estimates. Samples from development are not used for this pass; therefore, all blocks that have not been estimated in the previous interpolation passes can be estimated. Grades higher than 125g/t have a restricted ellipse (**C zone only**).
- Fifth pass: minimum of 1 and maximum of 16 composites within a search ellipse with the longest axis that corresponds to 1.5X the range of the second structure identified by variography. A maximum of four composites per drill hole from a minimum of one drill hole, can be used for block estimates. Samples from development are not used in this pass; therefore, all blocks that have not been estimated in the previous interpolation passes can be estimated. Grades higher than 125g/t have a restricted ellipse (**C zone only**).

Table 14-9 Summary of Island Lower Zones Estimation Parameters

Zone	Pass	Method	Search Anisotropy			Sample Search			Sample			Data type	Restricted Ellipse
			Primary Azimuth	Prim. Dip	Int. Azmth	X	Y	Z	Min	Max	Max per Hole		
EX-C	1	OK	117	-59	90	25	20	10	9	16	4	DDH + Faces	No
EX-C	2	OK	117	-59	90	25	20	10	9	16	4	DDH + Faces	No
EX-C	3	OK	117	-59	90	40	30	10	5	16	4	DDH + Faces	Yes
EX-C	4	OK	117	-59	90	40	30	10	5	16	4	DDH only	Yes
EX-C	5	OK	117	-59	90	60	45	20	1	16	4	DDH only	Yes
X2-E1E UP	1	OK	155	-64	90	30	25	10	9	16	4	DDH + Faces	No
X2-E1E UP	2	OK	155	-64	90	50	40	15	5	16	4	DDH + Faces	No
X2-E1E UP	3	OK	155	-64	90	50	40	15	5	16	4	DDH only	No
X2-E1E UP	4	OK	155	-64	90	85	75	16	1	16	4	DDH only	No
X2-E1E WEST	1	OK	117	-59	90	25	20	10	9	16	4	DDH only	No
X2-E1E WEST	2	OK	117	-59	90	40	30	15	5	16	4	DDH only	No
X2-E1E WEST	3	OK	117	-59	90	70	55	20	1	16	4	DDH only	No
X2-E1E EAST	1	OK	10	65	100	25	25	10	9	16	4	DDH only	No
X2-E1E EAST	2	OK	10	65	100	40	40	15	5	16	4	DDH only	No
X2-E1E EAST	3	OK	10	65	100	60	60	25	1	16	4	DDH only	No
EX-B	1	OK	117	-59	90	25	20	10	9	16	4	DDH + Faces	No
EX-B	2	OK	117	-59	90	40	30	10	5	16	4	DDH + Faces	No
EX-B	3	OK	117	-59	90	40	30	10	5	16	4	DDH only	No
EX-B	4	OK	117	-59	90	60	45	15	1	16	4	DDH only	No
EX-D	1	OK	117	-59	90	25	20	10	9	16	4	DDH + Faces	No
EX-D	2	OK	117	-59	90	40	30	15	5	16	4	DDH + Faces	No
EX-D	3	OK	117	-59	90	60	45	20	5	16	4	DDH only	No
EX-D	4	OK	117	-59	90	60	45	20	1	16	4	DDH only	No
EX-D1	1	OK	117	-59	90	25	20	10	9	16	4	DDH + Faces	No
EX-D1	2	OK	117	-59	90	40	30	15	5	16	4	DDH + Faces	No
EX-D1	3	OK	117	-59	90	60	45	20	1	16	4	DDH only	No
EX-G	1	OK	117	-59	90	25	20	10	9	16	4	DDH + Faces	No
EX-G	2	OK	117	-59	90	40	30	10	5	16	4	DDH + Faces	No
EX-G	3	OK	117	-59	90	40	30	10	5	16	4	DDH only	No
EX-G	4	OK	117	-59	90	60	45	15	1	16	4	DDH only	No
EX-GNW	1	OK	140	-57	92	25	20	10	9	16	4	DDH + Faces	No
EX-GNW	2	OK	140	-57	92	40	30	10	5	16	4	DDH + Faces	No
EX-GNW	3	OK	140	-57	92	40	30	10	5	16	4	DDH only	No
EX-GNW	4	OK	140	-57	92	60	45	15	1	16	4	DDH only	No
EX-G1	1	OK	117	-59	90	25	20	10	9	16	4	DDH only	No
EX-G1	2	OK	117	-59	90	40	30	10	5	16	4	DDH only	No
EX-G1	3	OK	117	-59	90	60	45	15	1	16	4	DDH only	No
EX-STH	1	OK	110	-60	85	25	20	10	9	16	4	DDH only	No
EX-STH	2	OK	110	-60	85	40	30	10	5	16	4	DDH only	No
EX-STH	3	OK	110	-60	85	60	45	15	1	16	4	DDH only	No

Note:

- *Restricted ellipse of 15m x 10m x 5m is applied for composites greater than 125 g/t for zone EX-C (730)*

14.11 Block Model Validation

Validation of the interpolated model was undertaken to confirm estimation parameters, to verify that the model reflects the input data on both local and global scales and particularly to verify that the estimate is not biased. The validation was performed using a combination of different techniques, as follows:

- Inspection of block grades in plans and sections and visual comparison with drill hole grades;
- Statistical validation of sample means versus block estimates by zones; and
- Mean sample grade within a block vs interpolated grade.

14.11.1 Visual Validation

Visual validation is a verification of the interpolated block model on a local block scale versus the composite grades. A visual inspection has been carried out on cross-sections and bench/level plans. Comparison between local block estimates and nearby composites is generally good and indicates that grade smoothing is not excessive in the block model.

14.11.2 Statistical Validation

Statistical validation of the block model estimates has also been done on the different Island Gold Lower Zones by comparing composite grades to interpolated block grades. Such validation has been done without an economic cut-off. Results indicate that, in general, the block models globally show lower grades than composites (see Table 14-10).

Table 14-10 Statistical Validation Block Models vs Composite Mean Grades (Faces and DDH)

Zone	Codification	Composite Count	Composites Grade (g/t Au)	Block Count	OK Model Grade (g/t Au)	Difference OK/CMP
EX-C	730	8,174	9.17	14,958	9.47	3%
EX-C (HG Zone)	730	2,084	27.53	1,307	27.29	-1%
EX-B	760	1,935	4.88	6,703	3.50	-28%
EXT2-E1E	310	4,139	7.26	122,700	7.78	7%
EX-G	740	1,452	2.98	9,661	2.33	-22%
EX-G1	745	676	2.16	9,750	1.87	-13%
EX-GNW	742	273	5.65	523	5.03	-11%
EX-STH	750	12	8.23	146	8.43	2%

14.11.3 Mean Composite Grade within Blocks vs Interpolated Grade

A separate block model was done for the lower zones which interpolated only blocks that had a composite within it. The block was assigned the grade of that composite. The block grade from the new model is then compared to the original interpolated grade of the block. A successful grade interpolation protocol should result in block grade estimates that demonstrate a minimum amount of bias.

A total of 9,014 blocks with composites within the mineralized solids were identified in the block model. The average gold grade of the composites within those blocks is 6.75 g/t Au while the average interpolated grade is 6.33 g/t Au. The comparison shows that there is no bias between the mean grade of the composites and the estimated grade. The analysis indicates that the Mineral Resource model provides a reasonable estimate of the Island Gold Mine deposit (see Table 14-11).

Table 14-11 Comp. - Mean Sample Grade Within Block and Interpolated Grade for Same Block

Zone	Number of Blocks with Composites	Grade Assigned to Blocks from Composites Only (g/t Au)	Interpolated Grade OK (g/t Au)	Difference OK/CMP
EX-C High Grade	695	26.56	26.31	-0.9%
EX-C Regular Ore	3099	10.49	9.56	-8.9%
EX-D1	10	7.51	6.82	-9.2%
EX-D	51	7.99	6.49	-18.8%
EX-G	781	2.88	2.86	-0.7%
EX-G1	364	2.40	2.36	-1.7%
EX-GNW	141	5.96	5.66	-5.0%
EX-B	919	5.02	4.79	-4.6%
EX-SHT	8	8.58	8.25	-3.8%
X2-E1E	2943	7.19	7.15	-0.6%

14.12 Classification

Block model tonnage and grade estimates for the Island Gold deposit were classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014).

A Mineral Resource classification is typically a subjective concept and industry best practices suggest that Mineral Resource classifications should consider the confidence in the geological continuity of the mineralized structures, the quality and quantity of exploration data supporting the estimates and the geostatistical confidence in the tonnage and grade estimates. Appropriate classification criteria should aim at integrating these concepts to delineate regular areas with similar Mineral Resource classifications.

The authors are satisfied that the geological modelling honours the current geological information and knowledge. The location of the samples and the assay data are sufficiently reliable to support Mineral Resource estimation.

The Mineral Resources at Island Gold Mine are classified into Measured, Indicated and Inferred Mineral Resource categories. The Mineral Resources were classified in two successive stages: automated classification followed by manual editing of the final Mineral Resource categories on longitudinal sections for each individual zone.

Mineral Resources are classified based on drilling density which are as follows:

- Measured Mineral Resources: A maximum drill hole spacing of about 20 m and associated mining development completed. Mineralization must be exposed and continuity visually confirmed. Corresponds mainly to blocks estimated during the first pass.
- Indicated Mineral Resources: A maximum drill hole spacing of 20 m to 25 m between drill holes if no lateral development is above or below the Mineral Resource outline. All Mineral Resources classified as Indicated Mineral Resources are within the blocks estimated in the second and third passes.

- Inferred Mineral Resources: These blocks are represented mainly by areas where drill holes are spaced by more than 30 m (up to 75m) where the mineralization is interpreted to be the extension of known mineralized zones. Extension is limited to a maximum of 30 m from the last drill holes. Blocks classified as Inferred Mineral Resources are estimated mainly during the fourth pass and partly during the third pass.

Additional infill drilling is required to support classification from Inferred to Indicated Mineral Resources and from Indicated to Measured Mineral Resources. It cannot be assumed that all or any part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource because of additional drilling.

Figure 14-9 is an illustration of the blocks estimated by different passes for Zone EX-C and E1E (EXT2). This information is used a guide for classification. Measured Resources (red polygons) are limited to the blocks estimated in the first pass. Indicated Mineral Resources (dark green polygons) are located well within the blocks estimated in the second and third passes. Inferred Mineral Resources (dark blue polygons) are estimated partly in the third pass or fourth pass.

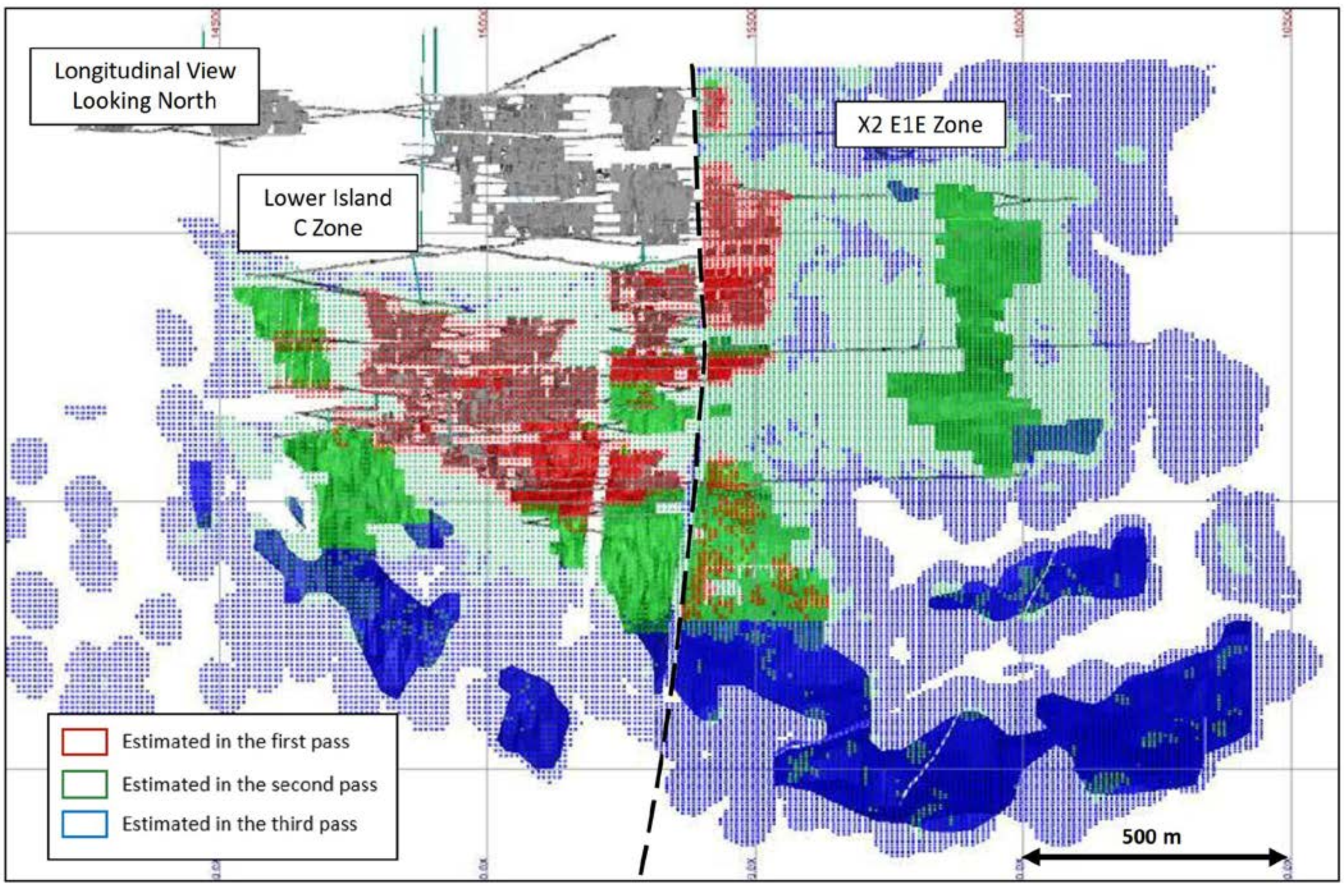


Figure 14-9 Longitudinal Lower C Zone and X2-E1E Zone showing Mineral Resource Classification

14.13 Mineral Resource Statement

CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) defines a Mineral Resource as:

"[A] concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge."

The "reasonable prospects for economic extraction" requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the Mineral Resources are reported at an appropriate cut-off grade considering extraction scenarios and processing recoveries.

Mineral Resources were estimated using a general undiluted cut-off grade of 4.03 g/t Au. This cut-off is based on a gold price of $1,250 per ounce, an exchange rate of 0.77, a mill recovery of 96.5%, a production cost estimated at $203 per tonne. The details of the economic and mining factors are presented in Section 15, Mineral Reserve Estimates.

Once interpolation has been carried out, the Mineral Resource areas were outlined on the vertical longitudinal section of the zone to a maximum lateral and vertical distance of approximately 30 m from drill hole intercepts for the C and E1E zones while a maximum lateral and vertical distance of 20 m was applied to other zones. All blocks within the outlined Mineral Resource shapes are included in the estimation. Cut-off is applied to the overall Mineral Resource shapes and not to individual estimated blocks.

Island Gold Mine reports Mineral Resources exclusive of Mineral Reserves. The majority of Measured and Indicated Mineral Resources are at a higher grade than the economic cut-off and have been converted to Mineral Reserves (see Section 15). Therefore, the vast majority of Mineral Resources at Island Gold Mine are classified as Inferred Mineral Resources. The economic viability of Inferred Mineral Resources has not been demonstrated.

The estimation of Mineral Resources is a complex and subjective process and the accuracy of any such estimate is a function of the quantity and quality of available data and of the assumptions made and judgments used in geological interpretation. Figure 14-10 shows the relative position of the Island Gold Mineral Resources to the underground infrastructure of the mine and the location of the gains and losses of Mineral Resource as of December 31, 2020.

14.13.1 Island Gold Mine - Mineral Resources

Island Gold Mine's Measured and Indicated Mineral Resources are estimated at 878,650 tonnes at 6.51 g/t Au for 184,000 ounces. As a matter of comparison, the Measured and Indicated Mineral Resources as of December 31, 2018 totaled 696,250 tonnes at an average grade of 8.77 g/t Au for 196,200 ounces.

The Inferred Mineral Resources are estimated at 5,392,300 tonnes at 13.26 g/t Au for 2,298,000 ounces. As a matter of comparison, the Inferred Mineral Resources as of December 31, 2018 totaled 4,178,100 tonnes at an average grade of 11.71 g/t Au for 1,573,150 ounces.

Mineral Resources are presented exclusive of Mineral Reserves. The difference in grade between Measured and Indicated Mineral Resources and Inferred Mineral Resources is explained by the fact that the higher grade Measured and Indicated Mineral Resources have been converted to Mineral Reserves (after applying mining factors). The increase in Inferred Mineral Resources (more than 724,500 oz) is largely due to the new drilling at depth in 2019.

Tables 14-12, 14-13, and 14-14 summarize the Mineral Resource by category, presented undiluted and in-situ. A combine Mineral Resource summary is presented in Table 14-15 and notes for all four tables follow Table 14-15.

A year over year reconciliation of Inferred Mineral Resources is presented in Figure 14-11.

Table 14-12 Island Gold Measured Mineral Resource Estimates as of Dec 31, 2019

Zone	Tonnes	Grade (g/t Au)	Ounces
Upper Island Domain – Upper Mine (D, D1and E2 Zones)	13,600	4.61	2,000
Lower Island Domain - Lower C	11,600	4.41	1,700
Total	**25,200**	**4.52**	**3,700**

Table 14-13 Island Gold Indicated Mineral Resource Estimates as of Dec 31, 2019

Location	Zone	Tonnes	Grade (Au g/t)	Ounces
Upper Mine	Lochalsh Domain	132,150	6.55	27,850
	Goudreau Domain - G2, G3, G6 and G7 Zone	59,800	10.38	19,950
	Island Domain - Upper C, E1E, D1, D, E1D and E2 Zones	74,850	6.17	14,850
	Extension 2 Upper Domain - E1E Zone	2,400	9.29	700
Lower Mine	Island Domain - Lower C Zone	213,050	6.93	47,450
	Island Domain - Lower D, B, G Zones	118,100	6.66	25,300
	Extension 2 Lower Domain - E1E Zone	253,050	5.44	44,200
TOTAL		853,400	6.57	180,300

Table 14-14 Island Gold Inferred Mineral Resource Estimate as of Dec 31, 2019

Location	Zone	Tonnes	Grade (Au g/t)	Ounces
Upper Mine	Lochalsh Domain - E2, E1E, D and C Zone	94,700	6.25	19,050
	Goudreau Domain - G3, G7, G9 and GP2 Zone	23,750	11.81	9,050
	Island Domain - Upper E1E, D1 and D Zones	31,900	7.57	7,750
	Extension 1 Domain - Upper E1E Zone	1,800	4.85	300
Lower Mine	Island Domain - Lower C Zones	890,700	13.24	379,150
	Island Domain - Lower B, D1, G, STH and G1 Zones	371,650	8.17	97,600
	Extension 2 Domain - Lower E1E Zone	3,977,800	13.96	1,785,100
TOTAL		5,392,300	13.26	2,298,000

Table 14-15 Island Gold Mineral Resource Estimate Summary as of Dec 31, 2019

Mineral Resource	Tonnes	Grade (g/t Au)	Ounces
Measured	25,200	4.52	3,700
Indicated	853,400	6.57	180,300
Total Measured and Indicated	**878,600**	**6.51**	**184,000**
Inferred	5,392,300	13.26	2,298,000

Notes:

- *CIM definitions of Mineral Resources were followed.*
- *Mineral Resources are estimated at a cut-off grade of 4.03 g/t Au.*
- *High-grade samples were capped at 75 g/t Au for most of the Upper Island Gold zones except IG-E1E and IG-C capped at 100 g/t Au, most of the Goudreau zones except for G2 and G6 capped at 100 g/t Au.*
- *High-grade samples in Lochalsh were capped at 75 g/t Au for E1E, 45 g/t Au for D, 60 g/t Au for C and 55 g/t Au for E2.*
- *In the Lower mine high-grade samples were capped at 90 g/t Au for B, 70 g/t Au for G and GNW, 45 g/t for G1, 50 g/t Au for D and STH, 40 g/t Au for D1, and 160 g/t Au for E1E zones.*
- *Lower C zone has 2 capping grades, at 300 g/t Au inside the HG domain and at 225 g/t Au everywhere else.*
- *Mineral Resources are estimated using a long-term gold price of $1,250 per ounce.*
- *A minimum mining width of 2.00 m was used.*
- *A specific gravity value of 2.78 t/m^3 was used in the Lower Zones and 2.82 t/m^3 otherwise.*
- *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.*
- *Totals may not match due to rounding.*

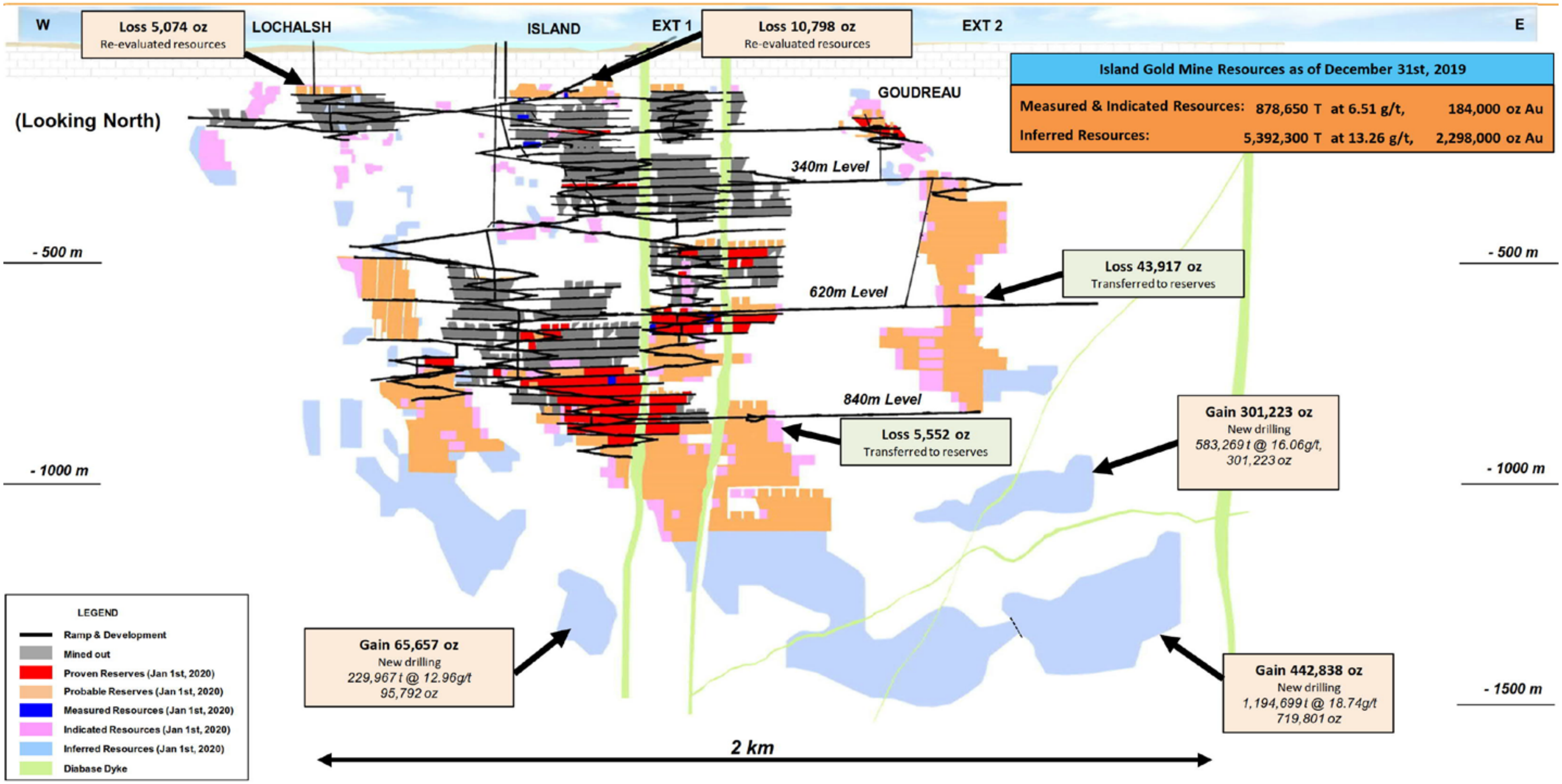


Figure 14-10 Change in Mineral Resources as of Dec 31st, 2019

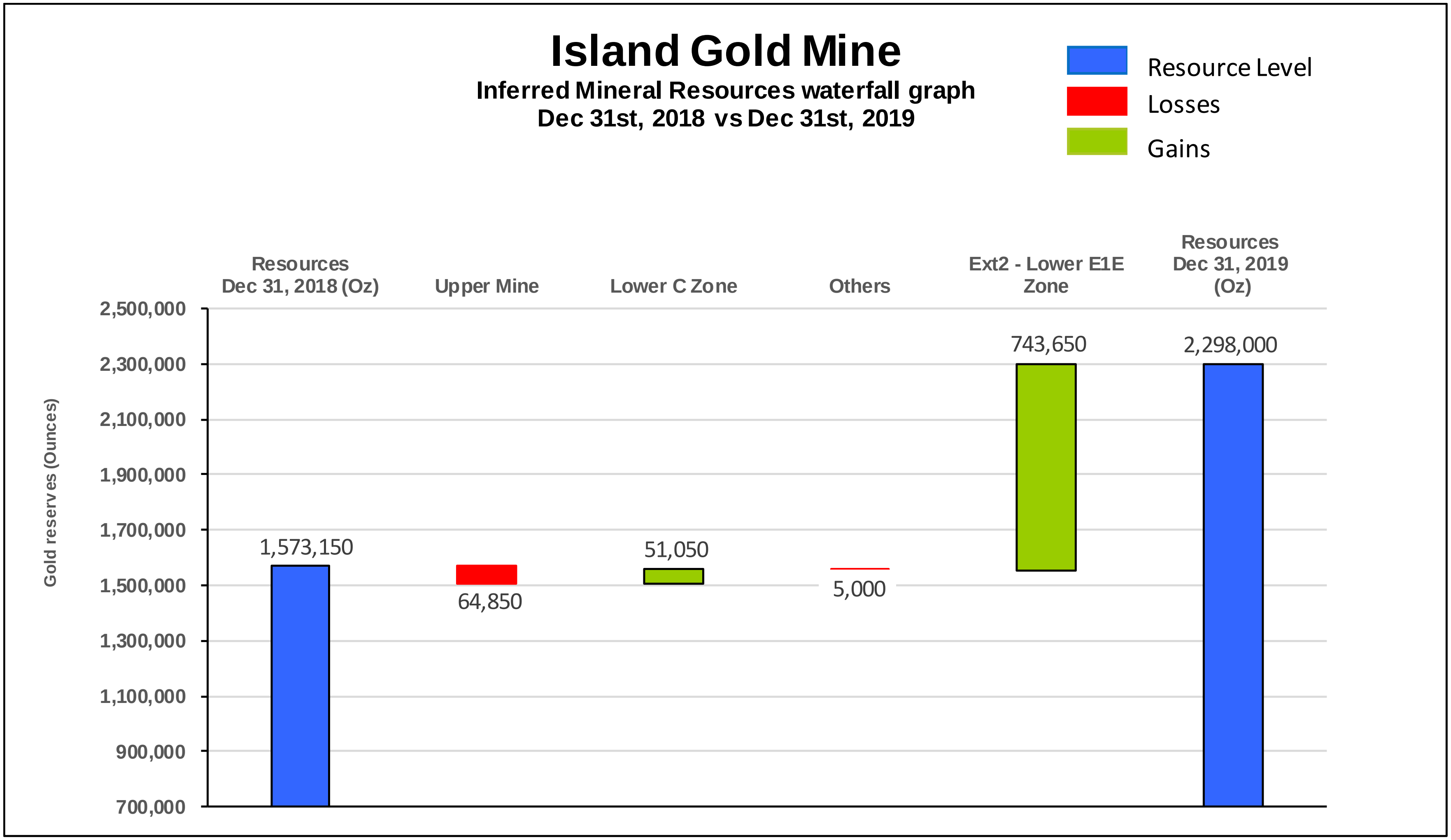


Figure 14-11 Inferred Mineral Resource Waterfall Graph (Dec 31st, 2018 vs Dec 31st ,2019)

15 MINERAL RESERVE ESTIMATES

Mineral Reserve calculations estimate the volume and grade of ore which can be mined and processed at a potential profit. The global Mineral Resource was reviewed by the Island Gold engineering department, with assistance from the geological staff, to define the Mineral Reserve blocks that could be economically extracted with a mining plan. The conversion of Mineral Resources into Mineral Reserves is based on the economic parameters detailed in Table 15-1. Only Mineral Resources that are classified as Measured or Indicated Mineral Resource categories were used in the economic calculations to estimate Mineral Reserves as of December 31, 2019.

Table 15-1 Mineral Reserve Estimation Parameters

Mineral Reserves Parameter	Value
Gold Price (USD)	$1,250
Exchange Rate (USD/CAD)	0.77
Stope Cut-off Grade (g/t Au)	4.03
Development/Marginal Cut-off Grade (g/t Au)	2.82
Stope Dilution[1] (%)	15%-50%
Development[1] Dilution (%)	20%-30%
Dilution Grade (g/t Au)	0.50
Mining Recovery[1] (%)	67%-95%
Process Recovery (%)	96.5%
Ore Specific Gravity[2] (t/m^3)	2.78
Minimum Mining Width (m)	2.0
Mining, Processing and G&A Cost (CAD $/t)	203

Notes:

1. *Dependant on sector and mining method*
2. *2.82 t/m3 for Upper Mine*

Mining costs and cut-off grades may vary depending on the mining method used and if the ore is already developed or not. The 4.03 g/t cut-off and $203/tonne operating cost are for undeveloped zones utilizing the long hole mining method. Mining recovery also depends on the mining method and the sector.

The economic viability of the Mineral Resources converted into Mineral Reserves was determined by Island Gold's engineering department. Dilution, recovery rates and mining costs used in the Mineral Resource and Mineral Reserve calculations represent Island Gold's best estimates as of December 31, 2019. These factors and parameters are revised each year to take into consideration actual or realized factors.

The following definitions detail the nomenclature of the Mineral Reserve estimates as of December 31, 2019:

Proven Mineral Reserves: Ore development has been completed above and below the mining block. A minimum drill spacing of 20 m is necessary to confirm vein continuity. Only Measured Mineral Resources can be transformed into Proven Mineral Reserves. Economic feasibility was estimated by Island Gold Mine's engineering department to validate the block as Mineral Reserves.

Probable Mineral Reserves: No development was done, or development was done only above or below the mining block. Since the information from the ore development is lacking, a maximum drill hole spacing of 20 m to 25 m is necessary to validate vein continuity inside the mining block. Only Measured and Indicated Mineral Resources can be transformed into Probable Mineral Reserves.

15.1 Island Gold Mine – Total Mineral Reserves

Total Island Gold Proven and Probable Mineral Reserves as of December 31, 2019 stand at 3,643,000 tonnes at a grade of 10.37 g/t Au for 1,215,000 contained ounces. As a matter of comparison, the Proven and Probable Mineral Reserves as of December 31, 2018 totaled 3,047,000 tonnes at an average grade of 10.28 g/t Au for 1,007,000 contained ounces. Total underground production in 2019 was 380,264 tonnes at an average grade of 12.28 g/t Au for 150,167 contained ounces. Table 15-2 and Table 15-3 summarize the Proven and Probable Mineral Reserve estimates The combined Mineral Reserve estimate is presented in Table 15-4 with notes applicable to all three tables following Table 15-4.

Mineral Reserves include 15% to 50% dilution at a grade of 0.5 g/t Au with an estimated mining recovery of 67% to 95%. Mineral Reserves are reported before mill recovery.

Table 15-2 Island Gold – Proven Mineral Reserve Estimates as of Dec 31, 2019

Location	Zone	Tonnes	Grade (Au g/t)	Ounces
Upper Mine	Island Gold Domain	23,900	7.84	6,000
	Goudreau Domain	29,900	12.58	12,100
Lower Mine	Broken Tonnes (UG and Surface Inventory)	12,200	7.59	3,000
	Island Domain Lower C	638,200	14.86	305,000
	Island Domain B & G	22500	6.54	4700
	Extension 2 Domain (Lower E1E Zone)	59,300	5.37	10,200
Total Proven Mineral Reserves		786,000	13.48	341,000

Table 15-3 Island Gold – Probable Mineral Reserve Estimates as of Dec 31, 2019

Location	Zone	Tonnes	Grade (Au g/t)	Ounces
Upper Mine	Island Domain	67,800	5.92	12,900
	Goudreau Domain	55,600	9.59	17,100
	Lochalsh Domain	19,800	7.54	4,700
Lower Mine	Island Domain C Lower	1,315,500	10.44	441,700
	Island Domain B & G	52,700	6.36	10,800
	Extension 2 Domain (Lower E1E Zone)	1,345,600	8.94	386,800
TOTAL Probable Mineral Reserves		**2,857,000**	**9.52**	**874,000**

Table 15-4 Island Gold – Combined Mineral Reserve Estimate as of Dec 31, 2019

Mineral Reserve	Tonnes	Grade (g/t Au)	Ounces
Proven	786,000	13.48	341,000
Probable	2,857,000	9.52	874,000
Total Proven and Probable	**3,643,000**	**10.37**	**1,215,000**

Notes:

- *CIM definitions of Mineral Reserves were followed.*
- *Mineral Reserves are estimated at a cut-off grade of 4.03 g/t Au.*
- *High-grade samples were capped at 75 g/t Au for most of the Upper Island Gold zones except IG-E1E and IG-C capped at 100 g/t Au, most of the Goudreau zones except for G2 and G6 capped at 100 g/t Au.*
- *High-grade samples in Lochalsh were capped at 75 g/t Au for E1E, 45 g/t Au for D, 60 g/t Au for C and 55 g/t Au for E2.*
- *In the Lower mine high-grade samples were capped at 90 g/t Au for B, 70 g/t Au for G and GNW, 45 g/t for G1, 50 g/t Au for D and STH, 40 g/t Au for D1, and 160 g/t Au for E1E zones.*
- *Lower C zone has 2 capping grades, at 300 g/t Au inside the HG domain and at 225 g/t Au everywhere else.*
- *Mineral Reserves are estimated using a long-term gold price of $1,250 per ounce.*
- *A minimum mining width of 2.00 m was used.*
- *A specific gravity value of 2.78 t/m^3 was used in the Lower Zones and 2.82 t/m^3 otherwise.*
- *Totals may not match due to rounding.*

Mineral Reserves presented herein are in large part estimates and production of the anticipated tonnages and grades may not be achieved or the indicated level of recovery may not be realized. The estimation of Mineral Reserves is a complex and subjective process and the accuracy of any such estimate is a function of the quantity and quality of available data and of the assumptions made and judgments used in engineering and geological interpretation. Mineral Reserve estimates may require revision based on various factors such as actual production experience, exploration results, fluctuations in the market price of gold, results of drilling, metallurgical testing, production costs or recovery rates. These factors may render the Proven and Probable Mineral Reserves unprofitable to develop. Also, the grade of ore mined may differ from that indicated by drilling results and this variation may have an adverse impact on production results.

15.2 Reconciliation of the 2019 Production with Mineral Reserve Models

The 2019 production tonnage and grades (stopes and development) have been reconciled to the December 31, 2018 and December 31, 2019 Mineral Reserves statements.

Total production reconciled to the mill was 380,264 tonnes at 12.28 g/t Au for 150,167 contained ounces of gold. Corresponding mining from Mineral Reserves was 339,973 tonnes at 11.77 g/t Au for 128,660 contained ounces for the December 31, 2018 model and 355,323 tonnes at 12.51 g/t Au for 142,864 contained ounces for the new December 31, 2019 model.

For the December 31, 2018 model, total reconciled production is 12% higher in tonnes, 4% higher in grade and 17% higher in gold ounces than Mineral Reserves (150,167 vs. 128,660 contained ounces).

For the December 31, 2019 model (current model), total reconciled production is 7% higher in tonnes, 2% lower in grade and 5% higher in gold ounces than Mineral Reserves (150,167 vs. 142,864 contained ounces).

Table 15-5 summarizes the comparison between 2019 production and the corresponding Mineral Reserves as of December 31st, 2018 and 2019.

Table 15-5 2019 Production Reconciliation with Dec 31, 2018 and Dec 31, 2019

Sector	Production 2019			Model Dec 31, 2018			Model Dec 31, 2019		
	Reconciled			Reserve			Reserve		
	Tonnes	Grade	Ounces	Tonnes	Grade	Ounces	Tonnes	Grade	Ounces
B	6,715	9.81	2,117	5,685	6.61	1,208	5,685	6.80	1,243
C-740	79,880	18.33	47,081	63,268	17.75	36,101	63,686	19.08	39,057
C-760	146,493	13.81	65,033	148,470	13.77	65,748	159,959	14.56	74,889
AL	12,706	5.08	2,076	5,174	5.46	909	4,873	7.97	1,249
West Ramp	8,393	5.95	1,606	2,921	4.37	410	5,662	8.72	1,587
D1	593	0.61	12	2,688	5.46	472	218	2.36	17
GNW	264	1.10	9	194	2.21	14	194	2.21	14
Stockpile Reclamation	4,135	4.25	566						
C-X1≤750	51,653	5.90	9,798	53,041	5.35	9,128	52,332	5.79	9,737
X2<750	41,971	9.41	12,701	34,401	6.63	7,328	34,058	7.30	7,995
C-X1>750	27,462	10.38	9,167	24,131	9.46	7,343	28,656	7.68	7,076
2019 Total	380,264	12.28	150,167	339,973	11.77	128,660	355,323	12.51	142,864
Production vs Dec 31st, 2018 Model	**112%**	**104%**	**117%**						
Production vs Dec 31st, 2019 Model	**107%**	**98%**	**105%**						

Based on this reconciliation, the new December 31, 2019 Mineral Resource and Mineral Reserve model is a good representation of what was mined in 2019 and an improvement compared to December 31, 2018 model. Comparison between actual production and the Mineral Reserve model will continue to be undertaken monthly going forward to confirm that geological interpretation, block model parameters and mining factors continue give a good estimation of future production.

15.3 Mineral Reserve Reconciliation 2018 vs 2019

Combined Proven and Probable Mineral Reserve estimates for December 31, 2019 are 1,215,000 contained ounces while the December 31, 2018 totaled 1,008,000 contained ounces. This represents an increase of 207,000 ounces. The gains are mainly attributed to definition drilling (transfer from Inferred Mineral Resources) for EXT2 area and adding the High Grade domain to the Main Zone C zone.

Table 15-6 shows reconciliation of Proven and Probable Reserve estimates between the December 31, 2018 and the December 31, 2019 estimations, the gains and losses in different areas with their impact on the Mineral Reserve estimates. Figure 15-1 shows the same information but in a graphic form. The table and graph include the 2019 production to show the gain in Mineral Reserves before depletion between the two years.

Table 15-6 Mineral Reserve Reconciliation 2018 vs 2019 – Gains (losses) from Different Sectors

Sector	Dec 31, 2018 Reserves			2019 Production			Dec 31, 2019 Reserves			Gain/ (loss)	Description
	Tonnes	Grade	Ounces	Tonnes	Grade	Ounces	Tonnes	Grade	Ounces		
Lochalsh (Upper Mine)	58,197	5.79	10,834				19,758	7.45	4,730	-6,105	New interpretation, block model and review of blocks that qualify as reserves
Island Gold (Upper Mine)	123,311	5.87	23,284				80,180	6.26	16,145	-7,139	New interpretation, block model and review of blocks that qualify as reserves
Goudreau (Upper Mine)	92,163	9.63	28,541				85,539	10.64	29,256	714	Review of blocks that qualify as reserves
Alimak Sector	139,978	7.39	33,278	12,706	5.08	2,076	167,200	7.29	39,185	7,983	New drilling, mined drifts
B Zone	27,617	7.63	6,779	6,715	9.81	2,117	35,400	7.36	7,987	3,325	Added reserves in Ext 1
C>740	93,938	14.60	44,103	79,880	18.33	47,081	33,291	9.42	10,082	13,061	New capping grade in HG zone and positive reconciliation from reserves
C≤760	681,268	15.14	331,698	146,493	13.81	65,033	559,468	17.30	311,127	44,462	New capping grade in HG zone and positive reconciliation from reserves
C-X1>750	474,137	12.54	191,197	23,375	11.37	8,543	428,905	12.81	176,583	-6,071	Mined stopes
C-X1≤750	296,744	5.49	52,382	55,741	5.82	10,423	258,432	5.36	44,546	2,586	Mined stopes
W-Ramp	515,229	9.51	157,476	9,207	5.50	1,628	506,183	9.86	165,144	9,296	New drilling
G + GNW Zone	39,626	5.79	7,379	264	1.10	9	39,834	5.91	7,573	203	No changes
X1E1E	16,816	7.46	4,035				11,559	7.45	2,768	-1,266	Loss of 100 level
X2<750	110,950	6.11	21,803	41,971	9.41	12,701	112,466	5.74	20,756	11,654	Added a new level
X2>750	122,603	6.13	24,178				619,753	8.77	174,679	150,502	New drilling
X2-East	221,390	9.07	64,577				672,704	9.11	201,583	137,006	New drilling
Other				3,914	4.42	556				556	Stockpile reclamation
Inventory	33,280	5.36	5,730				12,260	7.59	2,990	-2,740	Depletion of the stockpile
Total	**3,047,249**	**10.28**	**1,007,274**	**380,264**	**12.28**	**150,167**	**3,642,933**	**10.37**	**1,215,135**		

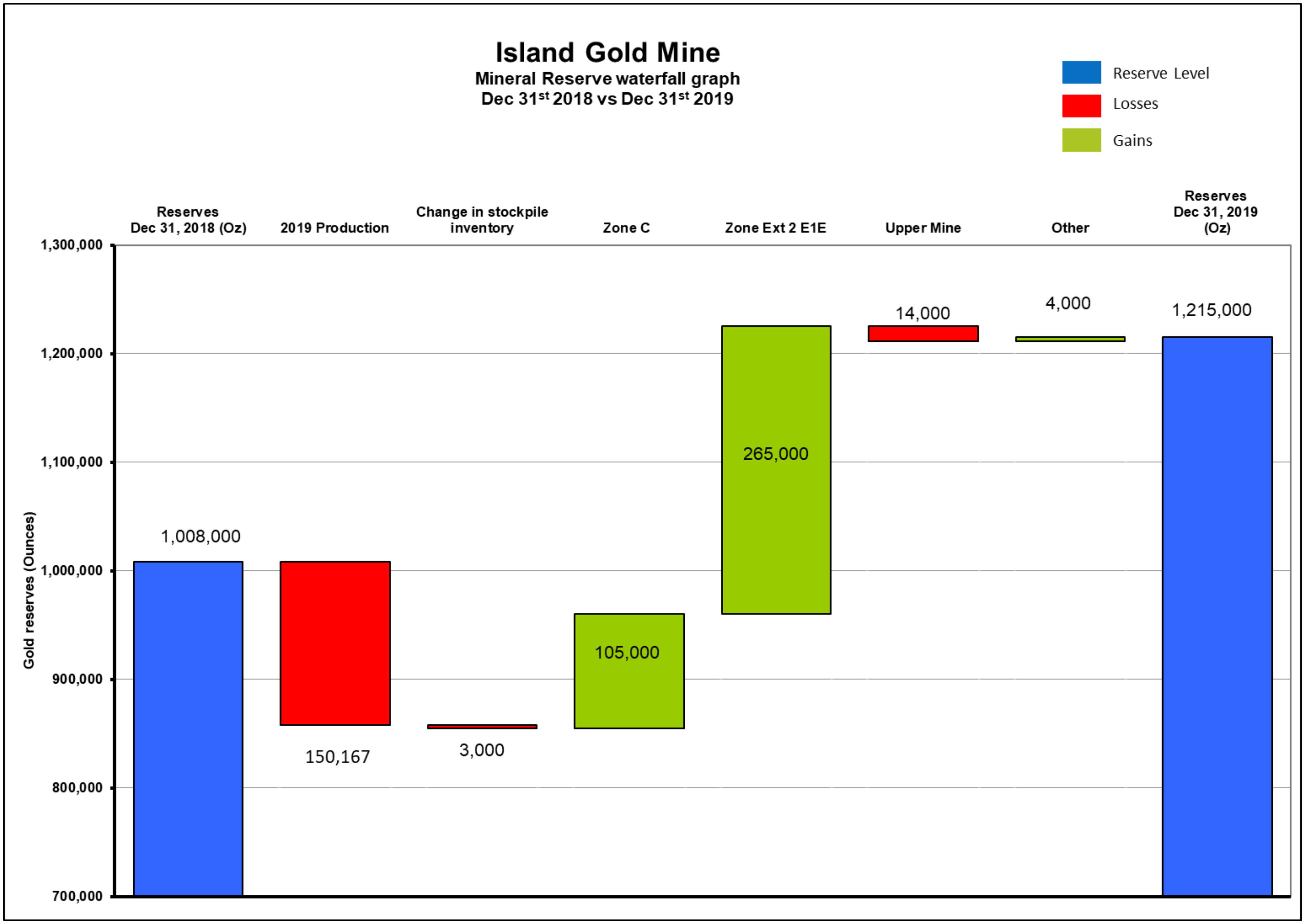


Figure 15-1 Mineral Reserve Reconciliation Waterfall Graph Dec 31, 2018 vs Dec 31, 2019

16 MINING METHODS

16.1 Overview

There are currently four active mining areas at the Island Gold Mine: the West Zone, the Main IG Zone, the Extension Zone, and the East Zone. The overall mine configuration is shown in Figure 16-1 below, which outlines the various mining zones as well as future stopes and development included in the Life of Mine plan (LOM).

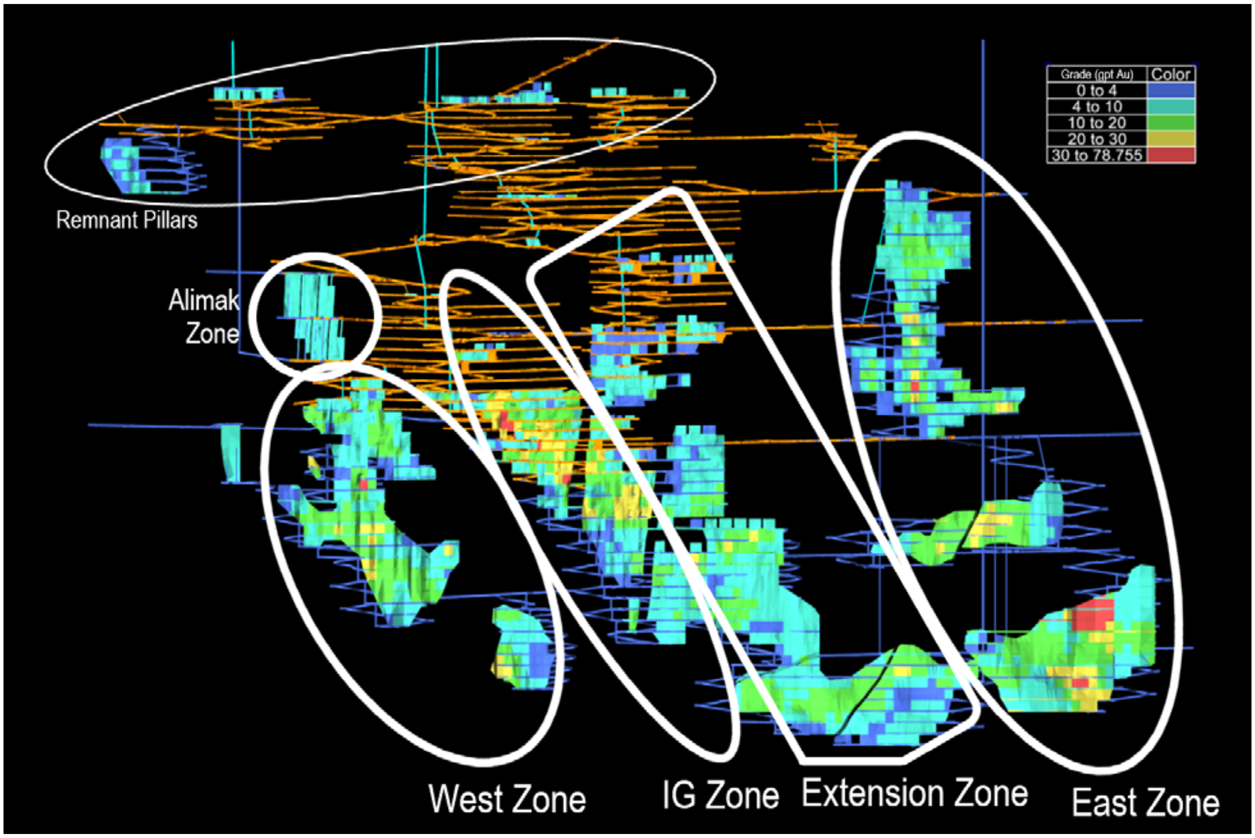


Figure 16-1 LOM Design Looking North

16.2 Mine Access and Development

The Island Gold deposit is accessed via a single decline from surface down to the 425 Level, at which point multiple ramps are utilized to access the main IG, IG West, Extension and East zones. These ramps are also connected at numerous points throughout the mine allowing for easy travel between mining zones.

The LOM plan includes the addition of a mine shaft which will be constructed between 2021 and 2025. Once commissioned, the shaft will be utilized to hoist ore and waste from the 1305 Level to surface. Additionally, the shaft will used to transport personnel and materials to any of the three shaft stations. From the shaft collar location ore and waste will be trucked to either the mill or the surface waste stockpile.

Level accesses are typically developed at 20 m intervals (floor to floor) and are designed south of internal ramps providing access to the footwall of the deposit. Once the ore is reached, sills are developed along the ore contact, with their direction controlled by geology. Sill development is used as a drilling, mucking and backfilling platform for stope extraction. On some levels, additional footwall and cross-cut development is required when the width of the mineralization exceeds 10 metres. Standard drift dimensions are shown in Table 16-1.

Table 16-1 Standard Excavation Dimensions

Excavation Type	Dimensions
Lateral Development	
Jumbo sill	4.0mW x 4.0mH
Jumbo ramp	4.75mW x 4.75mH (Arch)
Sump	4.5mW x 4.0mH x 10.0mL
Secondary sump	4.5mW x 4.0mH x 7.0mL
Electrical sub station	6.5mW x 4.5mH x 13.0mL
Electrical bay	6.0mW x 4.5mH x 6.0mL
Remuck in level	5.0mW x 6.5mH x 13.5mL
Remuck in ramp	5.0mW x 5.0mH x 13.5mL
Secondary remuck	5.0mW x 4.5mH x 13.5mL
Vent raise access	5mW x 4.5mH
Safety bay	1.8mW x 2.0mH x 1.8mL
DDH bay	5.0mW x 5.0mH x 10mL
DDH bay used as turn-out	5.0mW x 5.0mH x 13.5mL
Minimum turning radius for jumbo corner	3.5m
Minimum turning radius for truck corner	5.0m
Turning radius in ramp	20m
Level intersection in ramp	5.5mW x 5.5mH x 12.5mL
Truck load out	5.0mW x 6.5mH
Scoop load-out	5.0mW x 5.5mH
Truck turn-out	5.0mW x 4.5mH
Level entrance	5.5mW x 5.5mH
Vertical Development	
Alimak Raises	4.0mW x 4.0mL
Drop Raise (Ventilation Raises)	3.0mW x 3.0mL

A total of 95 km of lateral and vertical development are planned as part of the life of mine. Of this total approximately 28% is operating development, 67% is capital development and 5% is planned to support exploration activities.

Presently, level accesses are designed towards the center of the ore vein and stopes are mined longitudinally from sill extremities towards the level intersection. As mining progresses deeper level accesses are designed to access the extents of the deposit with stopes being mined from the center towards the extremities to support improved mining stress management.

A standard level configuration is shown in Figure 16-2.

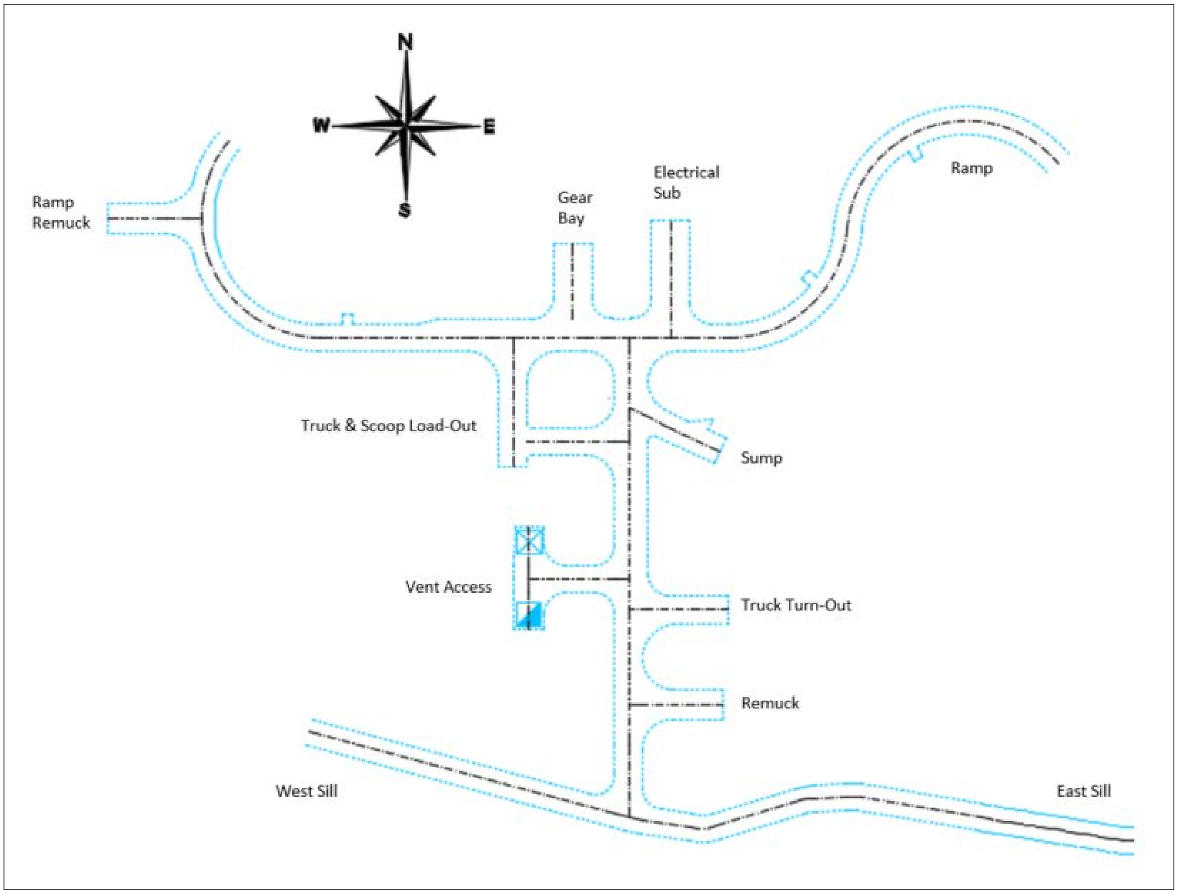


Figure 16-2 Typical Level Design

16.3 General Design Considerations

Island Gold has various tools and systems in place to gather and analyze geotechnical data for each new design. Underground geologists and ground control engineers perform regular mapping campaigns in order to keep the structural data up to date as mining advances deeper into the orebody. Face mapping and sampling is performed in all ore drives and major structures, quartz veining and shear zones are identified. This data is then digitized and shared with the planning team for future development and stoping designs. Each design is optimized by considering and mitigating risk with instability drivers such as faults, dykes, discontinuity families and changes in lithology.

In addition to mapping, Island Gold has also evaluated intact rock properties through several laboratory testing campaigns and has analyzed results from core samples at depth. In general, it was determined that the rock mass is considered blocky in nature, and can be rated as "Good" to "Very Good" (RMR = 75-83), with a Q' range (at the 50^{th} percentile) of 20 to 40 (MDEng, 2018a, 2018b).

As the mine progresses deeper and new mining horizons are met, new testing campaigns are planned to ensure designs are created with accurate geotechnical information. This ensures that the design shape or sequence of excavation is optimized without compromising safety or the integrity of future excavations.

16.4 Stope Dimensions

Several different empirical assessments are performed on a regular basis at Island Gold. Empirical assessments allow the ground control department to quickly reference industry standards and published literature to ensure the initial design is in line with past experiences. The Matthews Stability Graph is the main empirical tool used to determine optimal stope dimensions that will yield a stable shape.

Geotechnical parameters (Q', N') are calculated by using specific underground details of rock mass ratings or major geological intrusions. The N' parameter is then plotted on the stability graph, where an approximation of the ideal hydraulic radius is obtained for each face of the excavation. From there, the strike length of the stope can be calculated by using the fixed dimensions of the shape (level spacing and ore width). Stopes at IGM are typically designed with an approximate strike length of 18m. This stope size has been proven to be successful in various zones throughout the mine, however this analysis is regularly performed to account for any new structures and geological features.

16.5 Stope Design

Mineral Resource shapes are created by geology then submitted to the production engineering team for design. A mineable stope shape is produced by engineering and is optimized by maximizing ore recovery and minimizing planned dilution. Recovery and external dilution factors are applied to the stope shape and its economic viability is evaluated. Stope shapes that have proven to be economically feasible are converted to Mineral Reserves and are mined using the most favorable mining method.

16.6 Mining Methods

The mining method for a particular stope is selected based on a variety of factors such as overall geometry of the mineralization, width of the ore zone, local stresses, mapping and geotechnical data, spatial location of the stope, and existing nearby development and infrastructure. Other factors considered include equipment size and limitations as well as available fill type. Ultimately, each stope is evaluated individually, and a stope package is produced to include detailed drilling plans, blast letters, ventilation, and gas check instructions, mucking plans as well as backfilling directives.

16.6.1 Longhole Open Stoping

The predominant mining method used at the Island Gold mine is longhole open stoping. This mining method is conducive to tabular, steeply dipping orebodies and is considered to be highly productive with low mining costs. The average dip of the orebody at Island Gold ranges from 75 to 85 degrees, making this a favorable mining method for ore extraction.

Longhole mining consists of drilling a series of sub-vertical down holes between two mining platforms, also known as the overcut and undercut sills. These holes are drilled with electric-hydraulic drill rigs. The top sill is typically used as the drilling and backfilling horizon, and the bottom sill is used as the mucking horizon. In some cases where there is no top sill development, up-holes are drilled from the bottom sill which acts as both the drilling and mucking platform. Once the stope is drilled, the ore is blasted in vertical slices towards an open void and retrieved from the bottom sill using remote LHDs. The material from the stope is trucked to surface, at which point the stope is then backfilled with unconsolidated rock fill (UCF), cemented rock fill (CRF) or paste fill. The backfilling process will be further discussed in Section 16.8.

There are two types of longhole stoping methods utilized at Island Gold: longitudinal open stoping and transverse open stoping. These two methods employ the same mining principles mentioned above; however, they differ by the stope's mining direction. Longitudinal stopes are mined along the strike of the ore vein and follow either a modified Avoca technique or a traditional blast hole stoping technique, whereas transverse stopes are mined perpendicular to the vein.

16.6.1.1 *Longitudinal Open Stoping*

Stopes are typically mined longitudinally when the ore width is narrow (usually under 10 m). For every first stope on a horizontal sublevel, a primary slot raise is drilled at the extremity of the ore contact. This raise is drilled using an in-the-hole (ITH) drill with a large reaming head that produces a large diameter hole. This large hole is used as a free face for the first blast. The stope is then fired towards the open void in several blasts (2-3 typically) which is achieved by retreating longitudinally towards the main level access (retreat is done in east/west direction). The broken ore is extracted after each blast is taken to ensure ample void for the following blast. Once the stope is empty, UCF, CRF or paste fill is placed in the void to fill the opened excavation. This is shown in Figures 16-3 through 16-5 below.

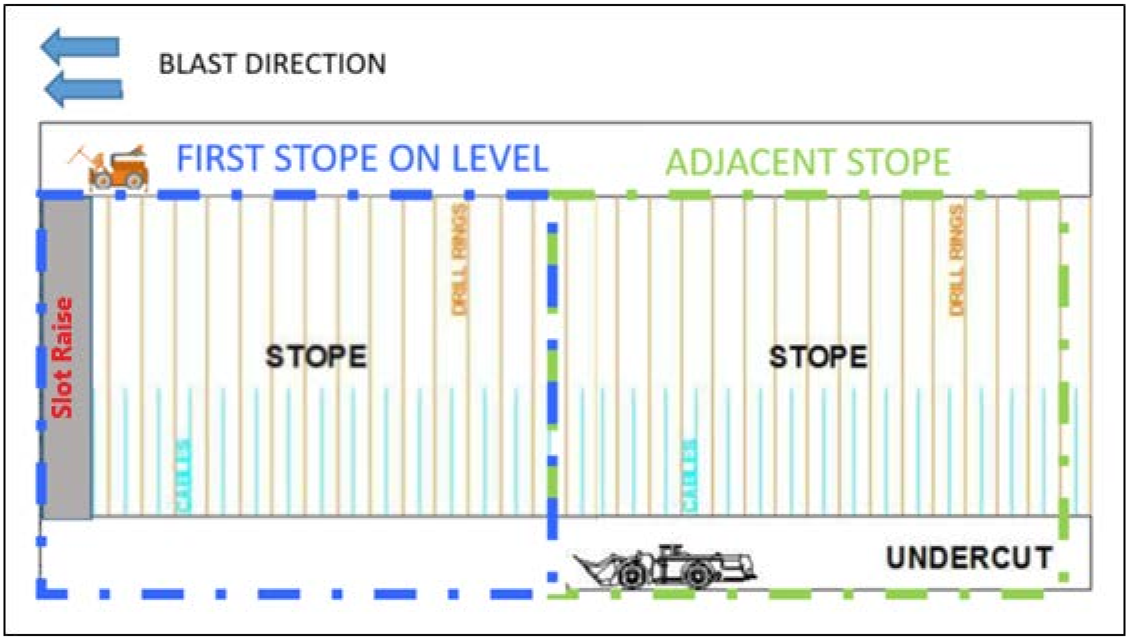


Figure 16-3 Drilling - Longhole Stope, Longitudinally Drilled and Mucked

To mine the adjacent stope, the UCF material from the first stope on the level is removed until an open brow and angle of repose of approximately 48 degrees is achieved. This creates a primary free face for blasting of the second stope, also known as a "pull void". The second stope is then blasted, mucked, and backfilled. The process is repeated until the entire sublevel is mined out. Figure 16-6 illustrates the concept of this mining method. This method is commonly known as Modified Avoca Mining. Cavity monitoring surveys (CMS) are performed regularly to distinguish the between the ore and backfill material. The cavity surveys along with the judgement of underground beat geologists help control grade dilution while mucking.

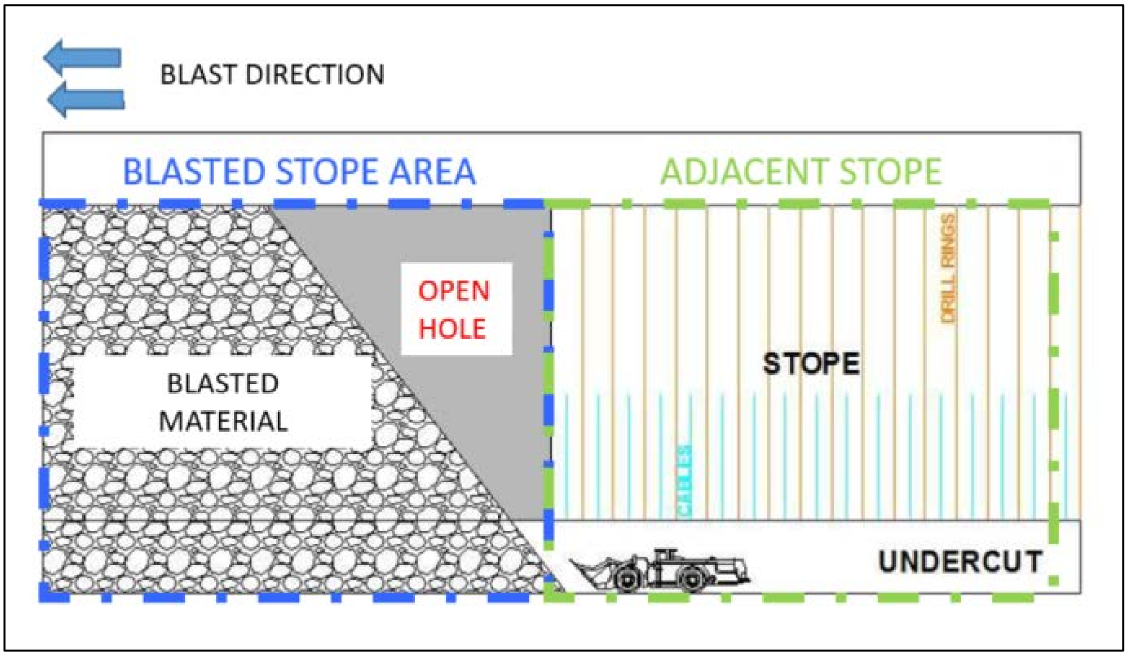


Figure 16-4 Blasting and Mucking - Longhole Stope, Longitudinally Drilled and Mucked

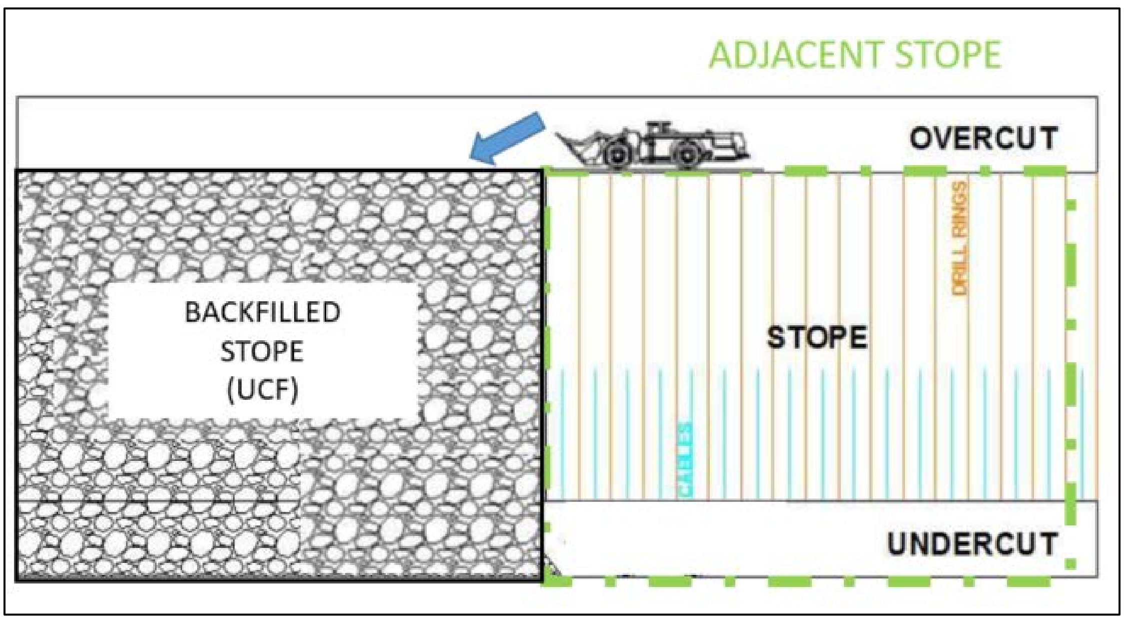


Figure 16-5 UCF Backfilling - Longhole Stope, Longitudinally Drilled and Mucked

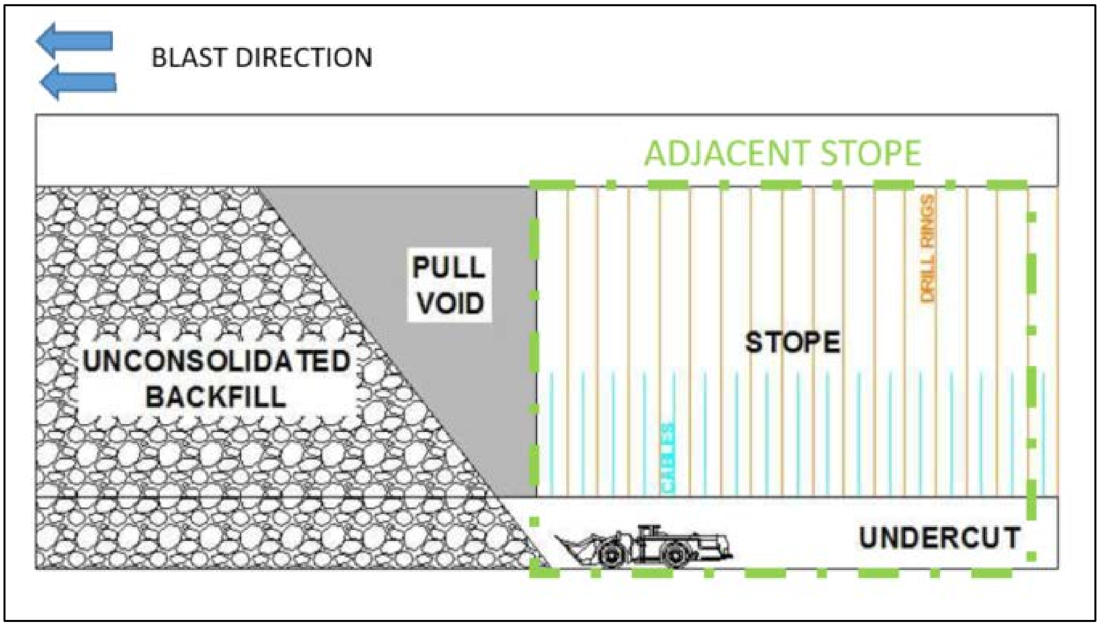


Figure 16-6 Pull Void - Longhole Stope, Longitudinally Drilled and Mucked

When CRF or paste fill material is used as fill, the backfill material solidifies due to the cement which acts as a binding agent. Therefore, the adjacent stope requires a slot raise for blasting. In this case, the stope must be mined in the same fashion as the first stope on the level, and ultimately follows the same process until the entire level is mined out. This is shown in Figure 16-7.

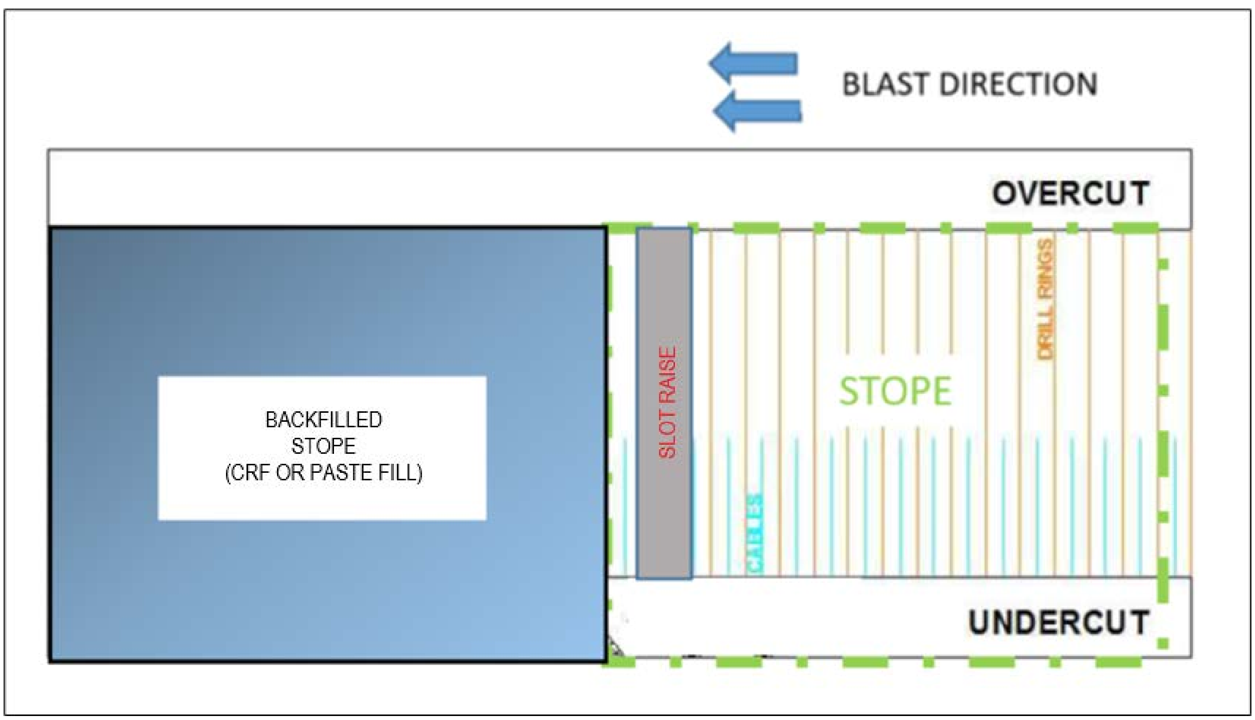


Figure 16-7 CRF or Paste Fill - Longhole Stope, Longitudinally Drilled and Mucked

16.6.1.2 *Transverse Open Stoping*

Stopes are typically mined transversely when the ore width is too wide to mine efficiently and safely using a longitudinal retreat method. Island Gold employs transversal mining where the mining direction runs perpendicular to the strike of the orebody (North/South). Stope mucking is done via multiple draw points that allow for line-of-sight mucking from the remote stand which optimizes mucking productivity. Furthermore, this method allows for production holes to be drilled parallel to the hanging wall and footwall and only requires fanning into the vertical stope ends which are inherently more stable. Each block is split into different panels employing a true primary/secondary sequence. Figure 16-8 displays how each block is accessed by its own drawpoint or access. This mining method requires the use of a raise as initial void for blasting. This raise is typically designed in line with the drawpoint, which facilitates mucking as the material is blasted towards the drawpoint. Once the stope has been blasted and emptied, the void must be backfilled with UCF, CRF or paste fill. The primary stopes require a consolidated fill that creates solid end walls to withstand the blast energy while extracting adjacent stopes. The secondary stopes can be filled with UCF if there is no remnant mineralization nearby. One advantage of this method is it allows concurrent activities to take place on a single level improving mining cycle times.

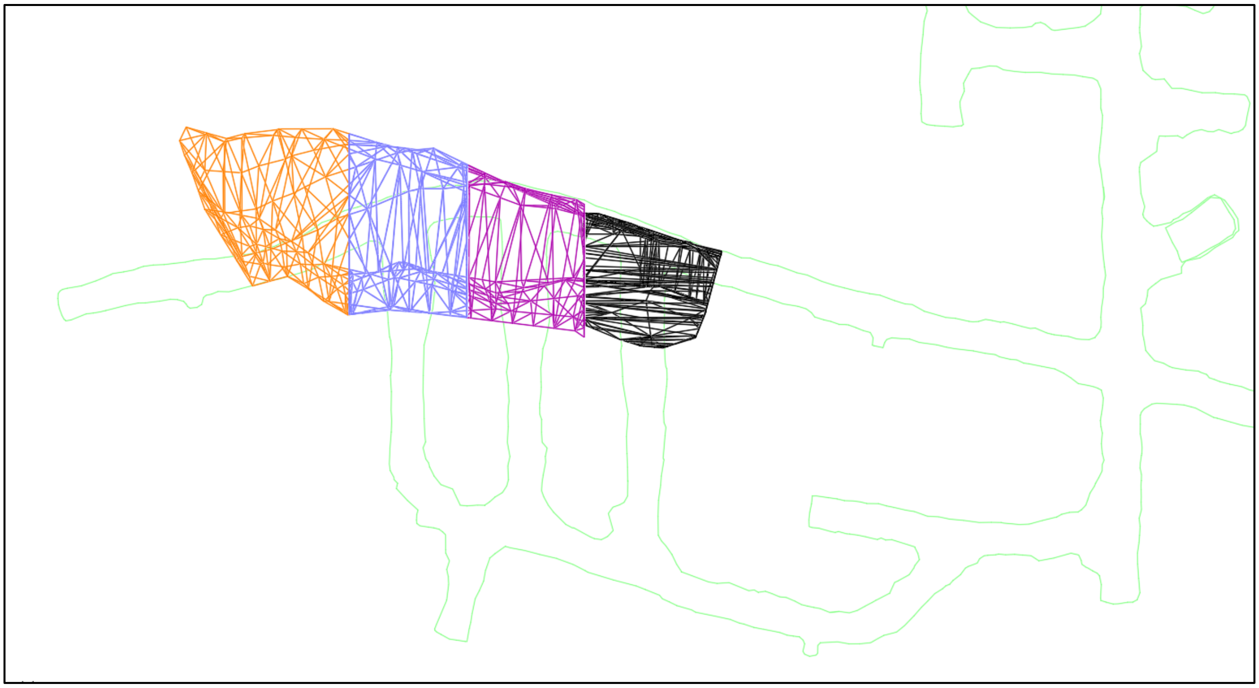


Figure 16-8 Transversal Mining Access

16.6.2 Alimak Stoping

Alimak mining is planned to be utilized in a portion of the Island Gold West Zone. This method consists of using an Alimak climber as a means of development and production drilling instead of conventional horizontal development.

The process starts by driving a raise along the height of the stope that will serve for secondary support and production drilling access. The raise dimensions will typically be 3 m x 3 m.

Once the raise is completely driven, the raise screening is installed. Cable bolts are then drilled and installed as secondary support.

Production drilling is conducted on a horizontal axis on both sides of the raise. The blasting sequence consists of taking horizontal slices followed by void mucking only. Once the entire stope is blasted, continuous mucking can begin. Maintaining the stope filled with blasted material allows for better dilution control. Once mucking is completed, the Alimak stope will be backfilled with UCF. Pillars will be left between each stope. Figure 16-9 shows the Alimak mining sequence.

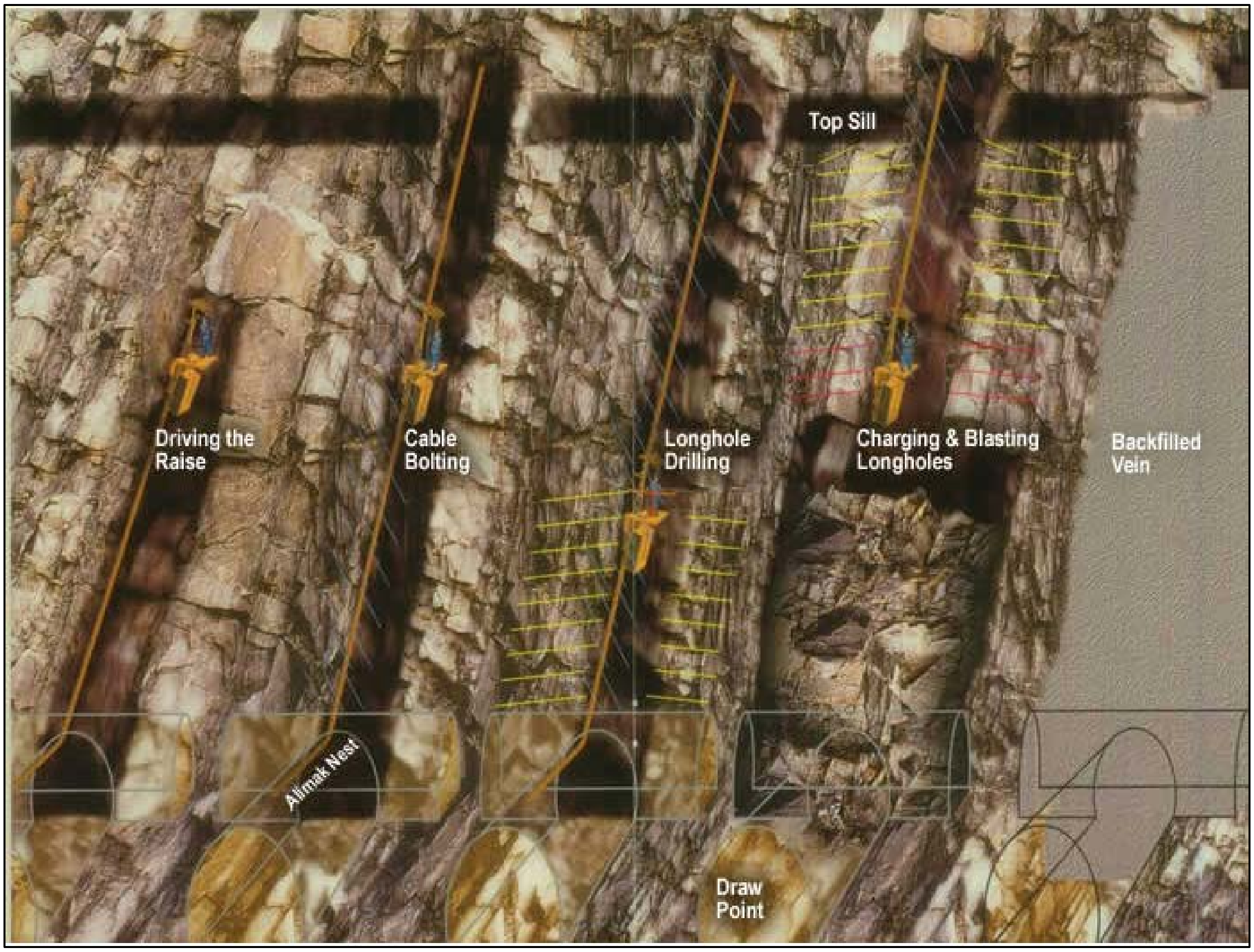


Figure 16-9 Alimak Stoping

Alimak mining has not yet been employed at the Island Gold, however some Alimak accesses and raise nests have been developed. This mining method is part of the LOM design and production using this method is scheduled to begin in Q2 2021.

16.7 Ground Control

A geomechanical sampling campaign was completed in 2019 and results were used to build a stress model. An update to this model was completed in 2019 to incorporate updated geotechnical structural features and mine designs, with a full geomechanical study currently ongoing in 2020. This study involves the collection of new core samples underground, implementation of seismic data, as well the development of a new geomechanical model for the updated LOM and proposed underground infrastructure (shaft and ore/waste handling systems). Computerized numerical modeling programs are being utilized as a tool to assist in determining ground control practices and risk management of possible ground failures.

Ground support standards are regularly reviewed and updated based on observations and communications between engineering and mine operations. A larger update of the ground support standard was implemented in 2019 to address the increased stress levels with depth and to add robustness to the ground support standards. The option to add arched backs in development was also implemented as a supplemental means of adding long term stability to Island Gold's lateral excavations.

A microseismic system was implemented in 2017 and 2018 with full commissioning of the system in 2019. The microseismic system covers every zone of the mine with regular expansion programs happening as the mining front progresses deeper and laterally. A stope re-entry protocol was also implemented based on the micro seismic noise that stopes create after being blasted. The re-entry protocol limits access to areas deemed higher risk once a stope blast is taken (usually levels near the stope or sill levels), until the micro seismic activity returns to background noise. At this point, the "all clear" is given for workers to re-enter the barricaded levels to begin regular operations.

Stope ground support is used to control dilution. Dilution may come from a local structural failure or from inadequate drilling and blasting practices. Dilution control can be achieved, to a certain extent, by improving ground support. Cable bolts are used to limit stope wall dilution and this method has provided good results. Cable bolts are installed along the undercut and overcut. Cables being used range from 6 metres to 12 metres in length.

Level access and stoping sequence methodologies were investigated below the 920 meter level with a planned transition to a center out stope sequence (Figure 16-11) from the current practice of outside in (Figure 16-10). This is expected to improve mining stress management, as mining moves deeper, by shedding stress outward.

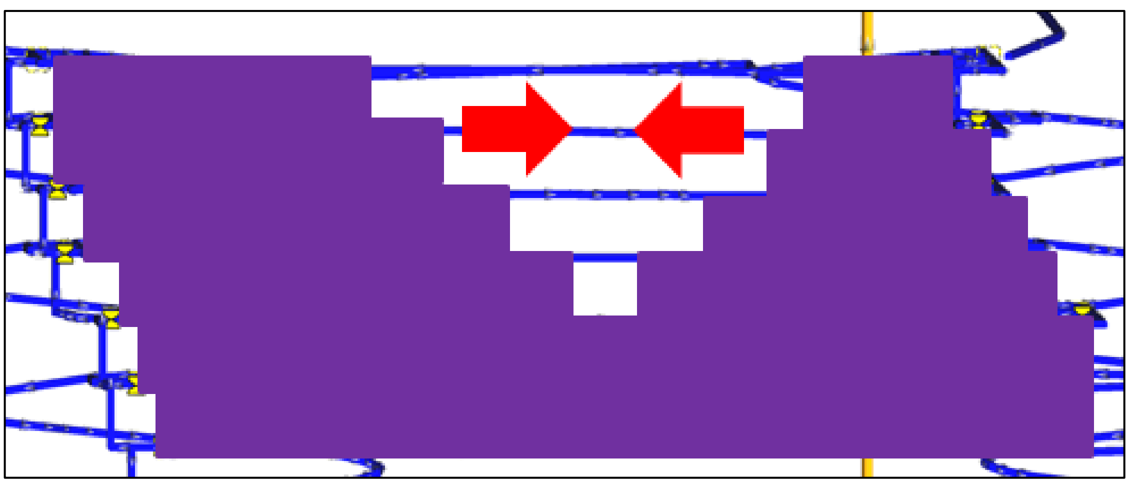


Figure 16-10 Current Outside-In Mining Sequence

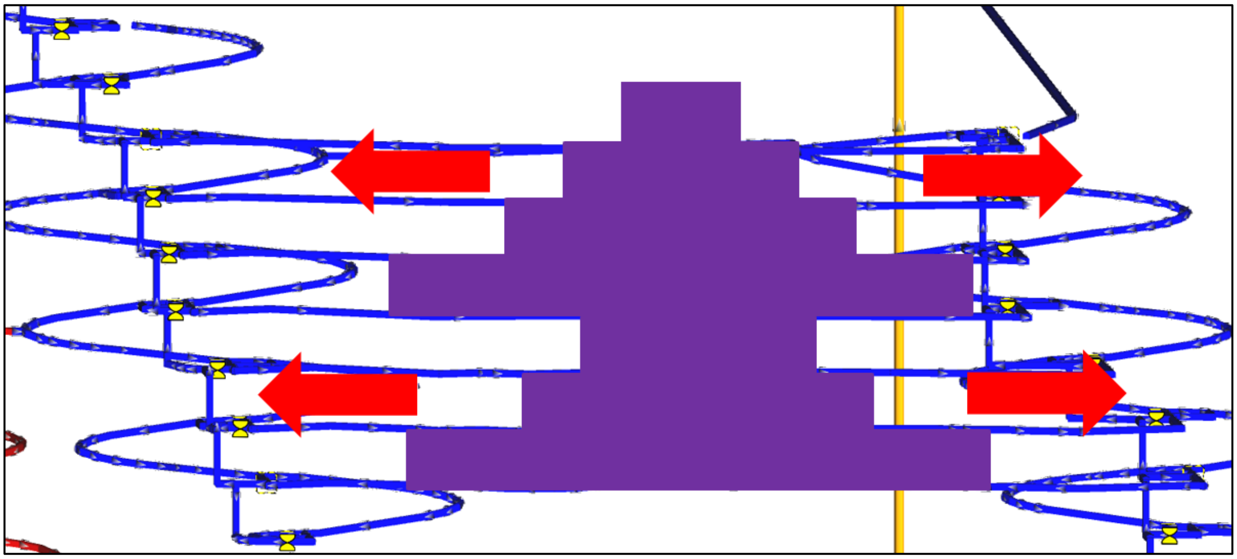


Figure 16-11 Proposed Centre-Out Sequence

16.8 Backfill

Island Gold is currently using two types of backfill methods: unconsolidated rock fill (UCF) and cemented rock fill (CRF) with the addition of paste fill planned as part of the Phase III Expansion plan. Both USC and CRF fill methods are dumped from the top cut of a stope by an LHD. In the event of a hanging wall failure, a Rammer Jammer is employed to “ram” (push) muck tighter against the hanging wall to fill the voids.

16.8.1 Unconsolidated Fill (UCF)

Using UCF to fill empty stopes helps with mine waste management and minimizes stope wall failures by stabilizing them. UCF is not screened and comes directly from development faces. The angle of repose for UCF ranges between 45-54°, however 54°is usually used when modelling or estimating fill angles to remain conservative.

16.8.2 Consolidated Rock Fill (CRF)

CRF was implemented at the IGM in 2019, with placement focused on transverse mining zones, sill pillar recovery and problematic stopes that require CRF instead of UCF. Waste is hauled from development faces to the underground cement plant, where slurry is poured directly in the box of the haul trucks. The trucks then haul the CRF over to the top cut of the stope being backfilled, where it is dumped in a remuck. The LHD then picks up the CRF and dumps it into the stope.

It has been observed that the driving cycle from the cement plant to when the LHD picks up the muck and dumps is enough to mix the waste rock and slurry. BASF’s Masteroc MF 701 is being added into the slurry mixture to help stabilize the cement’s reactivity. This increases strength and increases workability time with the slurry to 4-6 hours.

When further qualitative and possibly quantitative testing can be performed underground, the binder content will be optimised.

Like the UCF, the CRF is still not considered an engineered product as there is limited quality control on the aggregates being used and no gradation curve can be obtained. However, samples of the cement slurry are sent out for analysis.

16.8.3 Paste Fill

Island Gold does not currently utilize paste fill onsite. The addition of a paste plant and an underground paste distribution system is included in the LOM plan which will be utilized for filling future stopes and improving sill pillar recovery.

Filtered tailings from the process plant will be used as aggregate for paste backfill. The paste plant is incorporated into the process tailings dewatering circuit and includes the thickening, filtration, mixing, and batching equipment. The delivery of paste will be gravity-fed to the stopes via the underground distribution system (UDS) as shown in Figure 16-12.

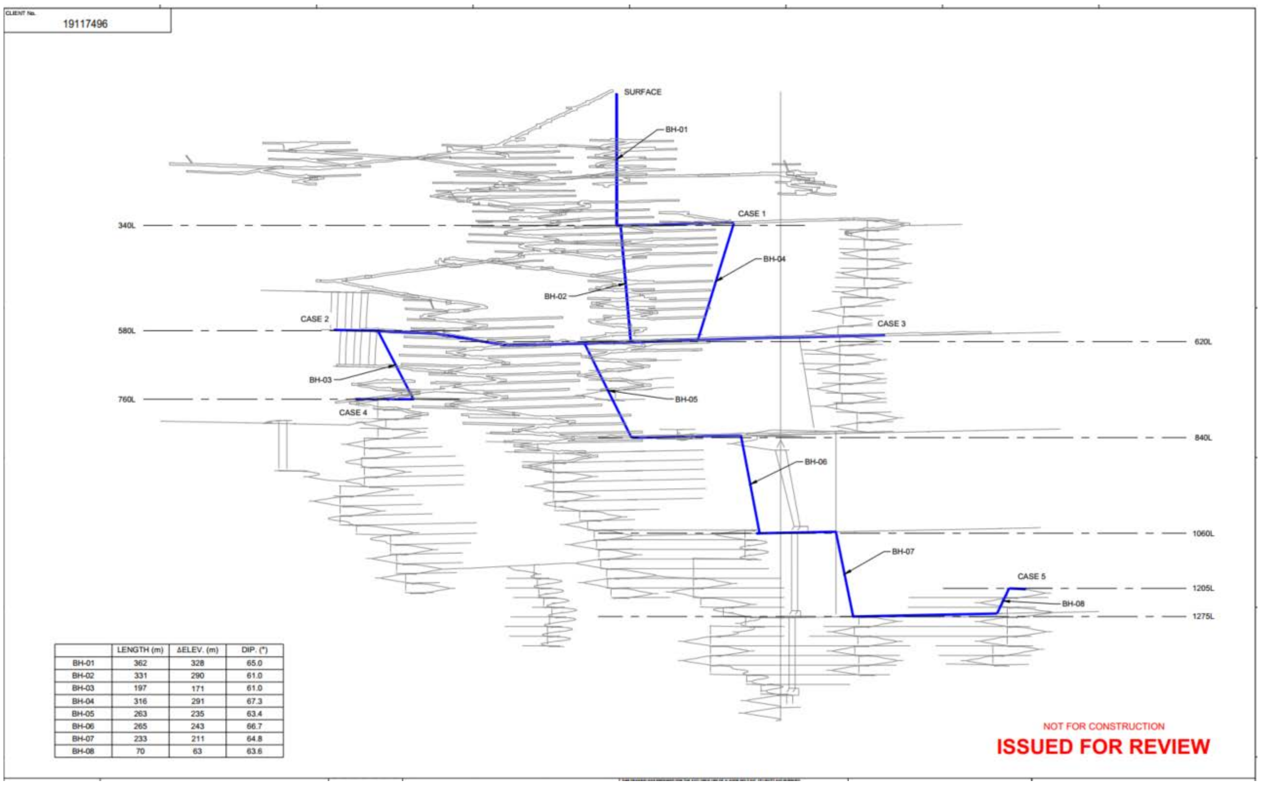


Figure 16-12 Paste Backfill Underground Distribution System

16.9 Stope Sequencing

The Island Gold Mine has multiple active stoping horizons in the Main IG Zone, the Extension Zone and East Zone. This allows for flexibility in the production schedule as each mining horizon follow its own sequence to follow and is independent of mining activities in other zones or horizons.

In areas where longitudinal retreat with UCF is employed, stopes are blasted, mucked, and backfilled starting from the eastern or western most point of the sill on the bottom horizon. This process repeats itself until the last intersection stope (at the level access and sill intersection) is excavated. Figure 16-13 show a typical longitudinal retreat mining sequence at Island Gold.

Once 3 stopes are taken on the bottom level of a horizon, production can begin on the level above, by retreating towards the level access. This process is repeated until the top horizon of the zone reached.

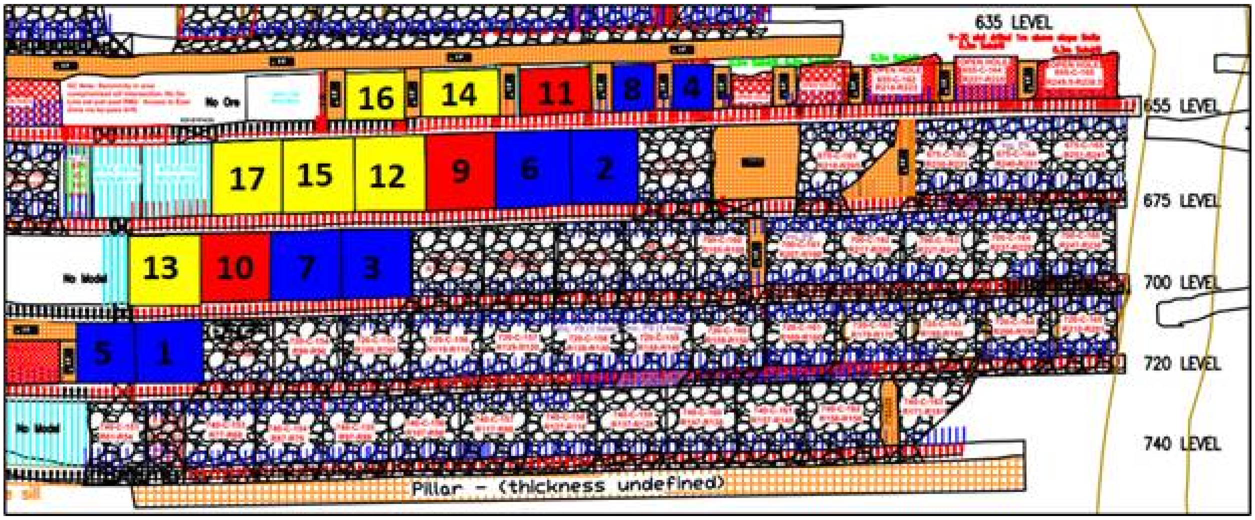


Figure 16-13 Example of Longitudinal Retreat Mining Sequence

Uphole stopes are taken on the top horizon where sill and rib pillars are left behind for stability purposes. With the addition of Paste Fill as a backfill method, future sill and rib pillars will be recovered by mining full uphole stopes to the Paste Fill. The addition of paste fill will allow for accelerated fill times, improved pillar recovery and concurrent activities (filling and drilling) resulting in improved cycle times.

In transverse mining zones typically include a mix of transverse and longitudinally accessed mining blocks. These zones follow a traditional primary-secondary mining sequence with primary stopes being filled with a consolidated fill such as CRF or Paste Fill and secondary stopes being able to be filled with either unconsolidated or consolidated fill as required.

16.9.1 Void Management Plan

Due to the nature of IGM's mining sequence and use of UCF in many areas, backfill subsidence and backfill run of muck is possible. To mitigate this risk, a Void Management Plan has been developed. This plan helps to track and manage the voids as well as defines a series of steps to be taken when an unfillable or unexpected void occurs. A backfill action plan is developed and implemented, and a series of steps are taken afterwards to ensure the void is logged and considered during future designs.

16.10 Material Movement & Equipment

Island Gold Mine currently utilizes an internal ramp system to haul ore and waste to surface. The ore is brought to the surface by a combination of Epiroc MT-42 and Caterpillar AD-30 haul trucks using a ramp system. A detailed list of primary equipment was developed for each scenario and can be found in Table 16-2. Capital cost for equipment was developed based on supplier quotes and include provisions for rebuilds and replacements throughout the Life of Mine.

Once on the surface, ore is hauled by surface trucks to the mill located at an approximate distance of 0.8 km from the portal of the ramp. As part of the study a mine shaft is includes the addition of a mine shaft which will be utilized to hoist ore and waste from the 1305L to surface. From the shaft collar location ore and waste will be trucked to either the mill or the surface waste stockpile

Table 16-2 Island Gold Current And Phase III Underground Equipment Fleet

Equipment Type	Application	Current Fleet	Average Post-Project
Jumbo	Development	4	3
Bolter	Ground Support	0	4
Scissor Lift	Ground Support / Services	17	11
UG Haulage Truck	Ore/Waste Transport	17	5
LHD 6 Yard	Production / Development	12	15
LHD 3.5 Yard	U/G Maintenance	4	4
Grader	Ramp Maintenance	2	2
Lube Truck/Water Truck	Maintenance	3	3
Boom Truck	Material Logistics	6	3
U/G Personnel Vehicles	Personnel Transport	31	26
Tractor	Maintenance	4	4
Excavator	Maintenance	1	1
Loader	Surface Works	4	4

16.11 2019 Scoping Study

In mid 2019, with the expansion to 1,200 tpd underway, Island Gold undertook a scoping level study to give some insight into the possibility of expanding the mine capacity further, and what might be the best way to undertake such an expansion. As the Mineral Resource increases have been predominantly below the current mining horizons, and approaching up to 1,500 metres in depth, it was becoming increasingly clear that with the existing ramp haulage configuration of 1,200 tpd would limit further production growth. Therefore, two additional material handling systems were examined, as a means of overcoming potential trucking limitations: conveying and shaft hoisting. A combination of three different mine capacities and three material handling systems were examined to yield five scenarios. Mine plans, preliminary designs and layouts, and high-level costing were undertaken for each of the five scenarios. JDS Energy & Mining Inc. and Cementation Canada Inc. aided in the assessments.

The concepts are discussed below:

16.11.1 Ramp Haulage at 1,200 TPD and 1,500 TPD

Movement of ore and waste from the working levels to the surface is currently undertaken with truck haulage up a system of ramps to the mine portal. In addition, the ramp system is used to transport personnel and material to the working face. The ramp system as currently implemented is capable of handling 1,200 tpd of ore and the associated waste, and the ramp 1,200 scenario was considered the “Basecase” for the scoping study.

As the mine deepens the ramp will be extended. As the ramp is extended additional haulage trucks will be required which in turn requires additional ventilation capital infrastructure and incurs higher power costs. As the mine deepens it will take increased time for personnel to travel to their working areas and therefore reduces the amount time available to perform productive work. These factors were all incorporated into the Basecase economics.

The scoping study considered mining to a depth of 1,500 metres below surface. One conclusion from the study was that should additional Mineral Resources be found below 1,500 metres, a production rate of 1,200 tpd would be difficult to maintain.

To increase the mine capacity to 1,500 tpd, an additional ramp to surface would have to be developed from the 840 m Level. This was costed into scoping study ramp 1,500 tpd using Island Gold's standard owner's and contractor's development costs. An advantage to the additional ramps its that there would be limited disruption to current production during development. However, the ramp 1,500 tpd option would still be subject to the reduced employee productivity with depth.

16.11.2 Conveyor at 1,500 TPD

The addition of conveyor from the 840 m Level to surface was also studied. This would require the installation of an underground crusher, the development of five conveyor ramp segments and the installation of five flights of conveyor. The last segment of conveyor would end at the mill's coarse ore stockpile, removing the requirement for the surface haulage of ore from the portal stockpile to the mill. Any ore mined below the 840 m Level would still require trucking up to the crusher on the 840 m Level.

With the overall reduction in truck haulage, capital savings would be seen in reduced ventilation requirements and reduced truck requirement. With the reduced trucking and ventilation requirement the conveyor option also saw reduced operating costs. The conveyor drift, generally located to the east of existing Mineral Reserves, could also be used as potential platform for exploration and delineation drilling.

The conveyor would add significant lateral development capital and employees would still see reduced productivity as a result of having to use existing and future ramp systems for transport. In addition, there is increased operational risk associated with operating an extensive conveyor system underground, and increased maintenance costs would be incurred.

16.11.3 Shaft at 1,500 TPD and 2,000 TPD

Several options for the installation of a shaft system to the 1,500 m Level were evaluated. The primary option would be to raisebore from the 840 m Level and concurrently conventional sink from the 840 m Level to the 1,500 m Level. Other options investigated were a conventional blind sink from surface to the 1,500 m Level and a conveyor from the 840 m Level to surface combined with a winze from the 840 m Level to the 1,500 m Level.

Although the shaft options had the highest capital cost, they had the advantage of having the lowest operating costs of all option examined. This was due to:

- The reduced ventilation requirement due to fewer trucks,
- the use of the shaft as source of fresh air negating the requirement for additional raises to surface,
- reduced underground trucking costs,
- automation of ore handling,
- and significantly increased personnel productivity over current and future expected rates.

The disadvantages to the shaft option would be its location away from the mill requiring surface ore trucking from the headframe to the mill, and the relatively higher power requirements,

16.11.4 Scoping Study Conclusions

The mine planning undertaken on the Mineral Reserves and a portion of the Mineral resources demonstrated that from a mining perspective, 2,000 tpd per day could be achieved due to the number of available ore horizons.

The conveyor option, although carrying favourable economics, was not deemed a viable option due to the inherent operational risks and higher maintenance associated with it.

Conventional shaft sinking from surface was determined to be preferable over the raisebore from the 840 m Level and shaft sinking from the 840 m Level to the 1,500 m Level. It became evident that the amount of cuttings produced from raiseboring and the amount of rock produced from the winze, both coming out at the 840 m Level, would overwhelm the ability of the mine to haul it to surface and still maintain a mining rate of 1,200 tpd.

The ramp and shaft options were selected for a more detailed level of evaluation in the Phase III Expansion Study.

16.12 Phase III Expansion Study Mineral Inventory

Island Gold in the past several years Island Gold has significantly increased its Mineral Reserve and Mineral Resources. For the purposes of the Study, it was assumed that the Mineral Reserves and a significant portion of the Mineral Resource would ultimately be available for mining. The bulk of Island Gold’s Mineral Resources are in the Inferred Mineral Resource category and require infill drilling to upgrade them to Indicated Mineral Resources. Infill drilling is usually undertaken from exploration drives driven eastward and westward as the ramp system develops at depth. Generally, this infill drilling has been successful, and Island has had a historical conversion rate of 83% over the last number of years.

Prior to the mine planning and sequencing process Island Gold’s geologists and engineers evaluated the December 31, 2019 Mineral Resource inventory (left hand side of Table 16-3) on a block by block basis and determined which blocks would support being included into a potential stope. Stopes were evaluated for mining shape, continuity of mineralization, and whether they would support the development required to access them. The undiluted tonnes and grade of the Mineral Resources that made it into these stopes are found in the middle section of Table 16-3. Island Gold’s standard dilution and factors (Table 16-4 and Table 16-5), which vary by zone and mining type, were them applied. If, after applying dilution the stoping shape made the cut-off grade (Table 16-6), it was then deemed eligible for inclusion with the mine plan. These Mineral Resources appear on the right hand side of Table 16-3. Total Mineral Reserves and Mineral Resources included within the mine plans for the Study are 9.6 Mt at a gold grade of 10.45 g/t. A reconciliation of the Minable Resource gold ounces to the Dec 31, 2019 Mineral Reserve and Mineral Resource gold ounces can be found in Figure 16-14. A long section depicting the Mineable Resource stoping blocks categorized by grade is presented in Figure 16-15.

Table 16-3 Phase III Expansion Study Minable Resource

	December 31 2019			Undiluted Resource Used in Phase III Study			Diluted and Recovered Resource Used in Phase III Study		
	Tonnes (x1,000)	Grade (g/t)	Ounces (x1,000)	Tonnes (x1,000)	Grade (g/t)	Ounces (x1,000)	Tonnes (x1,000)	Grade (g/t)	Ounces (x1,000)
Mineral Reserves									
Proven	786	13.48	341				786	13.48	341
Probable	2,857	9.52	874				2,857	9.52	874
Total Mineral Reserves	3,643	10.37	1,215				3,643	10.37	1,215
Mineral Resources									
Measured	25	4.52	4	21	4.52	3	24	3.85	3
Indicated	853	6.57	180	724	6.57	153	807	5.60	145
Total Measured and Indicated	879	6.51	184	746	6.51	156	831	5.55	148
Inferred	5,392	13.26	2,298	4,576	13.26	1,950	5,099	11.30	1,853
						Phase III Mine Plan	**9,572**	**10.45**	**3,216**

Table 16-4 Extension 1/2 Zone Dilution and Recovery Factors

Stope Type	Dilution	Recovery
Upper (>10m in height)	40%	85%
Upper (<10m in height)	20-30%	90%
Pillar stopes	40%	67%
Down	30-50%	92%

Table 16-5 C and D1 Zone Dilution and Recovery Factors

Stope Type	Dilution	Recovery
Upper (>10m in height)	40%	85%
Upper (<10m in height)	20%	90%
Pillar stopes	40%	67%
Transverse	15%	93%
Down	26-28%	93%

Table 16-6 Island Gold Cut-off Grades

Areas of Application	Reserve Cut-Off
Undeveloped areas	4.03
Developed Stopes	2.82
Alimak Stopes	4.89

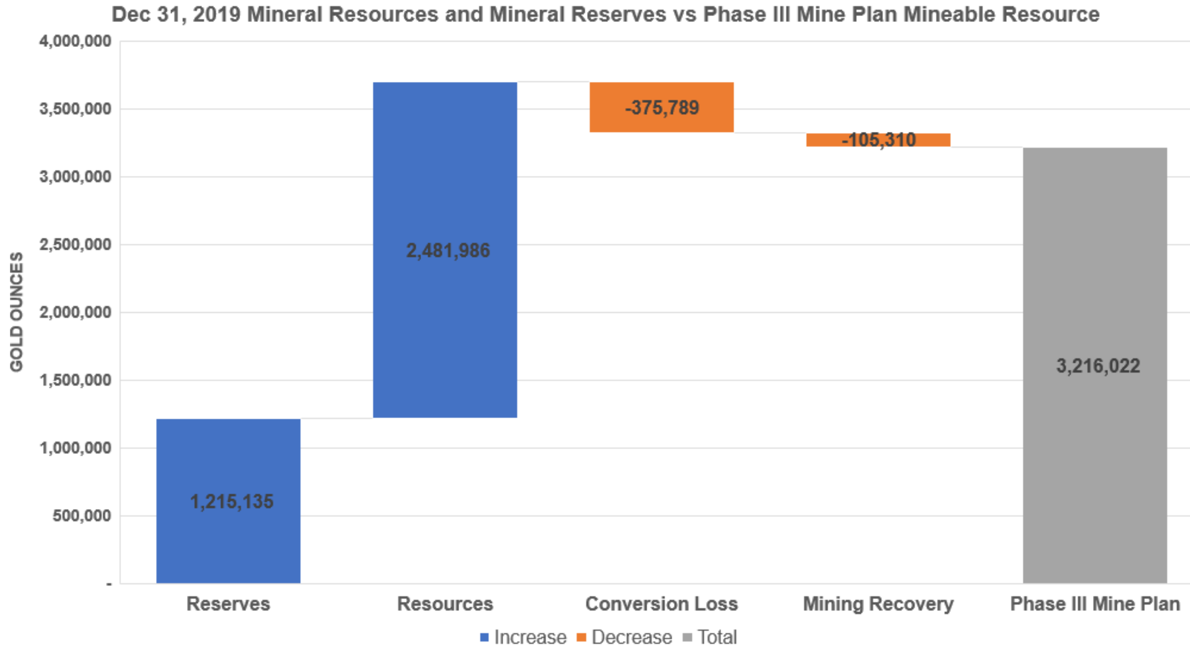


Figure 16-14 Reconciliation of Minable Resource to Dec 31, 2019 Mineral Reserve and Resources

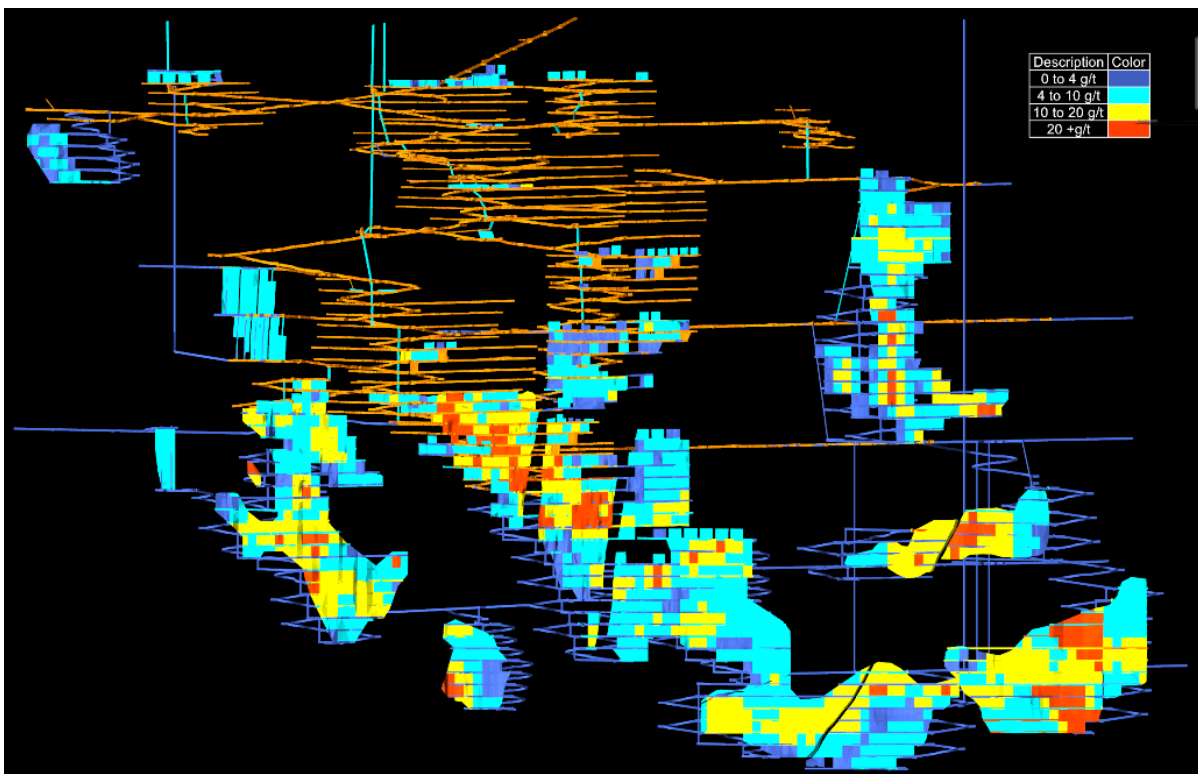


Figure 16-15 Mineable Resource Stoping Blocks Categorized by Grade

16.13 Phase III Expansion Study Scenarios Examined

Three different mine capacity rates were examined, 1,200 tpd, 1,600 tpd, and 2,000 tpd. The current mill capacity of Island Gold is 1,200 tpd and this case was deemed the Basecase for the Study. Early in the Study, grinding simulation work indicated that the installed grinding capacity of the mill is 1,600 tpd, although downstream processes would require upgrading for the mill to operate at that rate. It was therefore decided that the mid-range capacity scenario would be at 1,600 tpd. After mine planning in the scoping study work indicated that a 2,000 tpd mining capacity was a viable option, this scenario was added to the Study.

Two material handling options were examined: ramp ore and waste haulage and skipping ore and waste with a shaft.

The ramp scenario at 1,200 tpd was evaluated with and without a paste plant, to assess the incremental economics of adding a paste plant on similar mining scenarios. Different Mineable Resources and mine plans were used with each as the paste plant allows for a higher mining recovery.

Multiple iterations of individual mine designs and sequences were undertaken for each scenario examined. Mine designs and resource levelled sequencing were undertaken with Deswik software. Mine designs were unique for each scenario as each scenario had different infrastructure requirements for material handling and ventilation. The mine design to some extent drove the sequence of development as some areas (i.e. shaft underground ore/waste handling system) required earlier access than would other wise be required for the Basecase. Development and stope sequencing were resource driven and generated the annual physicals and equipment requirements.

Mine costing was from first principles and was guided by actual site cost and productivities experience.

16.13.1 Ramp Haulage at 1,200 TPD with No Paste Plant (R1200NP)

The R1200NP scenario is a continuation of the current mining plan (prior to the Study) but with the addition of the Minable Resources, described earlier, and the additional development required to bring those Minable Resources into productions described earlier. Trucking would continue be used as the sole method of transporting ore and waste to the surface. As the mining horizons deepen the number of trucks required to meet a 1,200 tpd mining capacity increases. Currently (2020), eight 42 tonne haul trucks are required to support 1,200 tpd with a 1.7 hour cycle time. Truck requirements peak at 18 in the future in this scenario and require cycle times of up 3.3 hours. Similarly, personnel transportation time to the working faces increases significantly in the future, decreasing employee productivity.

With increasing trucking times, and more trucks, ventilation needs to be significantly upgraded. Approximately 900,000 cfm would be required, up from the current 470,000 cfm. To achieve this, an additional fresh air raise (FAR) and exhaust or return air raise (RAR), along with the associated fans and heater, would be required (Figure 16-16).

The above increases in trucks, ventilation and the reduced productivity combine to increase capital and operating costs from their present levels. It should be noted that no material mill modifications are required with either ramp 1,200 scenarios, however. other infrastructure upgrades are required to sustain mining over the longer mine life. These upgrades are common to all the scenarios studied and are detailed in Section 18.

Mine life in the R1200NP scenario would be to 2041.

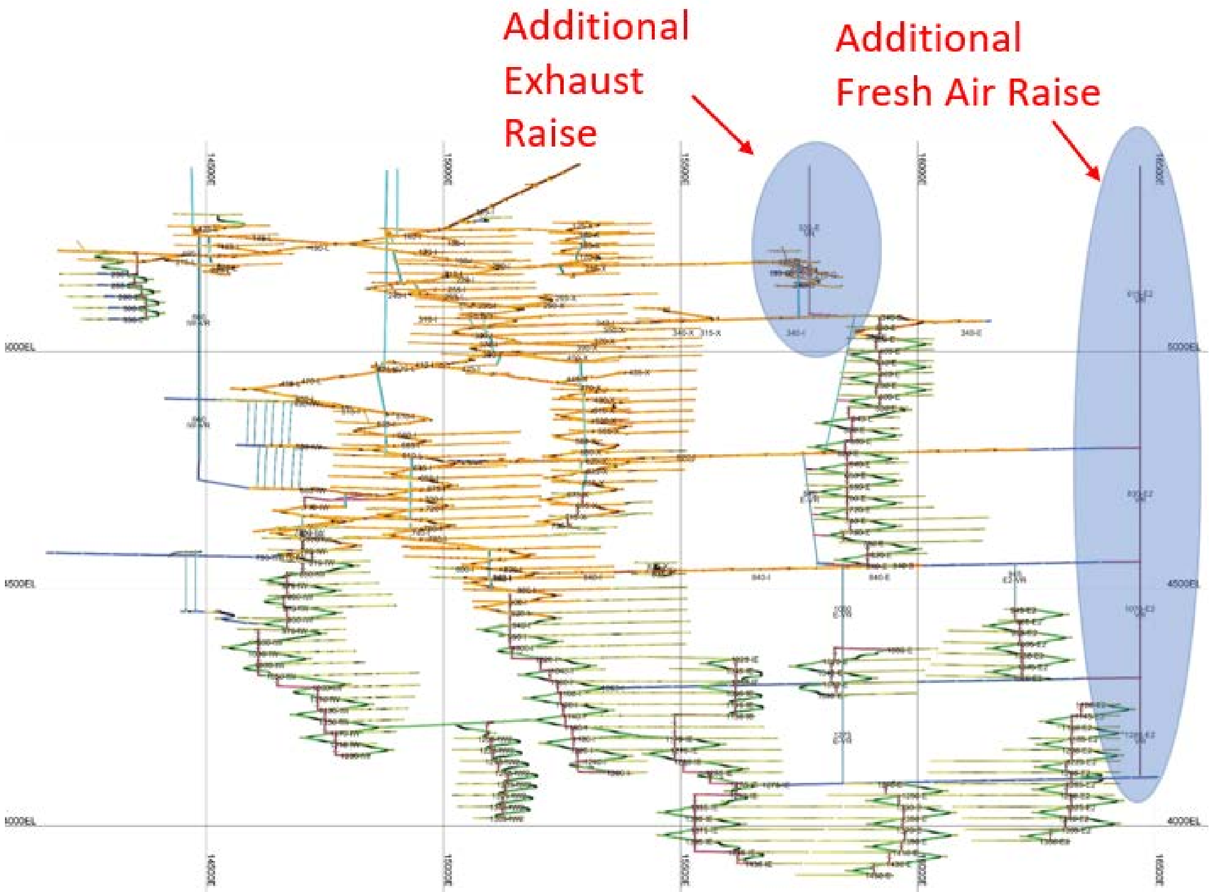


Figure 16-16   R1200 and R1200NP Underground Development and Infrastructure

16.13.2 Ramp Haulage at 1,200 TPD with a Paste Plant (R1200)

The R1200 scenario has a similar mine plan to the R1200NP scenario, but with a higher mining recovery, resulting from the incorporation of a paste fill plant and associated underground distribution system capable of delivering 1,200 tpd of paste. Incorporating paste fill into the mining sequence will provide several cost and operating efficiencies:

- The increased mining recovery provides another 100,000 recovered ounces over the no paste fill alterative by:
  - Allowing mining of sills without the need for remnant pillar;
  - Reducing backfill dilution;
- Faster stope cycling time which in turn supports higher mining rates;
- Increased geotechnical stability, particularly important as the mine gets deeper; and
- With 56% of the tailings going back underground as paste fill, the tailings dam required capacity is reduced, with two raises required rather than three, resulting in $17M life of mine capital savings.

The addition of paste fill has an after-tax Internal Rate of Return (IRR) of 32% at a $1,450 USD gold price. The IRR is calculated on the deltas of the annual after-tax free cash flows between the R1200NP and R1200 cases. Specifics of the paste fill plant are discussed in Section 18.3.3.

Mine life in the R1200 scenario would go to 2042, one year longer than R1200NP due to additional tonnage available with higher mining recovery with paste fill. The annual extraction sequence is presented in Figure 16-17.

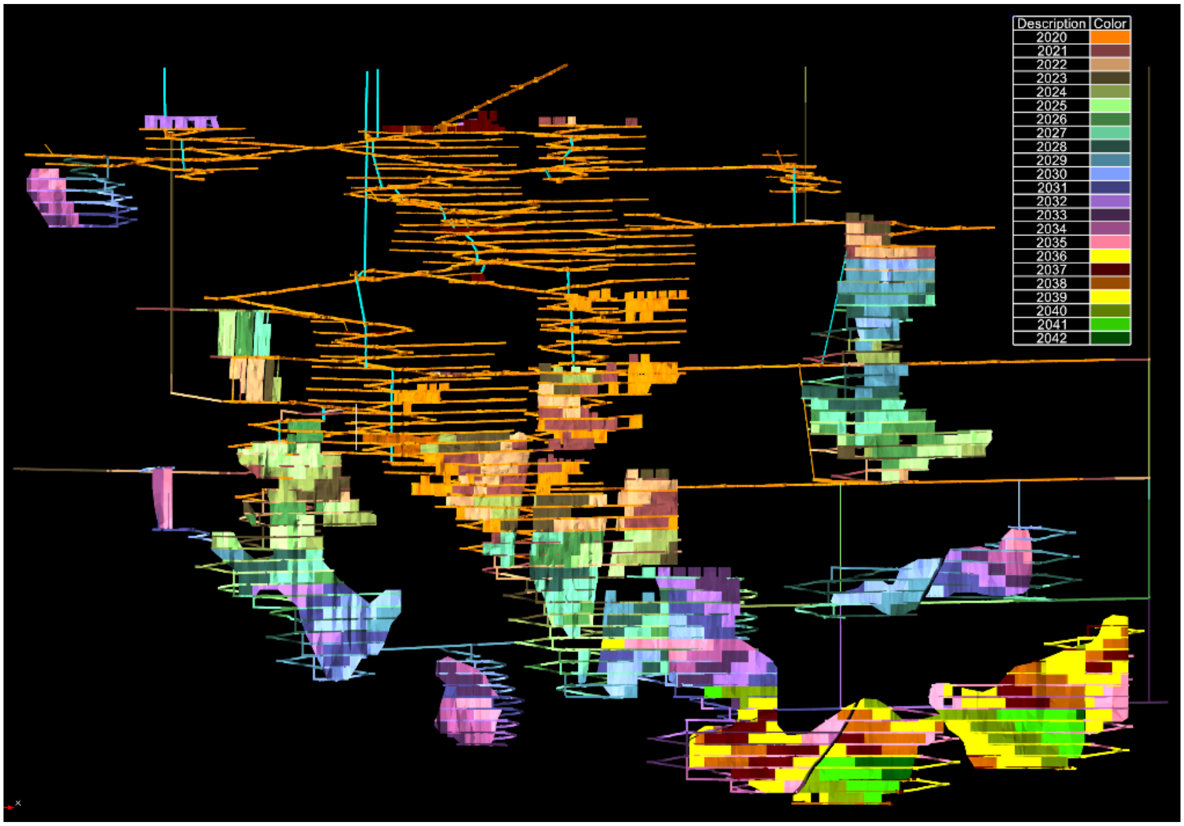


Figure 16-17 R1200 Annual Extraction Sequence

16.13.3 Ramp Haulage at 1,600 TPD with a Paste Plant (R1600)

The R1600 scenario anticipates increasing the mining rate to 1,600 tpd by 2026. With the increased mining rate and trucking requirements several significant capital investments would have to be made including:

- A second ramp to surface is required. The current ramp system cannot handle the trucking volumes required for 1,600 tpd due traffic congestion in the ramp as was determined by simulations done on the haulage circuits;
- Additional internal ramps connecting upwards to the ramp system accessing the eastern extension zone, which then connects to the new ramp to surface;
- Additional ventilation infrastructure beyond that required for the R1200 and R1200NP scenarios (Figure 16-18). The air requirements increase to 1.1 million cfm, as additional trucks and loaders are required to attain a 1,600 tpd mining rate. Truck requirements in this scenario peak at twenty five 42 tonne trucks comparted to the 8 that the mine is currently running. To cater to this a second FAR and fans, in addition to the new FAR required for R1200, would be added on the west end of the ore body and the new ramp to surface would used for exhaust;
- A paste fill plant, and the associated underground distribution system, capable of delivering 1,600 tpd of paste; and

- The mill capacity would be expanded to 1,600 tpd. This would require upgrades or additions to several of the areas of the process plant such as the fine ore stockpile capacity, pre-leach thickening, leaching, CIP, acid wash, process water management, and other equipment modifications. This is fully discussed in Section 17.

As in the R1200NP and R1200 scenarios, personnel transportation time to the working faces increases significantly in the future, decreasing employee productivity.

Mine life in the R1600 scenario would go to 2038 and the annual extraction sequence is shown in Figure 16-19.

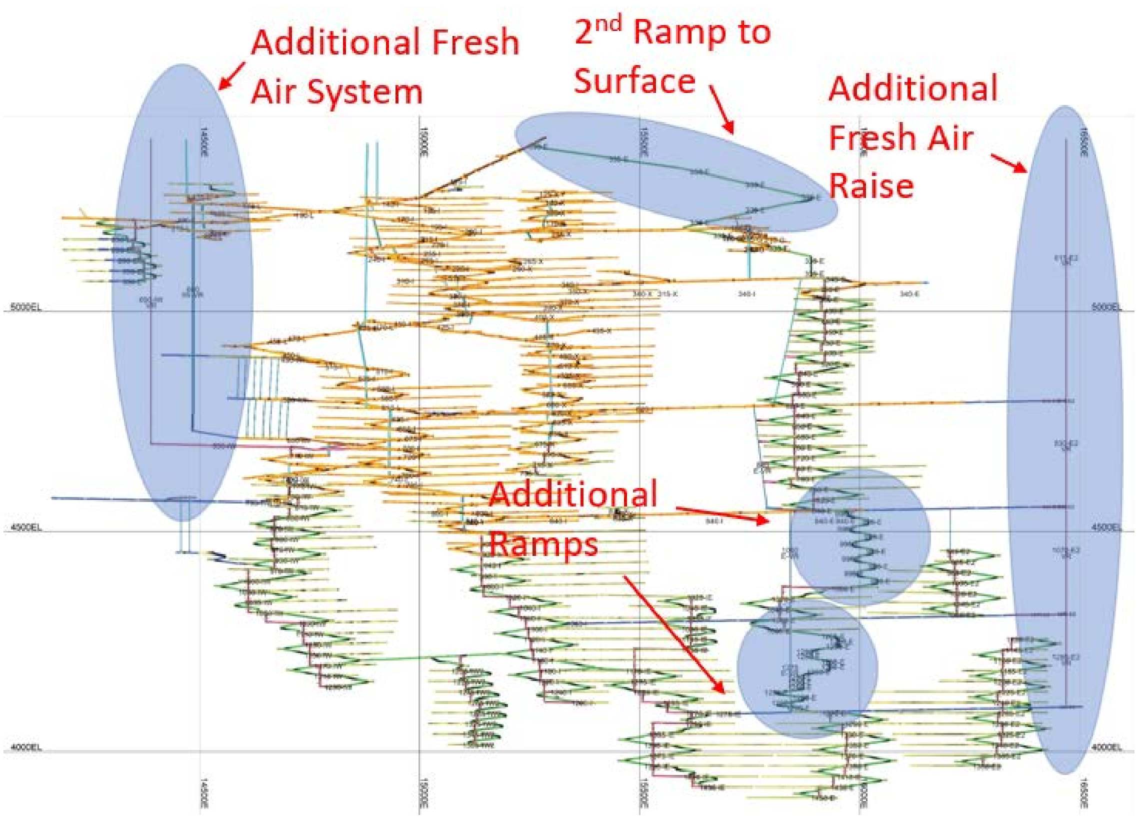


Figure 16-18 R1600 Underground Development and Infrastructure

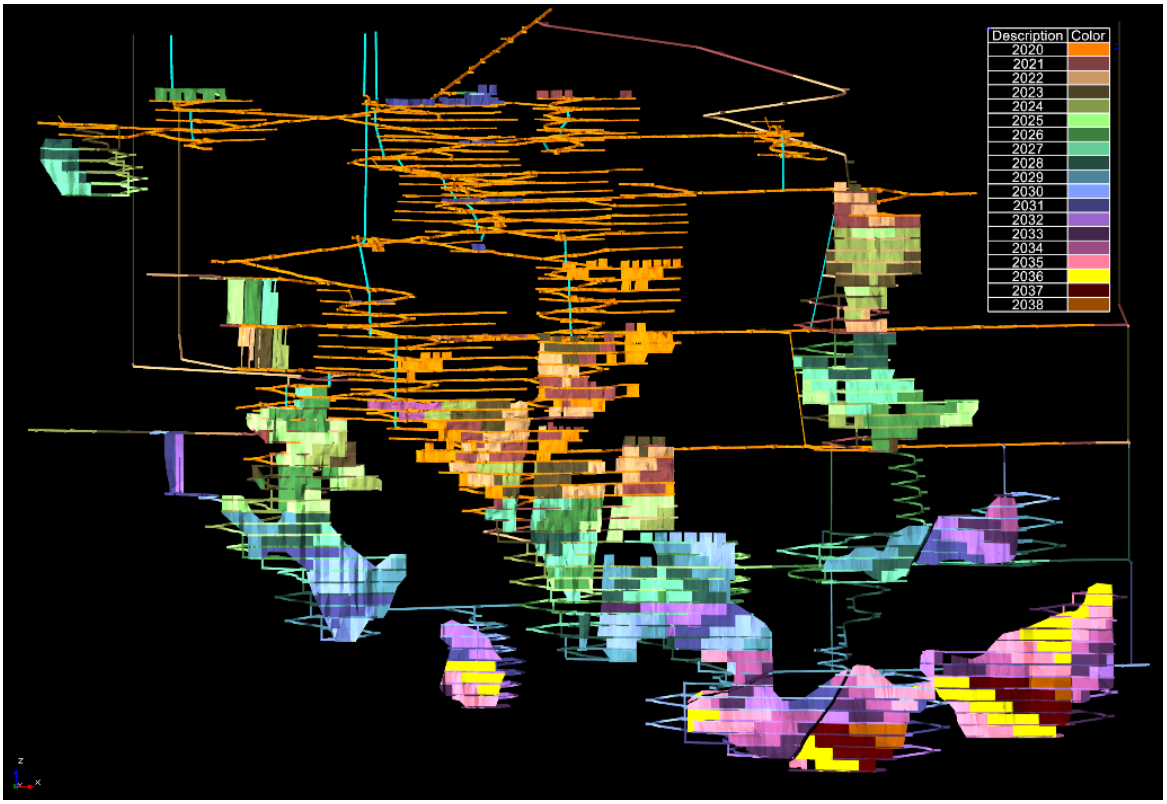


Figure 16-19 R1600 Annual Extraction Sequence

16.13.4 Shaft at 1,600 TPD with a Paste Plant (S1600)

The S1600 scenario anticipates sinking a 1,373 m deep shaft and increasing the mining rate to 1,600 tpd by 2025. Upon commissioning of the shaft and its associated infrastructure, all ore and waste transport would be via the shaft. In addition, the shaft would be used to transport personnel and materials to any of the three shaft station levels thereby decreasing travel time significantly. The scenario has several significant capital investments required including:

- The sinking of a 1,373 m deep, 5 m diameter, concrete lined shaft;
- Construction of a hosting plant and associated infrastructure. The design selected would be capable of hoisting 4,500 tpd or ore and waste from the 1,373 m elevation and 3,500 tpd of ore and waste from the 2,000 m elevation should the shaft be required to be deepened in the future to access new Mineral Resources. Details of the shaft and associated infrastructure are fully described in Section 18.3;
- Construction of an ore and waste handling system underground consisting of ore and waste passes, a grizzly, coarse ore bin, and a loading pocket;
- A paste fill plant, and the associated underground distribution system, capable of delivering 1,600 tpd of paste; and
- The mill capacity would be expanded to 1,600 tpd. This would require upgrades or additions to several of the areas of the process plant such as the fine ore stockpile capacity, pre-leach thickening, leaching, CIP, acid wash, process water management, and other equipment modifications. This is fully discussed in Section 17.

As the shaft acts as fresh air way, the S1600 scenario does not require any additional ventilation raises to surface beyond what is currently in place at Island Gold. Ventilation fans and propane heaters will be required to be installed at the shaft plenum (Figure 16-20).

Mine life in the S1600 scenario would go to 2037.

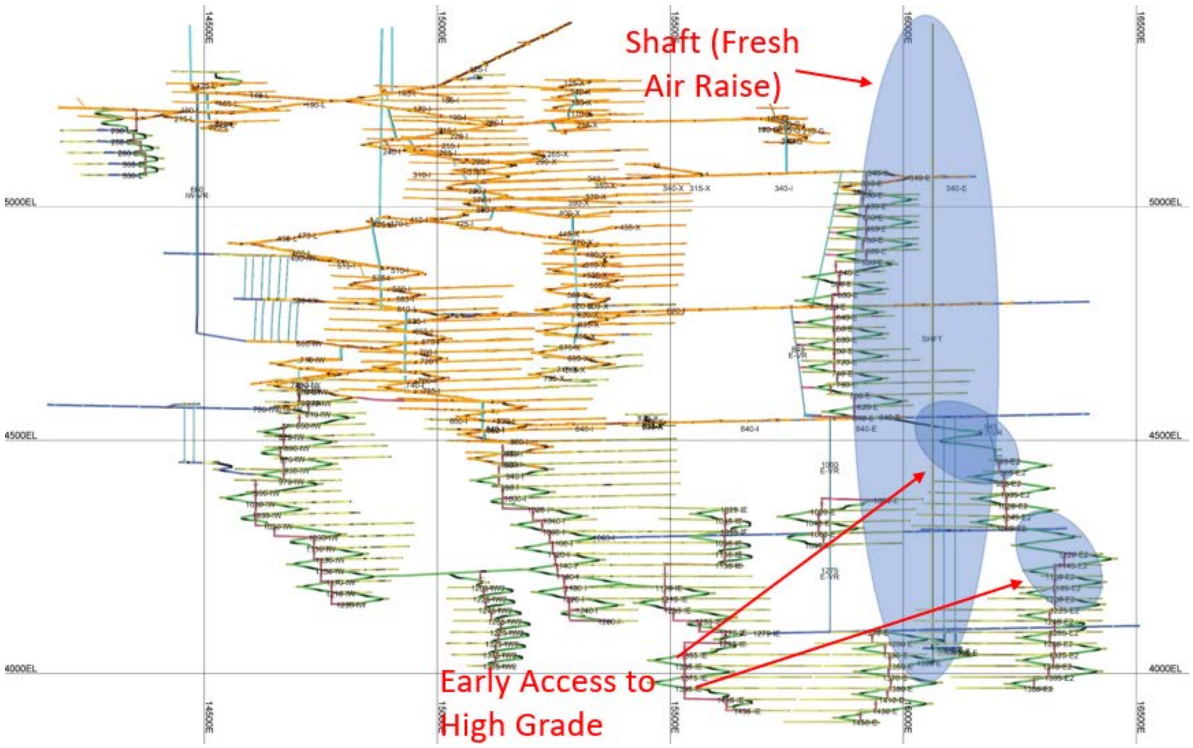


Figure 16-20   S1600 and S2000 Underground Development and Infrastructure

16.13.5 Shaft at 2,000 TPD with a Paste Plant (S2000)

The S2000 scenario anticipates sinking a 1,373 m deep shaft and increasing the mining rate to 2,000 tpd in 2026. Upon commissioning of the shaft and its associated infrastructure all ore and waste transport would be via the shaft. In addition, the shaft would be used to transport personnel and materials to any of the three shaft station levels thereby decreasing travel time significantly. The scenario has several significant capital investments including:

- The sinking of a 1,373 m deep, 5 m diameter, concrete lined shaft;
- Construction of a hosting plant and associated infrastructure. The design selected would be capable of hoisting 4,500 tpd or ore and waste from the 1,373 m elevation and 3,500 tpd of ore and waste from the 2,000 m elevation should the shaft be required to be deepened in the future to access new Mineral Resources. Details of the shaft and associated infrastructure are fully described in Section 18.3;
- Construction of an ore and waste handling system underground consisting of ore and waste passes, a grizzly, coarse ore bins, and a loading pocket;
- A paste fill plant, and the associated underground distribution system, capable of delivering 2,000 tpd of paste; and

- The mill capacity would be expanded to 2,000 tpd. This would require upgrades or additions to several of the areas of the process plant such as the crushing circuit, fine ore stockpile capacity, primary grinding circuit, pre-leach thickening, leaching, CIP, acid wash, process water management, and other equipment modifications. This is fully discussed in Section 17.

Total ventilation requirements for S2000 are 750,000 cfm, significantly less than the requirement for the R1200 and R1600 scenarios. As the shaft acts as a fresh air way, the S2000 scenario does not require any additional ventilation raises to surface beyond what is currently in place at Island Gold. Ventilation fans and propane heaters will be required to be installed at the shaft plenum.

As most of the ore will be moved on the level to the ore passes, the truck requirements are significantly reduced from current (2020) requirement of eight 42 tonne trucks. Five 42 tonne trucks will be required when the shaft infrastructure is in place.

Mine life in the S2000 scenario would go to 2035 and the annual extraction sequence is shown in Figure 16-21.

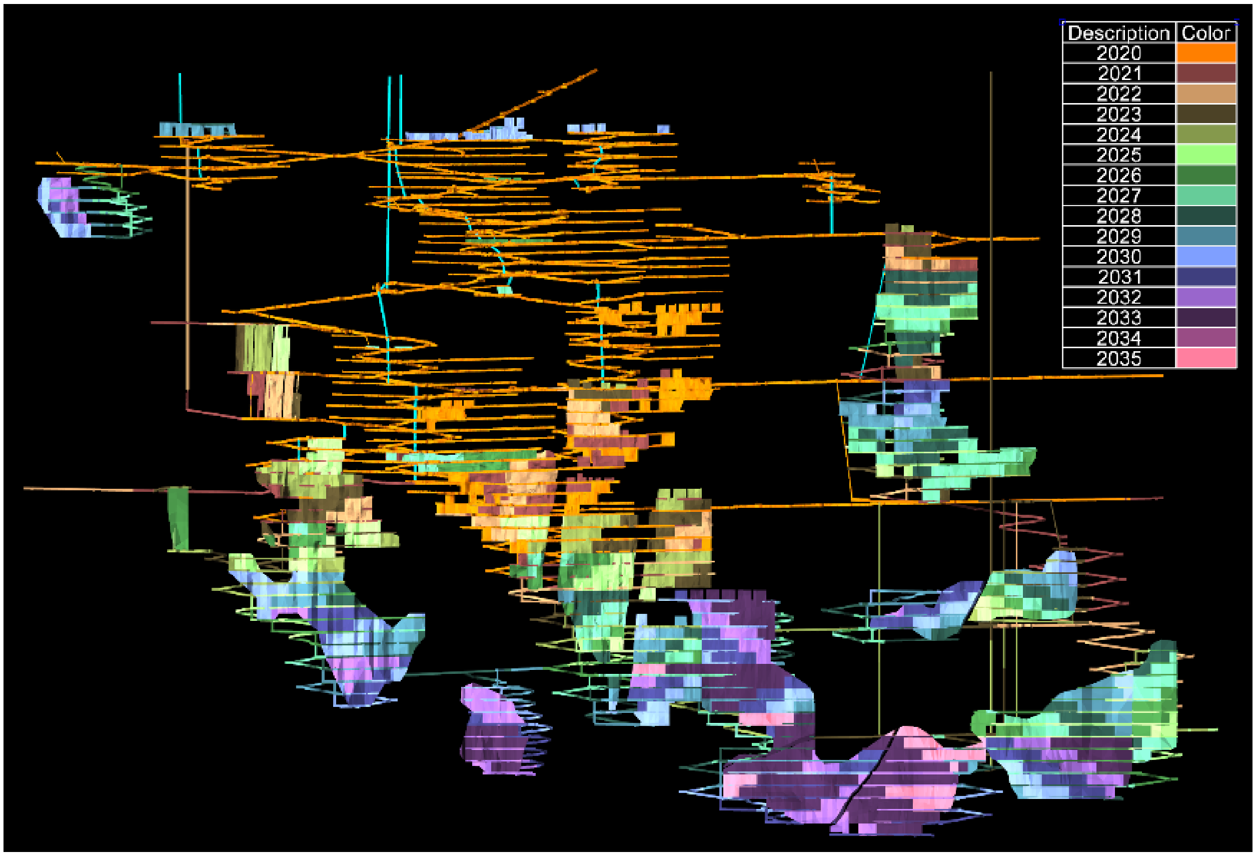


Figure 16-21 R2000 Annual Extraction Sequence

16.14 Phase III Expansion Study Observations

Detailed capital and operating costing models were developed for each of the five scenarios studied. Combining these models with the physicals, cash flow models were constructed that allowed for sensitivity analysis of costing and productivity input parameters. In comparing the five scenarios several observations were made that will focus on the R1200, R1600 and S2000 scenarios.

16.14.1 Capital Requirements

Capital costs increase moving from the R1200 scenario to the R1600 scenario to the S2000 scenario. The increase in capital from the R1200 to the R1600 is attributable to the increase in daily mining capacity requiring more trucks, ventilation infrastructure and an additional ramp to surface, in addition to the cost associated with expanding the milling capacity. The increase in capital from the R1600 scenario to S2000 scenario is attributable to construction of the shaft and hoisting facility and the capital required to expand the mill to 2,000 tpd, partially offset by less capital required for trucks, ventilation infrastructure and capital development. Capital requirements are discussed in detail in Section 21.

16.14.2 Productivity

Productivity levels between the R1200 scenario and R1600 are very similar and begin to drop as the mine gets deeper and it takes longer for employees to enter and leave the mine. Productivity levels dramatically increase with the use of the shaft to transport personnel. Using 2020 as a baseline, effective time at the face increases by 20% with the shaft (Figure 16-22). With additional time at the face, development metres per employee (Figure 16-23) and stoping tonnes per employee increase (Figure 16-24). Increased productivity results in less personnel required to attain the same tonnage or alternatively the same number of personnel to achieve higher tonnage rates as is the case with the mine staffing requirements in Figure 16-25.

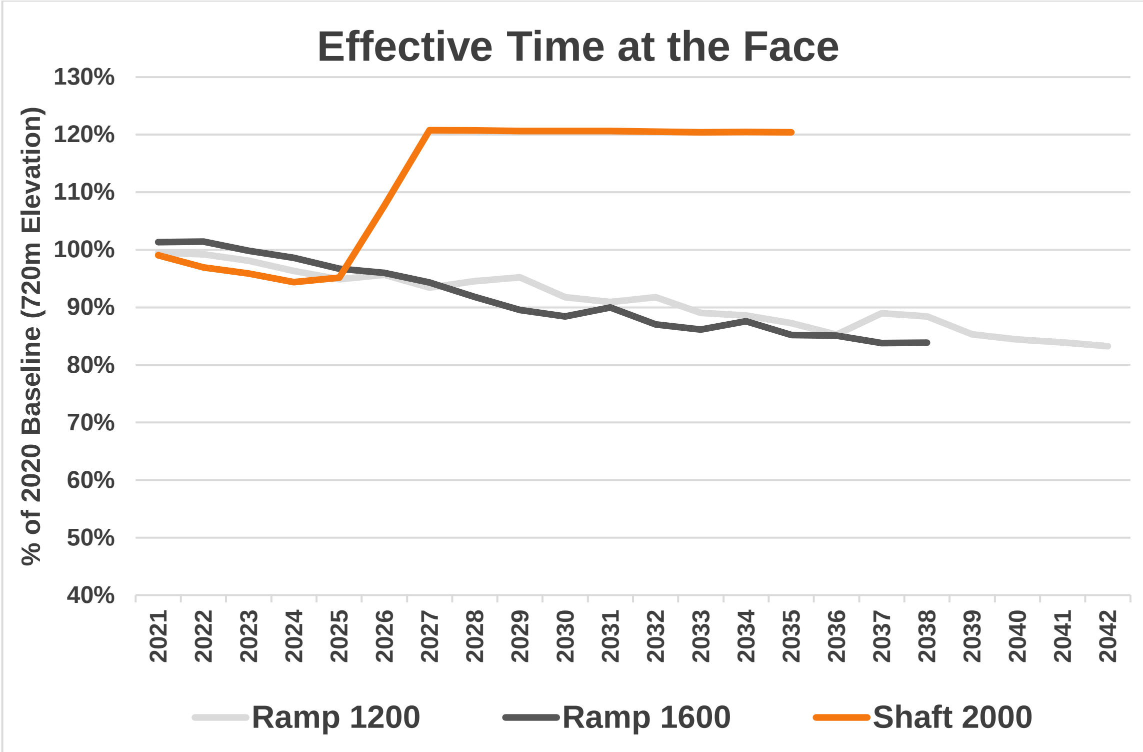


Figure 16-22 Effective Time at the Face with 2020 as a Baseline

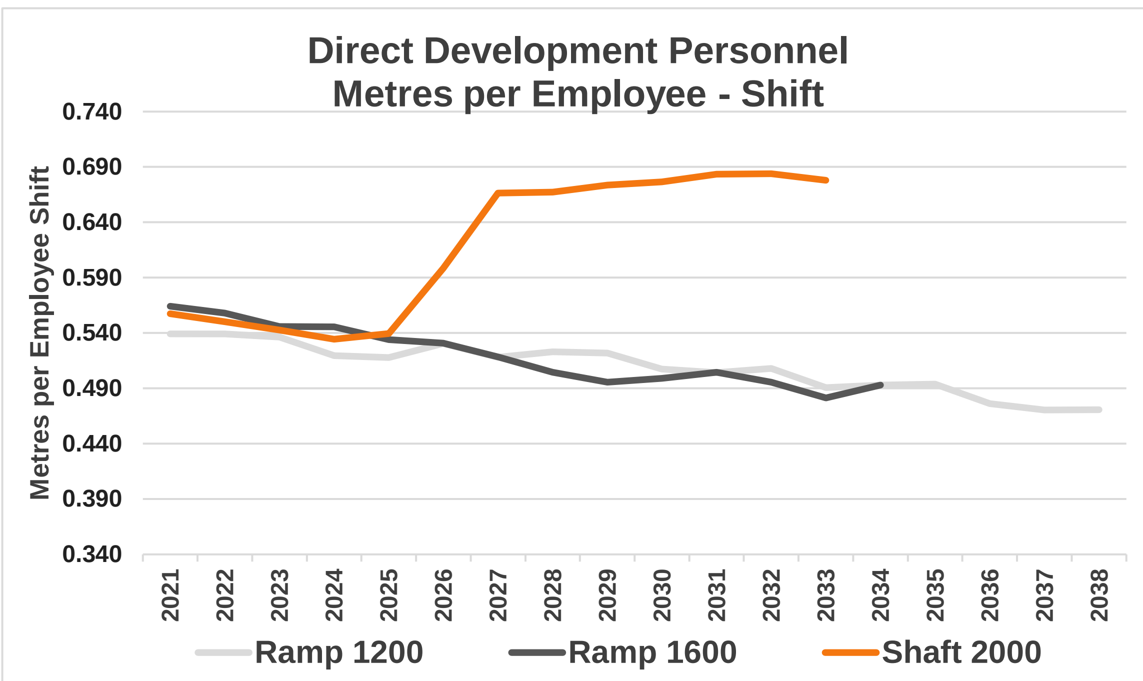


Figure 16-23 Metres of Development per Employee

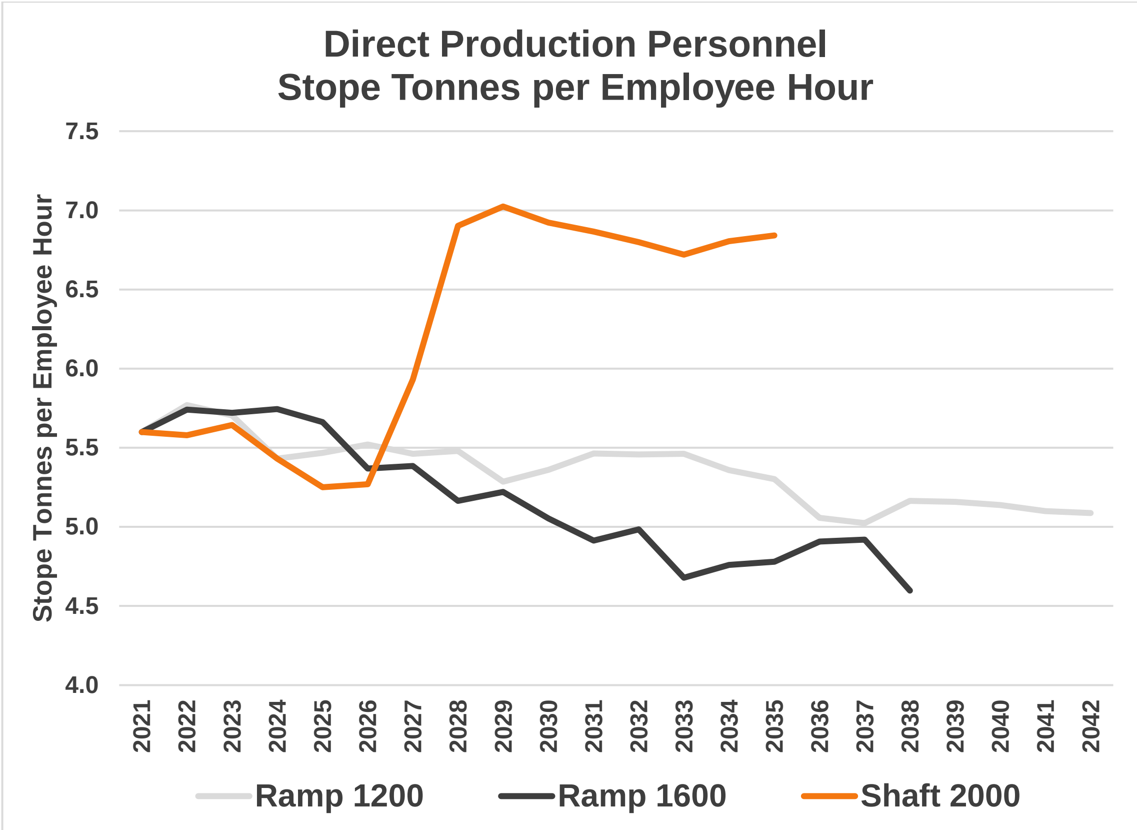


Figure 16-24 Stope Tonnes per Employee

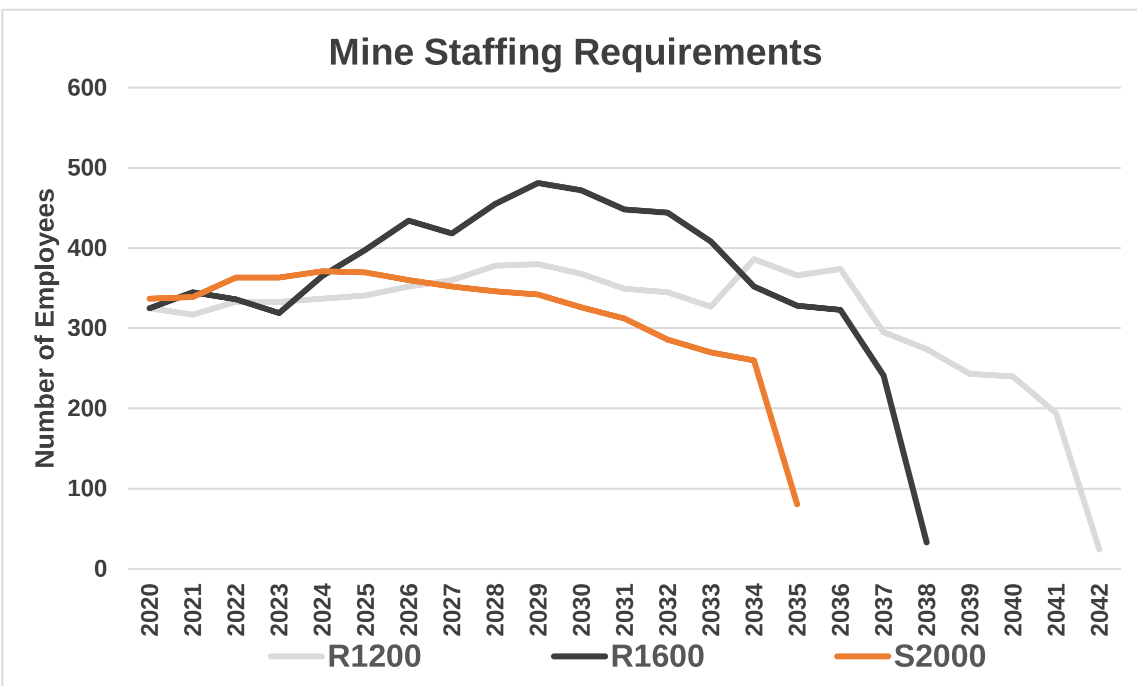


Figure 16-25 Mine Staffing Requirements

16.14.3 Operating Costs

With the ramp scenarios mining costs increase over the mine life due to increased haulage cycle times from lower mine horizons Mine unit operating costs decrease moving from the R1200 scenario to the R1600 scenario to the S2000 scenario (Figure 16-26). Annual mining costs decrease moving from the R1200 scenario to the R1600 scenario because of economies of scale, namely the sharing of fixed costs such as supervision, engineering, and geology, pumping etc. over more tonnes. Costs are further reduced moving to the S2000 scenario as a result of economies of scale, operating less trucks and reduced ventilation costs. Figure 16-27 depicts the reduction in truck hours with the S2000 scenario and Figure 16-28 depicts the reduction in primary production equipment (LHD's, trucks, jumbos, bolters and scissor lifts). Operating costs are discussed in more detail in Section 21.

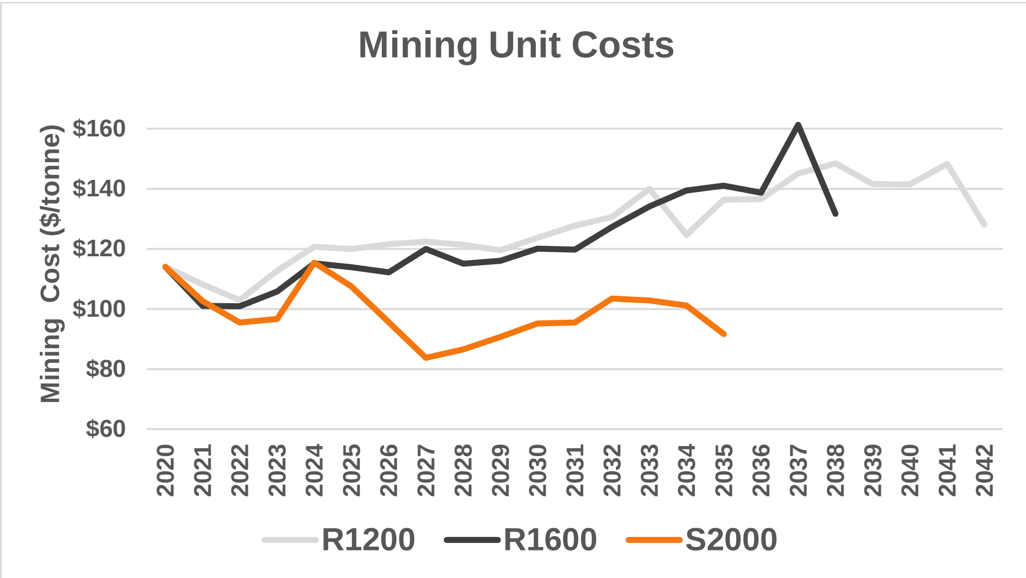


Figure 16-26 Mining Units Costs

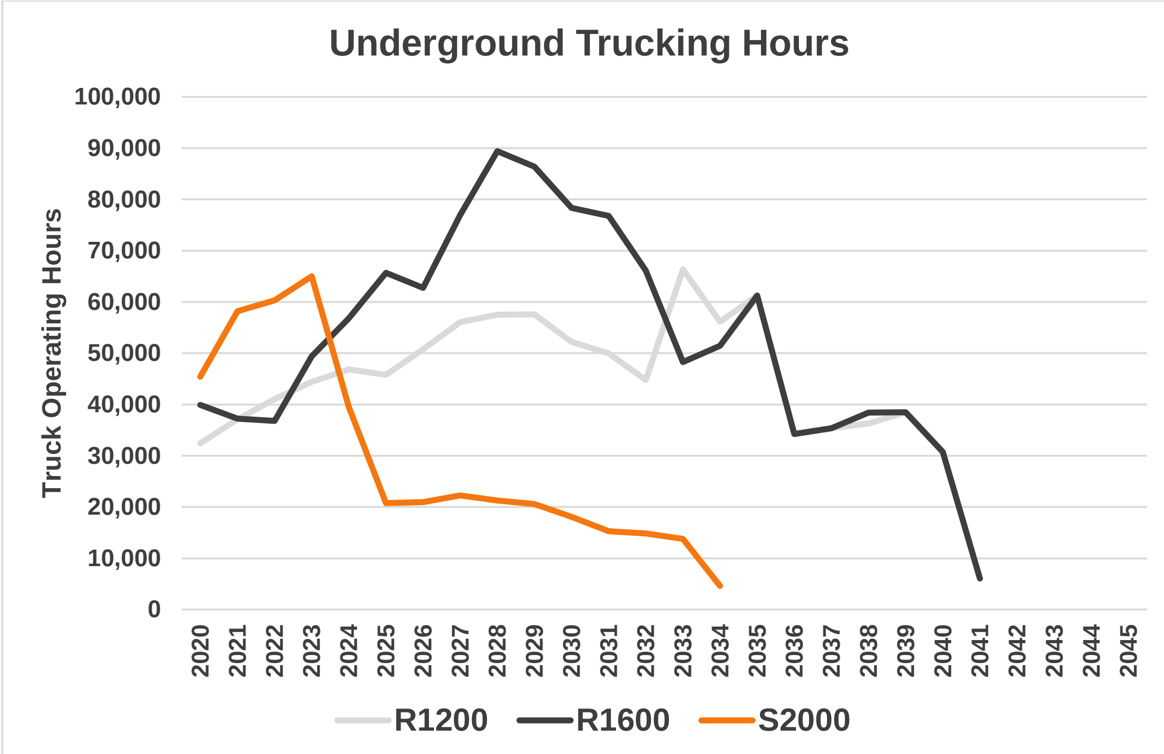


Figure 16-27 Underground trucking Hours

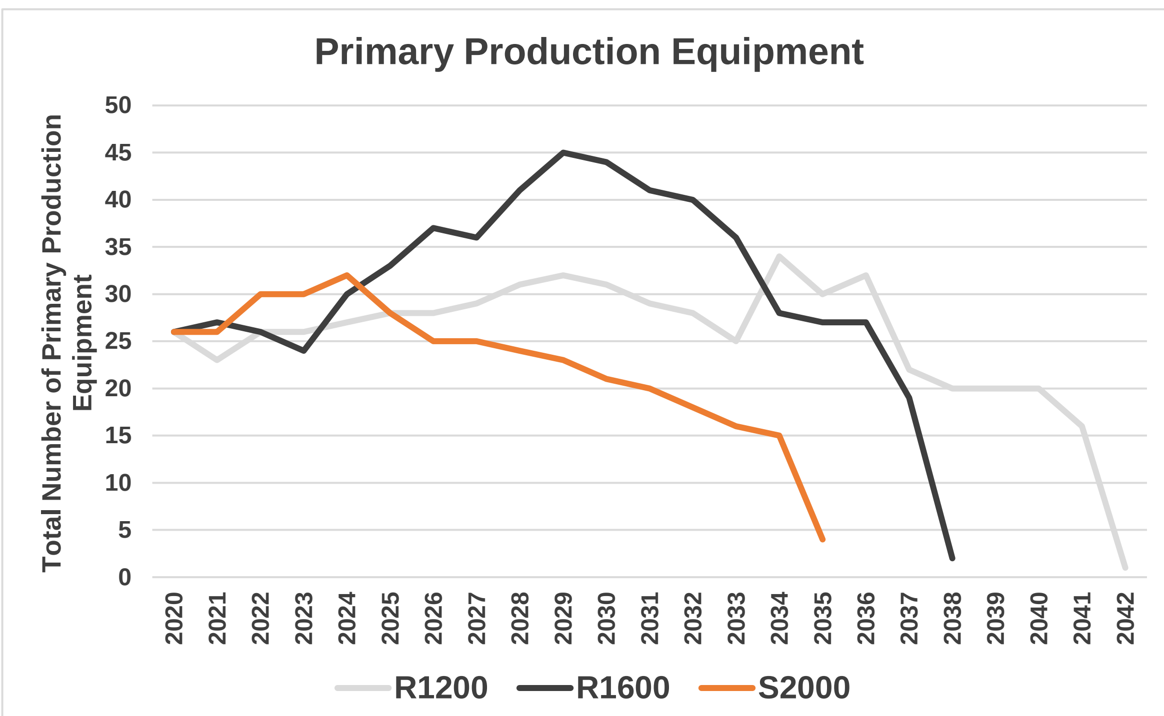


Figure 16-28 Quantity of Primary Production Equipment Required

16.14.4 Economics

With the R1200 scenario considered as the Basecase, after-tax net present value (NPV) and IRR comparisons were undertaken with the other scenarios. It was determined that the R1200 scenario had the lowest NPV while the S2000 scenario had the highest NPV. The NPV's of the R1600 and S1600 fell midway between R1200 and S2000. IRR's were undertaken on the deltas of the annual after-tax cash flow between the Basecase and the R1600, S1600 and S2000 scenarios. The S2000 case has a 17% IRR at USD $1450 gold price. The R1600 and S1600 scenarios have lower, but still acceptable IRR's.

Although the S2000 has a higher initial or growth capital, this is more than offset by lower sustaining capital and operating costs than the pother options. In addition, the impact of higher annual revenue from the increase in annual ounce production positively impacts the NPV and IRR. At higher gold prices than base case gold price of USD $1,450 the NPV and IRR increase. The economics are discussed in more detail in Section 22.

16.14.5 Other Considerations

Due to the lower number of trucks operated and the reduced ventilation requirements the S2000 option has the lowest greenhouse gas emissions both on an annual basis (Figure 16-29) and a life mine basis (Figure 16-30).

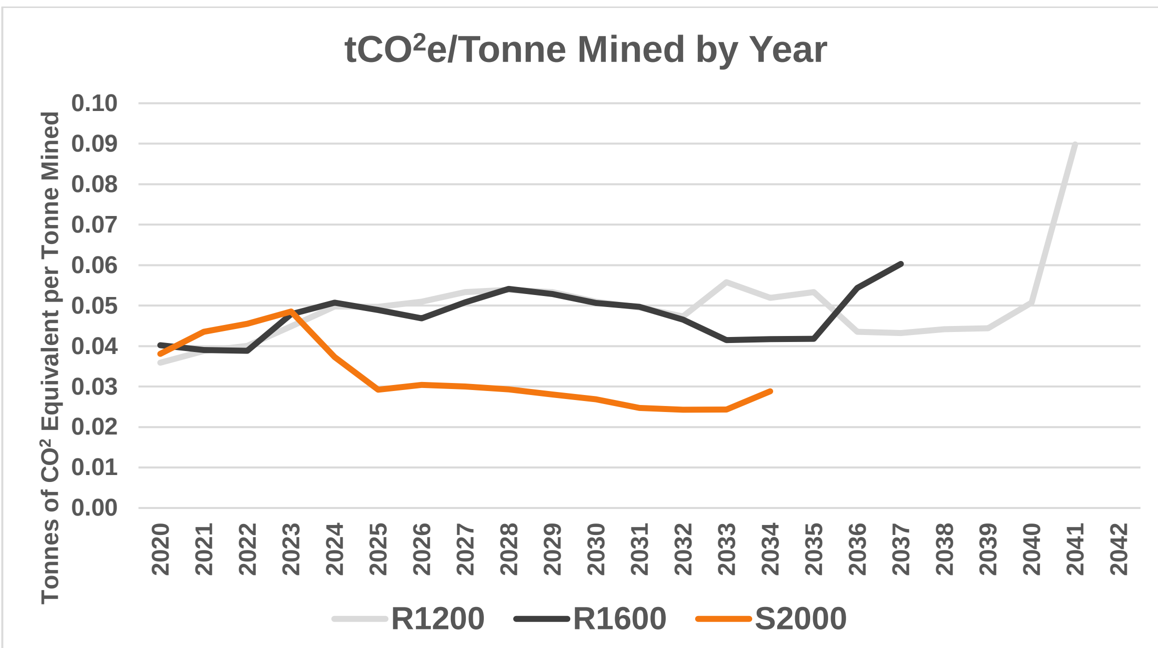


Figure 16-29 Annual CO2 Emissions

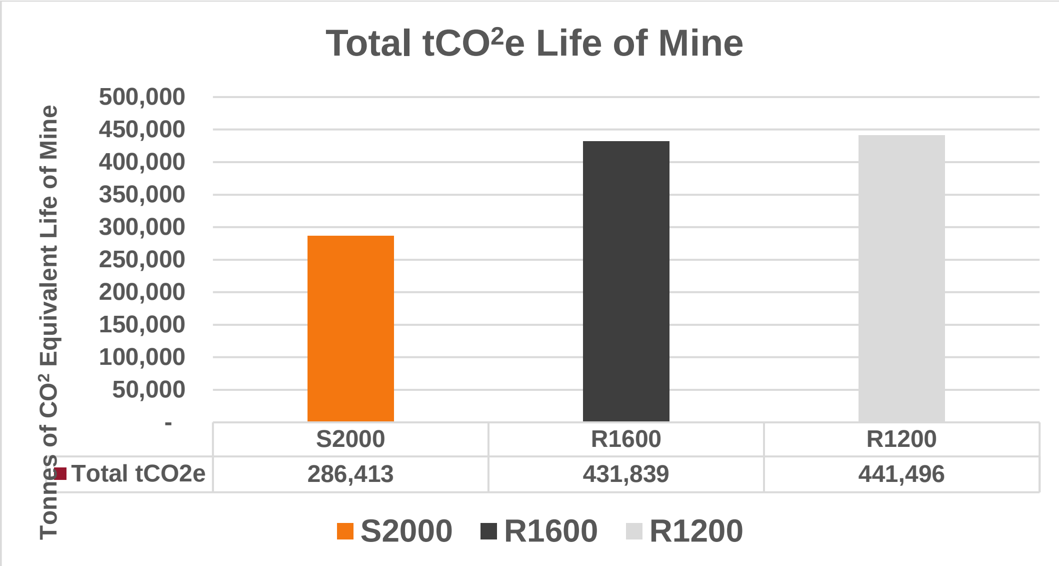


Figure 16-30 Life of Mine CO2 Emissions

In undertaking the mine planning exercise to generate the S2000 scenario it was once again demonstrated that a 2,000 tpd mine capacity is very viable. With the sinking of the shaft, the very high grade (+20 g/t) pods in east of the deposit, on the lower levels, are able to be brought into production much earlier in the mine life, as access to this area is obtained earlier than would otherwise be achieved with a ramp only system.

The S2000 option significantly de-risks the operation with reduced congestion and reduced personnel and mobile fleet requirements.

Should additional Mineral Resources be discovered below the 1,500 metre level, the shaft is the best positioned option to access those potential Mineral Resources. Ramp haulage below 1,500 m is not viable, and the shaft can be deepened, either during the initial sink, or after the shaft is in operation.

16.15 Phase III Expansion Study Conclusions

The two primary conclusions from the Study were:

- The paste plant should be built given:
  - The 100,000 additional ounces produced;
  - The increased geotechnical de-risking; and
  - Positive after-tax IRR of 32%.
- In expanding the Island Gold Mine, the shaft at a 2,000 tpd mining rate (S2000) scenario should be adopted given that it:
  - Provides the strongest economics (free cash flow, after-tax NPV, and IRR) of all the scenario studied;
  - Provides the highest annual gold production;
  - Has the lowest operating costs, as well as the lowest cash costs and mine-site all-in sustaining costs per ounce;

- Has the lowest combined operating and capital costs;
- Provides access to higher grade stopes sooner in the mine life;
- De-risks the lower mine operation;
- Provides for reduced congestion and reduced personnel and mobile fleet requirement; and
- Provides a significantly reduced carbon footprint and reduced exposure to diesel price and carbon tax increases.

Based upon these conclusions Island Gold is proceeding the permitting and construction of the paste plant, the shaft complex and mining at a rate of 2,000 tpd.

16.16 Island Gold Life of Mine Plan

With the commitment to implement the S2000 scenario, the mine plan associated with that scenario has been adopted as the Life of Mine Plan for Island Gold and is presented in Table 16-7.

Table 16-7 Life of Mine Production Physicals

	Units	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	LOM
Stope Tonnes	(kt)	302	322	384	369	339	412	585	681	645	612	607	670	663	717	721	297	8,326
Stope Grade	(g/t)	11.58	10.62	10.50	9.97	11.35	10.09	11.47	11.31	10.02	9.24	8.53	9.22	8.68	13.74	13.81	9.89	10.69
Development Tonnes	(kt)	108	116	54	69	100	145	135	49	87	118	123	60	69	13	0	0	1,247
Development Grade	(g/t)	8.90	8.78	6.78	7.90	6.20	8.81	10.20	8.66	9.15	13.20	8.11	7.40	5.85	12.48	0.00	0.00	8.79
Total Tonnes	**(kt)**	**411**	**438**	**438**	**438**	**439**	**557**	**720**	**730**	**732**	**730**	**730**	**730**	**732**	**730**	**721**	**297**	**9,572**
Total Grade	**(g/t)**	**10.87**	**10.17**	**9.85**	**8.37**	**9.70**	**13.08**	**11.41**	**9.22**	**10.62**	**13.91**	**8.81**	**9.37**	**10.32**	**11.09**	**9.60**	**9.77**	**10.45**
Total Waste Tonnes	(kt)	416	440	611	688	478	317	337	471	415	372	256	190	33	1	0	0	5,025
Operating Development	(m)	2,241	2,483	1,251	1,563	2,275	2,939	2,958	1,116	1,852	2,498	2,527	1,231	1,407	261	0	0	26,603
Capital Development	(m)	4,052	5,660	7,427	7,080	5,330	4,475	4,536	6,704	5,838	5,180	3,529	2,687	418	0	0	0	62,916
Exploration Development	(m)	748	648	764	1,404	759	29	0	0	0	0	0	0	0	0	0	0	4,352
Total Development	**(m)**	**7,041**	**8,791**	**9,441**	**10,046**	**8,364**	**7,444**	**7,495**	**7,820**	**7,690**	**7,678**	**6,056**	**3,917**	**1,826**	**261**	**0**	**0**	**93,871**
Alimak Raising	(m)	0	196	490	667	1,026	215	124	0	0	0	0	0	0	0	0	0	2,719
Conventional Vent Raising	(m)	123	61	145	203	216	158	271	221	267	243	227	116	39	0	0	0	2,290
Raisebore Vent Raising	(m)	0	0	0	487	0	0	0	0	0	0	0	0	0	0	0	0	487

17 RECOVERY METHODS

The current process plant at Island Gold is composed of a two-stage crushing circuit followed by a two-stage grinding circuit. The mill uses a cyanide leaching and a carbon-in-pulp (CIP) adsorption process to recover gold.

To determine the maximum throughput capability of the existing process plant equipment, and to provide several alternatives for additions to the grinding circuit and balance of plant, an assessment of the current plant flowsheet was undertaken by Orway Mineral Consultants. The major element effecting the throughput of the plant is the comminution circuit, specifically milling, therefore, the assessment of the current and recommended crushing and milling areas were completed first which lead into the assessment of the balance of the plant.

In all, six options for increasing the plant throughput were evaluated as part of this study, with two options considering an increase from 1,200 tpd to 1,600 tpd, two options considering a staged increase from 1,600 tpd to 2,000 tpd, and two options considering and increase directly from 1,200 tpd to 2,000 tpd.

Upon evaluation of each option, it was decided to proceed with a combination of Options A and C, which in summary involves upgrades to the crushing plant, changes to the fine ore storage arrangement, addition of a new ball milling circuit, addition of a Pumpcell CIP absorption plant and a new elution circuit. Details of these changes can be found in later sections of this report.

17.1 Expansion Considerations

To establish the throughput rate increase, the existing comminution circuit was assessed to identify its maximum capacity. In addition to this, alternatives to the existing crushing and grinding circuits were simulated at differing throughputs to determine which alternatives were available to increase the plant throughput.

The comminution assessment determined that that existing crushers and mills can handle a maximum throughput of approximately 1,600 tpd. This incremental change, however, requires upgrades or additions to several of the other areas of the process plant such as the fine ore stockpile capacity, pre-leach thickening, leaching, CIP, acid wash, process water management, and other equipment modifications.

After increasing the throughput to 1,600 tpd, the comminution assessment established options to further increase the throughput of the plant to approximately 2,000 tpd. These options included:

- the addition of a ball milling circuit (equivalent to the existing primary ball mill) in a parallel configuration, and
- the addition of a new primary ball milling circuit prior to the existing mill to create an in-series grinding configuration

This staged approach to achieve 2,000 tpd requires additional upgrades to the leaching area, pre-leach thickener including its underflow pumps, tailings pumps and process water management.

The comminution assessment also provided an option to increase the throughput of the process plant from 1,200 tpd to 2,000 tpd by way of utilizing an SAB comminution circuit design. This would entail installing a SAG milling circuit prior to the ball milling circuit (in-series grinding) as well as the upgrades or additions to several other areas of the process plant as indicated in the increase to 1,600 and 2,000 tpd descriptions above.

17.2 Selected Expansion Approach

In addition to the rate at which ore is delivered to the process plant from the mine, consideration of the following parameters were given when selecting an option to the throughput expansion: metallurgical performance (potential for gold loss mitigation), versatility (ability to cope with spikes in head grade, varying feed particle sizes, mitigation of bottlenecks), construction complexity (duration of downtime, tie-in points to the existing plant), equipment reliability and capital and operating costs for the process plant changes.

Based on the above criteria, the selected option was to combine the expansion plans from 1,200 tpd to 1,600 tpd with the parallel grinding expansion plan, to increase the throughput of the plant to 2,000 tpd. This entails the addition of a new ball milling circuit in parallel to the existing circuit as well as a new Pumpcell plant and elution circuit at the back end. The key advantage to utilizing a parallel milling circuit is it allows for a single milling stream to operate while the other stream is offline for maintenance. It should be noted that the downstream circuits would need to be managed at the lower throughput and may require modifications to allow the plant to run at the lower tonnage for an extended period.

17.3 Process Flowsheet and Design Criteria

The simplified process flowsheet for the Island Gold Mill expansion is presented in Figure 17-1.

Table 17-1 is a summary of the process design criteria for the expansion of the process plant.

17.4 Process Plant Layout

Figure 17-2 shows the new equipment installations (in bold) and how they are arranged in relation to the existing process plant.

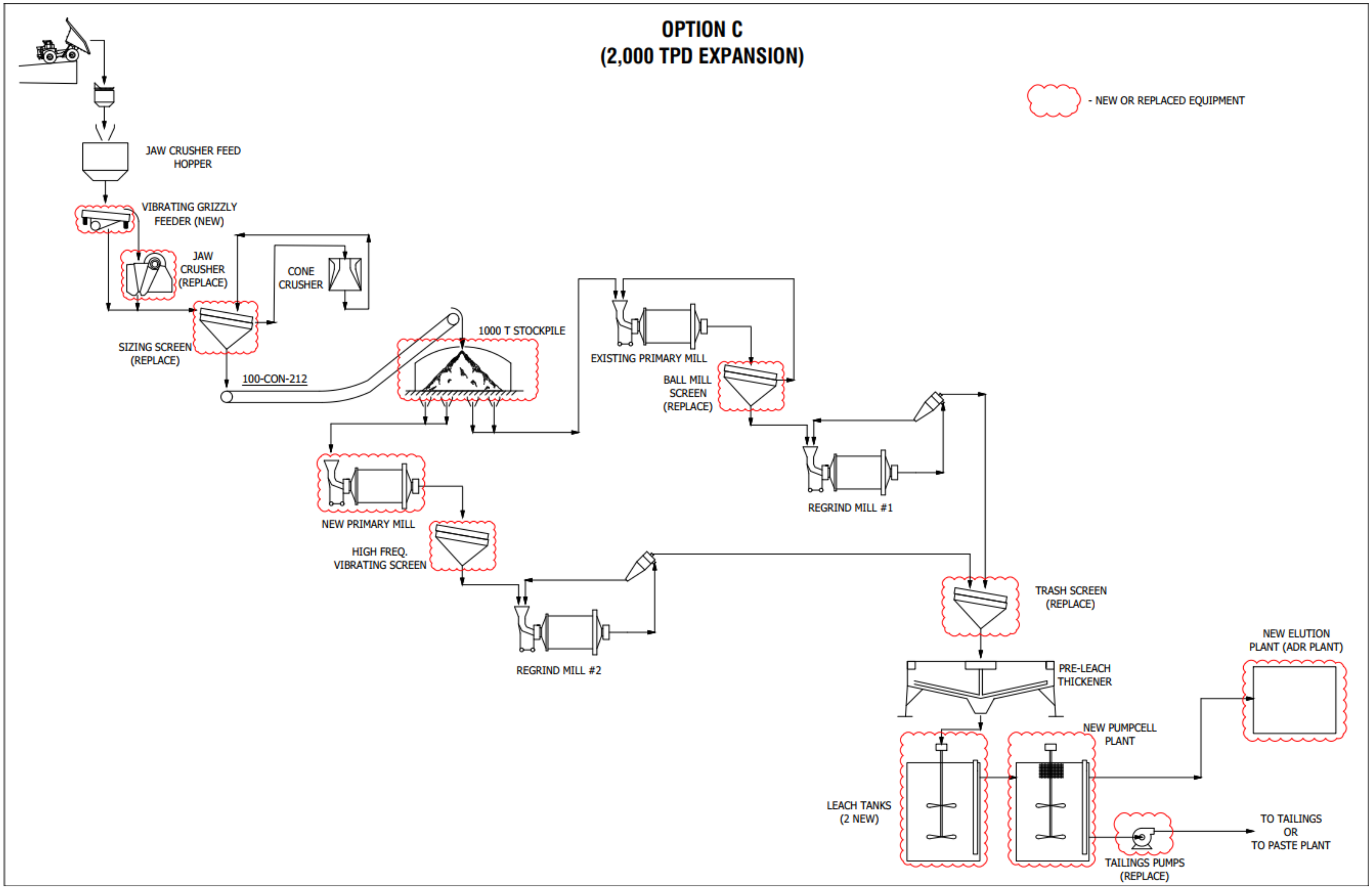


Figure 17-1 Simplified Process Flowsheet Changes for Expansion to 2,000 TPD Throughput

Table 17-1 Process Plant Design Criteria

	Units	Current Plant	Expansion to 2,000 tpd
General			
Annual Production Rate	t/y	438,000	730,000
Daily Production Rate	tpd	1,200	2,000
Operating Days/Year	days	365	365
Ore Parameters			
ROM Feed Size, D_{100}	Mm	500	500
ROM Feed Size, D_{80}	Mm	208	208
Sec Crush Product Size, D_{80}	Mm	11.7	11.7
Grinding Final Product Size, P_{80}	micron	64	64
Moisture	%	2.4	2.4
Head Grade	g/t	10.5	12.5
Crushing			
Annual Operating Hours	h/y	5,840	5,840
Operating Hours	h/d	24	24
Availability	%	67	67
Grinding			
Annual Operating Hours	h/y	8,000	8,000
Operating Hours	h/d	24	24
Availability	%	91.3	91.3
Thickener			
Feed Flowrate	m^3/h	258	429
Rise Rate	m/h	0.73	1.21
Flux	tpd/m^2	4.9	8.2
Underflow % solids	%(w/w)	54.0	54.0
Leaching & CIL			
No. of Tanks	#	4+1	6+1
Residence Time	h	22.4	18.8
CIP			
Configuration		5 x 4.3 m tanks	8 x 60 m^3 Pumpcell plant
Residence Time	h	4.5	4.1
Carbon Concentration	g/L	25-35	35
Elution/Regeneration			
Strip Circuit Capacity	tonnes C	1.5	3
Strips per Day	#	1.7 (max 2)	1.5 (max 2)
Nominal Capacity	tpd	2.5-3.0	4.5-6.0
Gold Loading (typical)	g/t	6,000 – 8,000	6,000 – 8,000

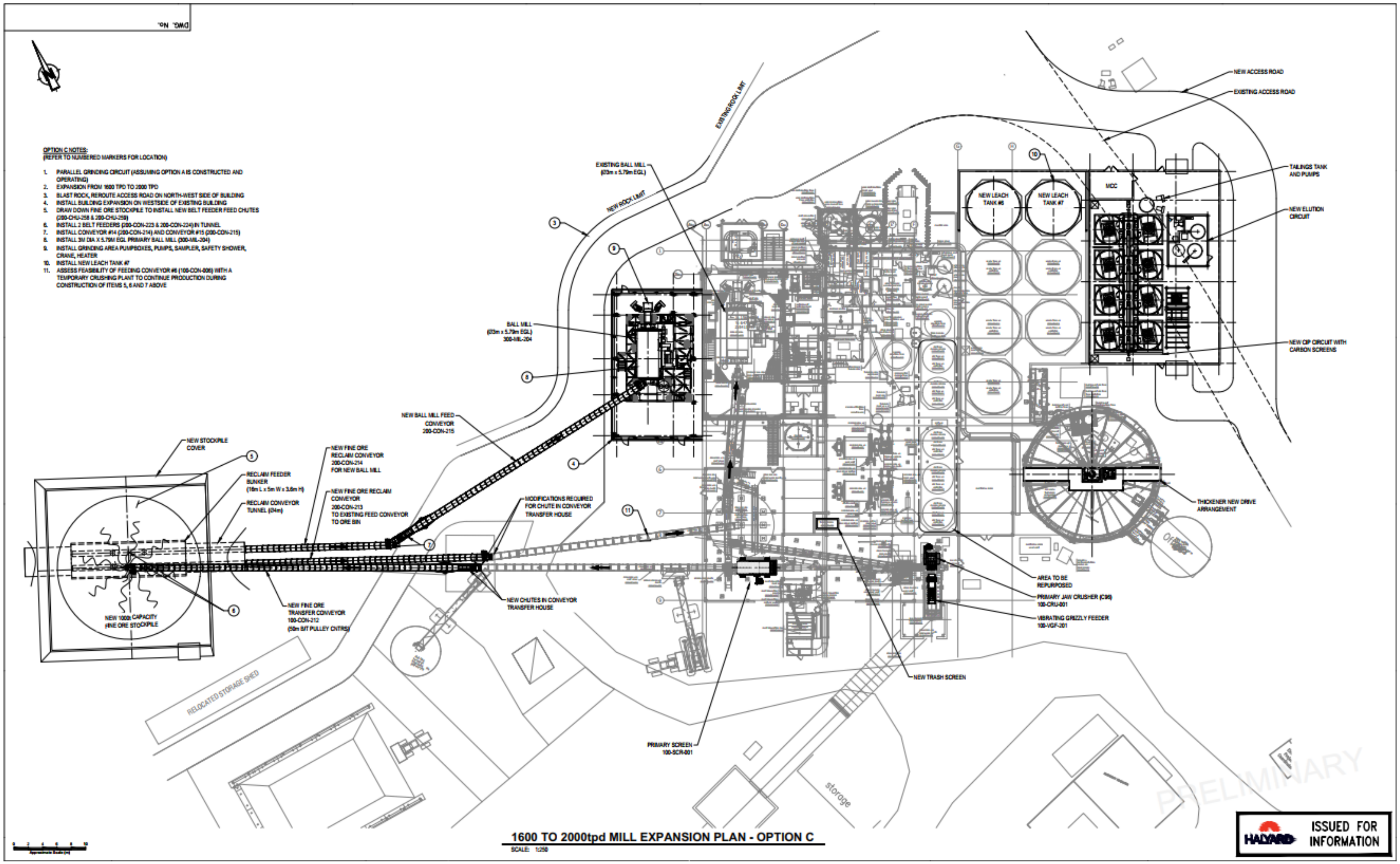


Figure 17-2 Island Gold Process Plant Changes for Expansion to 2,000 TPD Throughput

17.5 Process Description

17.5.1 Crushing Circuit Modifications

As part of the crushing circuit evaluation, several cases were simulated with varying run of mine particle size distributions in combination with two scenarios for the secondary crushing, namely a coarse closed side setting (CSS) of 75 mm and a fine CSS of 38-50 mm.

The outcome of the assessment recommended the installation of a new Metso TK9-42-2V vibrating grizzly feeder to relieve the load on the existing jaw crusher. Modelling was done with 56 mm slots, but 70 mm slots are suitable, as well. The oversize on the feeder will report to the jaw crusher, while the undersize will report directly to Conveyor #2 (100-CON-002) via new chute work, thus bypassing the jaw crusher.

The new jaw crusher (Metso C96 or equivalent) will be capable of operating at up to 125 tph (i.e. 2,000 tpd at 67% availability) with a CSS in the range of 38-75 mm which provides sufficient size reduction for the existing HP200 cone crusher to maintain a crushing circuit product size (D80) of less than 11.7 mm.

It was observed that according to 2019 operations data, the cone crusher average power is 71 kW or 54% power utilization. This indicates that the crusher is not power constrained given the current crushing rates and crusher CSS and is capable of higher tonnages.

The existing sizing screen (100-SCR-001) is overloaded at 1,200 tpd, therefore it is recommended to install a double deck RF1848-2 screen (1.8 m x 4.8 m) for the increased tonnage. Note that a secondary crushing circuit availability of greater than 70% is required to utilize this size of screen.

To cater for the installation of the bigger screen, Conveyor #3 (100-CON-003) needs to be modified to discharge at a slightly higher elevation. The screen oversize discharge remains the same and reports to Conveyor #4 to report to the cone crusher, while the screen undersize reports to Conveyor #5 towards the stockpile.

17.5.2 Ore Storage Modifications

Downstream of the sizing screen is the fine ore bin, which has a 500 tonne live capacity which is sufficient for 1,200 tpd, however, when operating at 1,600 tpd or higher, the surge capacity in this bin is insufficient. Therefore, it is recommended to implement a new stockpile with a 1,000 t live capacity prior to the grinding circuit which would be adequate for operating at up to 2,000 tpd. The stockpile would be fed via a new 24” Fine Ore Transfer Conveyor (100-CON-212) which will be fed from the existing Conveyor #5 (100-CON-005). Conveyor #5 presently feeds the transfer tower, however, during a planned shutdown, it will be redirected to feed the new Fine Ore Transfer Conveyor.

The stockpile would be housed within a fabric building, complete with a concrete slab on grade to mitigate gold losses into the ground, and overhead doors to allow access for mobile equipment. A corrugated steel tunnel under the stockpile cover would be installed to allow for the installation of two in-line belt feeders to withdraw ore from the stockpile to two new 24” Fine Ore Reclaim Conveyors (200-CON-213 and 200-CON-214). The tunnel will run the length of the stockpile cover with the back end opening to up to surface to provide a second means of egress out of the tunnel. Fine Ore Reclaim Conveyor #1 (200-CON-213) will exit the front end of the tunnel and discharge onto the existing Conveyor #6 (100-CON-006). The conveyor will proceed to discharge into the existing Fine Ore Bin (200-SIL-001). With a level of surge capacity in the new stockpile, it will not be necessary to keep the Fine Ore Bin full, however, the option to do so is still available.

Fine Ore Reclaim Conveyor #2 (200-CON-214) will exit the tunnel and discharge onto a new Ball Mill Feed Conveyor (200-CON-215).

It should be noted that the existing 24" wide conveyors that are planned on being reused after the expansion can achieve up to 2,000 tpd throughput based on their belt width if they are sped up. Upon detailed design, a full assessment of the drive arrangement for each conveyor is recommended to ensure the gearboxes and motors are suitable for the new duty.

17.5.3 Grinding Circuit Modifications

To implement a parallel grinding circuit, a new, equivalent primary mill (3 m diameter x 5.79 m effective grinding length) is required. The grinding circuit makes use of the existing regrind mills.

The existing flat-bottomed cyclone should be replaced with screens since this unit is considered incapable of providing a 300 micron cut point without compromising its efficiency significantly. Installation of two Derrick high frequency screens, capable of a 310 micron cut point, is therefore recommended to replace the cyclone. As this replacement will also reduce the mill circulating load from over 200% to 65%, the tanks and pumps in that part of the circuit will not need upgrading.

The feed to the secondary mills is a 250 mm diameter gravity line with a 5-degree angle. This line will handle the additional flow; however, it will need to be carefully assessed given the coarser grind size.

The two parallel regrind circuits will operate simultaneously. The discharge tanks and pumps will be unchanged as the flow through each regrind mill does not increase.

The secondary classification circuit will require the installation of a second cyclone pack (one dedicated to each regrind mill).

The existing Trash Screen (300-SCR-110) needs to be upgraded. Assuming a 1,500 micron aperture, 65 $m^3/h/m^2$ flux would be appropriate, therefore a 5.2 m^2 screen area is suitable. A 9' x 12' screen with a 1,500 micron mesh is recommended as the replacement.

The current pipeline to the thickener feed box is 100 mm diameter – this will be replaced with a larger diameter pipeline.

17.5.4 Pre-Leach Thickener Modifications

As part of the expansion, the thickener rake and rake drive unit should be inspected and refurbished during a scheduled shutdown during construction. Also, the thickener's feed well will be inspected for potential modifications, and the underflow and overflow configuration will be modified.

The feed flow increases from 256 m^3/h to 384 m^3/h. The thickener's feed launder is assumed to be insufficient at the increased flowrates and will be replaced as part of the expansion construction.

Feed well modifications will be required. These modifications are recommended to be undertaken with the assistance of the original thickener supplier. A high rate, auto-diluting design is also recommended to be installed.

The suction nozzles do not need to be replaced, as a 200 mm manifold is used prior to individual pump suctions.

Thickener rise rate increases from 0.73 m/h at 1,200 tpd to 1.21 m/h at 2,000 tpd, and the unit area increases from 4.9 t/d/m^2 at 1,200 tpd to 8.2 t/d/m^2 at 2,000 tpd. Previous testwork and recent work on tailing slurry samples both suggest that these rates are acceptable, albeit with a requirement for extra flocculant dosage.

Thickener underflow slurry will continue to be drawn out at 54-55% solids. The increased underflow flowrate is discussed below.

Flocculant addition rates will increase at the higher throughput rate. It is assumed that the additional dosage of flocculant can be addressed by mixing solutions more frequently, and by dosing a higher strength solution to the thickener.

Thickener underflow flowrates increase from 63 m^3/h at 1,200 tpd to 111 m^3/h at 2,000 tpd. Pulp density is expected to remain the same at 54-55% solids.

Current thickener underflow pumps (500-PMP-007/008) will not have capacity for 111 m^3/h, therefore, new 5x4-14 pumps with 22 kW motors will be required for the expansion.

The underflow pipeline and pump suction are will be changed to 150 mm diameters.

A second pipeline for the thickener overflow will be installed to cater for the flowrate increase from 192 m^3/h to 275 m^3/h.

A second process water tank will be installed for the additional process water.

17.5.5 Leach and CIL Modifications

The leach feed flowrate will increase from 66 m^3/h at 1,200 tpd to 111 m^3/h at 2,000 tpd. This will reduce leach and CIL residence time from 22.4 hours to 13.4 hours. The addition of two more tanks to the leach train will increase residence time to 19 hours which, although less than the initial conditions, is deemed sufficient given that over 50% of gold is leached within the milling and thickener circuits. Also, with the new Kemix Pumpcell CIP circuit installed, the overall residence time (thickener, leach, CIL, CIP) will be much closer to the original residence time.

Converting to a full CIL circuit for 2,000 tpd is possible but is not recommended, as carbon inventory requirements will increase significantly. Instead, the addition of a new Kemix Pumpcell CIP circuit is preferred for the 2,000 tpd option. The Pumpcell plant consists of eight 60 m^3 tanks.

17.5.6 CIP Modifications

A new Kemix Pumpcell plant which is capable of efficient carbon handling and lower solution losses will replace the existing CIP tanks. Kemix recommended an 8 x 60 m^3 Pumpcell plant to handle the higher plant throughput.

The Pumpcell plant will be located outside of existing process plant and will incorporate the new stripping/regeneration circuit.

This change will enable one of the old CIP tanks to be repurposed as a Process Water tank which will be required for the additional water flow.

The tailings flowrate will increase from 66 m^3/h to 112 m^3/h. The existing tailings tank has 2 m^3 of capacity and can handle extra flow, therefore no change will be required. The tailings pumps will need to be replaced with 6 x 6 pumps with 55 kW motors to handle the extra flow in the tailings line.

17.5.7 Carbon Elution and Regeneration Modifications

A new 3 tonne capacity carbon stripping plant will be implemented as part of the expansion. The plant includes acid wash, carbon stripping, electrowinning, refining and carbon regeneration and handling. The package plant comes complete with interconnecting piping, valves, instrumentation, tanks as well as structural steel and platforms complete with stairs, grating and handrails.

The plant will be situated on the northeast side of the existing building. The final location of the plant will be detailed in the next phase of the project and take into consideration the Pumpcell Plant that will be housed within the same pre-engineered building.

The elution plant need only run once per day. If required, the plant can run more frequently than once per day, resulting in additional capacity

17.5.8 Reagents Modifications

Minor changes to reagents systems will be required for the higher throughput.

17.5.8.1 *Lime System*

The existing equipment is suitable, while the pumps will be sped up for the additional requirements.

17.5.8.2 *Cyanide System*

The existing equipment is suitable, while the pumps will be sped up for the additional requirements.

17.5.8.3 *Caustic System*

The existing equipment is suitable, while piping will need to be rerouted to new equipment.

17.5.8.4 *Flocculant System*

A new dosing pump will be required for the additional requirements.

17.5.9 Process Water Management Modifications

The existing process water tank is approximately 300 m^3 which is too small for the higher throughput in the plant. Installation of a second process water tank of similar volume with a connecting balance line will be suitable for the increased throughput. The alternative to a new tank is the option to utilize a decommissioned CIP tank.

As the process water flow rate will be 330 m^3/h, new pumps will be required. The velocity in the delivery pipeline is 5.2 m/s, so a new process water pipeline will be installed– either a 200 mm line to replace the 150 mm line, or by adding a parallel 150 mm line to the mill area.

The gland water pumps will remain unchanged as the duty does not increase significantly with the new equipment in the plant.

18 PROJECT INFRASTRUCTURE

18.1 Local Resources and Services

The Island Gold Mine is an established producer in a mining district that has been historically active since the early 1980s with the former Kremzar, Magino, Edwards and Cline mines. The nearest town is Dubreuilville, Ontario, approximately 17 km from the mine, accessed via Goudreau Road. Dubreuilville is located at the end of Highway 519, heading east off the Trans-Canada Highway, 72 km northwest of Wawa.

The town of Dubreuilville has an estimated population of 635 inhabitants and the main available services consist of an elementary school, a secondary school, a health centre, a motel, a restaurant and bar, a grocery store, a Canada Post outlet, the town hall, a hardware store, a gas station, a municipal library and an arena.

Over 50% of the mine’s employees are local from the surrounding region (Dubreuilville, Wawa, White River, etc.). Out of town workers live in camp accommodations (newly installed 2019/2020) near Dubreuilville, where they have individual rooms, recreational services, and a cafeteria. Chartered flights are provided from Sudbury and Rouyn-Noranda which fly into the Wawa airport daily.

18.2 Current Site Infrastructure

18.2.1 Surface Site Infrastructure

The Island Gold Mine is accessed via a singular portal (Main Portal) and decline. The ore stockpile pad and waste storage are located directly adjacent to the mine portal. The mill feed is hauled approximately 1 km from the stockpile to the mill complex. The maintenance facility, surface office and dry complex are located adjacent to the mill. The Kremzar Portal accessing old mine workings and detached from current underground mine, is utilized to access the bottom of the surface ore bins which are used to feed the crusher section of the mill.

The primary tailings pond is located approximately 500 m west of the mill and the secondary pond is located just west of the portal area. Mine ventilation is via two surface fresh air fans and raises located adjacent to Goudreau Road, approximately 2.5 km away from the main site along with one exhaust raise located across from the fresh air fans. Figure 1 displays the relative location of the surface infrastructure.

Figure 18-1 Island Gold Mine Site - Surface General Arrangement

18.2.2 Power Supply

Site power is supplied by Algoma Power Inc. (API) via one 44kV transmission line. Two 44kV/4160V transformers (7.5MVA each) are located at the Main Portal and mill complex, respectively. One 44kV/13.8kV (10MVA) transformer is located off the main site not far from the surface fans.

The Main Portal transformer (44kV/4160V, 7.5MVA) feeds the compressor room, fresh air raise (FAR) #1 fans and two underground feeders. The two underground feeders are 3C 4/0 AWG, 5kV and feed the upper portion of the mine down to the 620 Level and the new east ramp descending from 340 Level. The compressed air is backed up in the event of a power loss with a diesel compressor.

The mill transformer (44kV/4160V, 7.5MVA) feeds the mill, surface shops, warehouse, water treatment plant, dry complexes, fire hall, tailings pond, core shack and office complex. A portion of the mill (critical equipment) and the surface buildings are backed up with a 600V, 1MW diesel generator.

The 13.8kV skid transformer (44kV/13.8kV, 10MVA) feeds the FAR #2 fans and one 3C 350MCM, 15kV underground feeder that descends down a borehole to the 620 Level where it is distributed to the bottom portion of the mine (620 Level downwards)

18.2.3 Underground Ventilation

The primary ventilation system consists of a push type system served with two fresh air raises. FAR #1 currently supplies approximately140,000 cfm while FAR #2 supplies approximately 350,000 cfm, totalling 490,000 cfm. Return Air Raise (RAR) #2 and the Main Portal serve as the main exhaust routes for the return air. Table 18-1 provides a summary of the surface fan arrangement at Island Gold.

Table 18-1 Key Surface Ventilation Fans Data

Item	FAR #2	FAR #1
Fan Type	Centrifugal	Axial
Fan Arrangement	Parallel	Parallel
Total Horsepower	2,400 HP	400 HP
Variable Frequency Drive	Yes	No

FAR #2 serves to ventilate the Island Deep and West Zones, while FAR #1 serves in ventilating the Extension and East Zones of the deposit. FAR #1 is supplemented with an underground booster fan located at the 390/400 Level. An underground booster fan arrangement is also located on 660W Level to ventilate the West Zone. This fan arrangement serves to pull air from FAR #2 into the West Zone to ventilate during development. A fresh air transfer drift is planned to be established between the Island Deep and West Zone to improve air quality in the West Zone and provide enough ventilation for production when the zone's production front comes online. Figure 18-2 displays the primary ventilation distribution system.

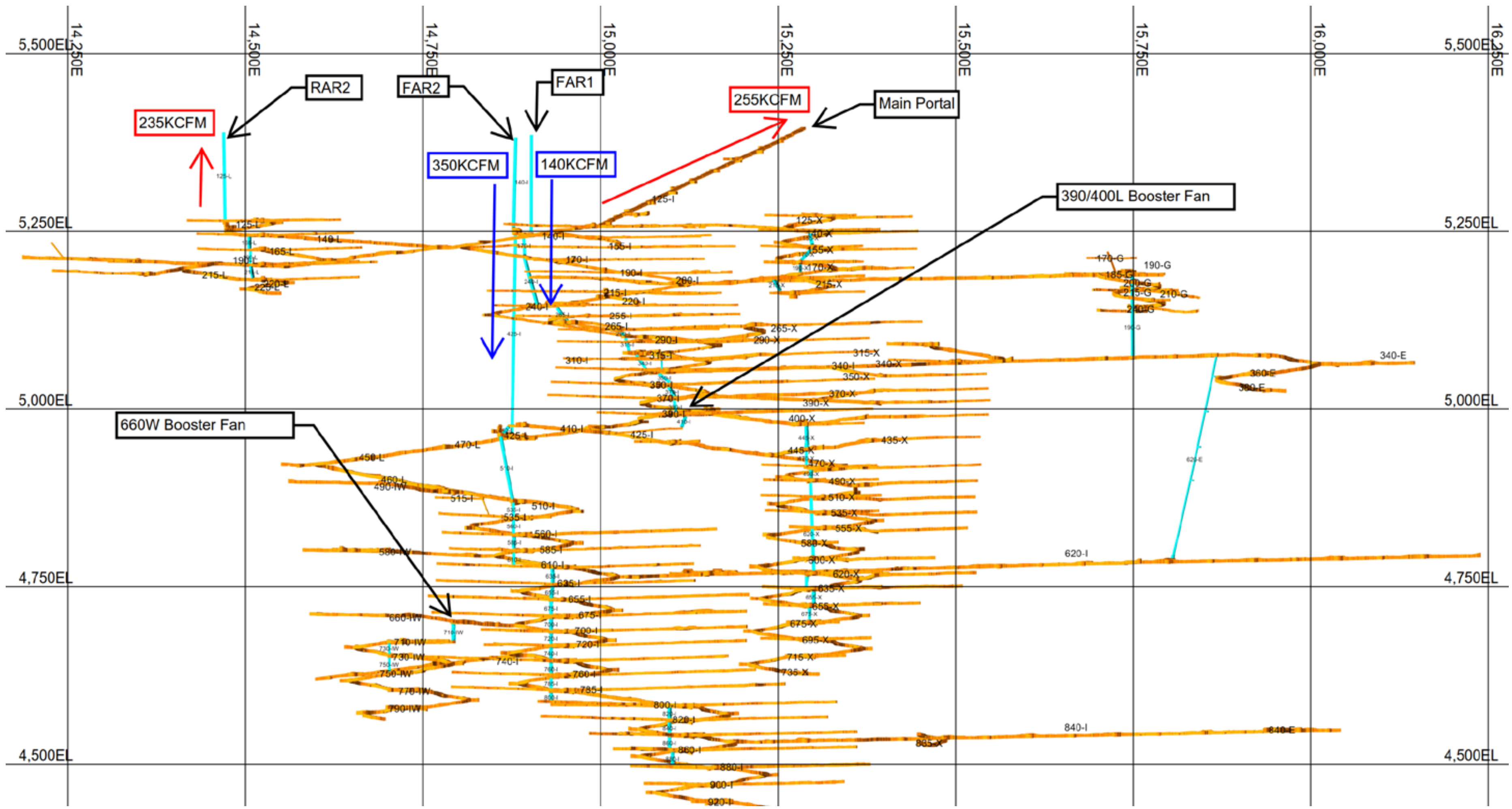


Figure 18-2 Underground Ventilation Distribution Network

Propane powered mine air heaters are located on both surface fresh air fans. FAR #1 has a 30 MBTU heater while FAR #2 has 20 MBTU which serve to heat the air to 7 degree C during the winter months.

18.2.4 Mine Process & Domestic Water

Surface process and potable water is supplied via Maskinonge Lake. Water is pumped from the lake and distributed to the existing site and mill. The raw water is filtered via a 4-stage treatment process: multi-media filtration, reverse osmosis membrane filtration, chlorine injection and ultraviolet rays.

Underground process water is collected underground in a naturally filling cavity (via groundwater and diamond drill holes) near the 190 Level. Process water is distributed via pipeline down the ramp to working horizons via gravity employing pressure reducing valves (PRV) to control pressure. A process water reserve is employed in the cavity for the 315 Level underground maintenance facility fire suppression system.

18.2.5 Mine Dewatering

The Island Gold Mine employs a clean water dewatering system. Water cascades down level sumps, via boreholes or pumps, until it reaches an intermediate dewatering pump station, at which point all water is pumped via the ramp or boreholes to the main dewatering pump stations, located on the 425 Level and the 125 Level. The main pump stations pump the water directly to either the primary or secondary pond on surface depending on pond status and water quality. On average, Island Gold dewaters approximately 2,400 m^3/day from the underground workings.

Island Gold is currently designing and implementing a new main dewatering station in the deep portion of the mine to sustain its operations at depth.

18.2.6 Mine Compressed Air

Island Gold's underground mine operations are serviced via one surface compressed air plant. The plant is located adjacent to the portal and is composed of a series of 200, 300 and 600 hp compressors totalling 2100 hp and produces approximately 9,920 cfm. One backup diesel unit provides 1,600 cfm in case of emergency. Underground workings are fed via one 8" air line down the ramp, stepping down to 6" lines to deliver air to the mine's auxiliary levels.

18.2.7 Miscellaneous Underground Infrastructure

There is currently one underground workshop located at the 315 Level underground. This workshop provides basic mechanical services to Island Gold's primary production fleet as well as secondary vehicles. Construction of a new underground workshop located on the 620 Level is currently underway. The new shop will be substantially bigger and allow Island to perform major mechanical work underground, not having to bring equipment to surface or offsite. The new shop will be composed of two mechanical bays, a welding bay, a warehouse, a waste bin and hose bay, tire bay as well as a washbay. Construction of the new workshop is expected to be completed in 2021.

An underground cement plant is located on the 760 Level which provides cement to waste rock to produce cemented rockfill. The 760 Level was designed to facilitate the movement of cement and truck traffic on the level. Trucks pull onto the level loaded with waste and get backfilled with slurry, to then haul the cemented rock fill to the backfill site.

18.2.8 Automation, Communication and Controls

The primary means of communication underground is via a 16 channel leaky feeder system. Femco lines are also installed in every refuge station as a secondary communication system. Island Gold is currently in the process of installing LTE underground to increase wireless data capacity and coverage. On surface, leaky feeder, phone lines and Voice over Internet Protocol (VoIP) are utilized.

Island has a fibre-optic network installed underground (and on surface) servicing the main ramps, underground infrastructure and microseismic system. This system also serves as the backbone for the ventilation on demand (VOD) network, recently implemented in 2019. The blasting system is also routed via the fiber network with the leaky feeder network as backup.

Each truck operating underground is also configured with a remote system with the ability to track payload and cycle times allowing the proper management of the underground fleet. The system is planned to be deployed on all prime movers in the fleet in the near future.

Island Gold also has a comprehensive microseismic system installed throughout its underground workings. This allows for continuous monitoring of microseismic activity underground and the implementation of re-entry protocols based on seismicity intensity underground following blasts.

A central control room (CCR) was implemented in 2019, where all communication and automation reports to. The CCR is used as the heart of the operation through which all information flows. This allows for the optimization of traffic flow, monitoring of microseismic activity, monitoring the VOD system as well as to relay key information to underground workers as required.

18.2.9 Tailings Management

The tailings management facility (TMF) represents the main water retention structures on the mine site. It consists of two ponds, the Primary Pond and the Secondary Pond which acts as a polishing pond in addition to water transfer systems via a siphon system (see aerial view of site plan in Figure 18-1).The Primary Pond (built in the former Miller Lake basin) occupies an area of 109 ha. The Secondary Pond has an area of 22 ha. The TMF is operated in accordance with ECA No. 5444-BNPL46 issued April 30, 2020, by the MECP.

Tailings slurry is conveyed by a pressurized pipeline from the mill and spigotted around the inside perimeter of the Primary Pond. The surface of the tailings forms a sloped beach allowing for a pond to form at the lowest part. Water is reclaimed (pumped) from the Primary Pond to the mill. Both the primary tailings and reclaim pipes are placed in an engineered ditch, with drainage to an emergency catchment section (with an area of 0.8 ha) at its lowest points and reinforced by construction of earthen berms. The TMF also includes seepage collection and pump back systems at dykes Nos. 1 and 2 at the Primary Pond; these were built to prevent any migration of seepage to Maskinonge Lake.

An Offline-Dyke Barrier (ODB) is currently being constructed downstream of Dyke 1 and 4 ensuring that the natural water features are not touching the toe of the TMF dykes. By constructing this dyke barrier Island Gold's tailings facility is considered offline by the ministry of Energy, Northern Development and Mines (ENDM) and the approval process will go through ENDM for any future dam raises and not through the Ministry of Natural Resources and Forestry (MNRF),as was previously the case..

The initial TMF was constructed in 1988 under the direct supervision of engineers of Gibson and Associates Inc. (Gibson). The Primary Pond capacity was increased in 2011 by raising, expanding, and adding additional dams or dykes under the supervision of AMEC Environmental.

The capacity of the Primary Pond of the TMF was further augmented in November 2015 to provide an extra six years of tailings deposition by increasing the height of all existing dykes to an elevation of 424 masl, as well as by adding a new dyke, in order to accommodate an additional storage capacity of up to 2.5 Mm^3. The maximum operating water level (OWL) is 422.5 masl, with the emergency spillway located 0.3 m metres above at an elevation of 422.8 masl. The minimum OWL is 417 masl to ensure enough water is present in the pond for reclaiming continuously throughout winter.

The Secondary Pond was initially constructed in 1988 alongside the Primary Pond and with Dam A built to capture tailings solution transferred from the Primary Pond and discharge as effluent to the environment pending passing water quality, A subsequent raise was done on the Secondary Pond in 2011 with Dam B and Dam C constructed to an elevation of 399 masl. A spillway was constructed at an elevation of 398.8 masl to convey any water during upset conditions. The minimum OWL is 396.4 masl while the maximum OWL is 398.8 masl. The dams at the Primary Pond have been designed and constructed using the downstream construction method. The body of the dam consists of engineered granular fill, placed in controlled lifts, and compacted. The embankment consists of a partially zoned construction, consisting of an exterior shell, an upstream membrane, a cut-off below grade, and filter systems. Annual inspections have been conducted by geotechnical specialists (WOOD group formerly AMEC Foster Wheeler), confirming overall good performance of the dykes. In 2019 a comprehensive Dam Safety Review (DSR) was completed by Golder Associates in conjunction with the annual Dam Safety Inspection (DSI) to review all phases of the construction, operations, and maintenance of the tailings facility. Nothing deficient was found of the tailings facility, but recommendations for minor improvements will be completed with the 2020 dam raise.

A 3 m tertiary dam raise is occurring in 2020 to bring the dam to elevation to 427 masl. All 5 dykes will be raised 3 metres by the modified downstream method. The spillway will also be raised to an elevation of 425.8 masl.

18.2.10 Water Treatment

Water treatment is managed through natural degradation in the Primary Pond and Secondary Pond. Natural degradation is primarily active during ice-free periods, and batch discharge cycles are timed to accommodate the natural processes. Cycle duration is typically 40 days:

- 10 days transfer from the Primary Pond to the Secondary Pond
- 20 days of final polishing at the Secondary Pond, and
- 10 days discharge of treated water from the Secondary Pond to the receiving environment in a series of streams, wetlands, and ponds, eventually discharging into the central part of Goudreau Lake.

This process can be expedited with the introduction of coagulant and flocculent in the transfer process to reduce total suspended solids (TSS) and metals levels. Total cyanide and ammonia naturally break down via sunlight which is enhanced by adding sulphuric acid to control pH levels and thus increasing microbial activity. Based on these processes, the water treatment is known to reduce site-wide water inventory all while meeting water quality limits prior to discharge.

Water quality is routinely monitored in the Primary Pond and Secondary Pond, and in Goudreau Lake at the discharge point and downstream. A comprehensive water monitoring program has been implemented for the site, and includes twelve compliance sampling locations, and effluent limits as mandated by the MECP. Limits have been established for TSS, total cyanide, copper, nickel, lead, zinc, unionized ammonia, oil, and grease, arsenic and pH. Effluent objectives have also been established for iron, phosphorus, total ammonia nitrogen, and oil and grease (daily).

Notwithstanding, Island Gold Mine also conducts sampling and analyses for other parameters of concerns, for example. metals, anions, hydrocarbons.

Water discharge and takings are recorded and kept in such a manner as to maintain compliance with the applicable regulations. Flow measurement devices have been installed to monitor the discharge of treated water from the Secondary Pond.

Under the previous 2012 ECA, discharge of treated water was seasonal, with the annual treatment and release window being from May 15 to December 31. However, with the amended ECA issued by MECP in November 2016, Island Gold can discharge treated water continuously, which allows increased operational flexibility. This operational flexibility is still maintained with the newly revised April 2020 ECA.

An Operations, Monitoring and Surveillance Manual (OMS Manual) has been prepared for the TMF, which includes operating procedures; inspection programs; repair and maintenance programs; contingency plans and procedures for dealing with potential spills, bypasses and any other abnormal situations and for notifying the MECP; and complaint procedures for receiving and responding to public complaints.

18.3 Phase III Infrastructure Expansion

Island Gold recently undertook a preliminary engineering study on a possible Phase III Expansion to increase underground tonnage rates and implement associated infrastructure upgrades as required. The study involved the evaluation of five scenarios (reduced from 12 during the scoping study), which demonstrated that the Shaft Expansion at a new production profile of 2,000 tpd was the most economic, most efficient, and productive alternative. This also best positions Island Gold to capitalize on further growth in Mineral Reserve and Mineral Resources. The Phase III Expansion will result in the construction of a new shaft amongst many other infrastructure upgrades as listed below:

- Development of a new production/service shaft down to 1373 m in depth (initial depth);
- Development/implementation of a new ore and waste handling system underground;
- Upgrade to the main site power supply;
- Construction of a paste plant and underground distribution system;
- Upgrade of the existing mill from 1,200 tpd to 2,000 tpd;
- Upgrade to the Tailings Management Facility to suit higher and longer LOM production; and
- Upgrade to mine dewatering and water treatment system.

The location of the new planned infrastructure is found in Figure 18-3.

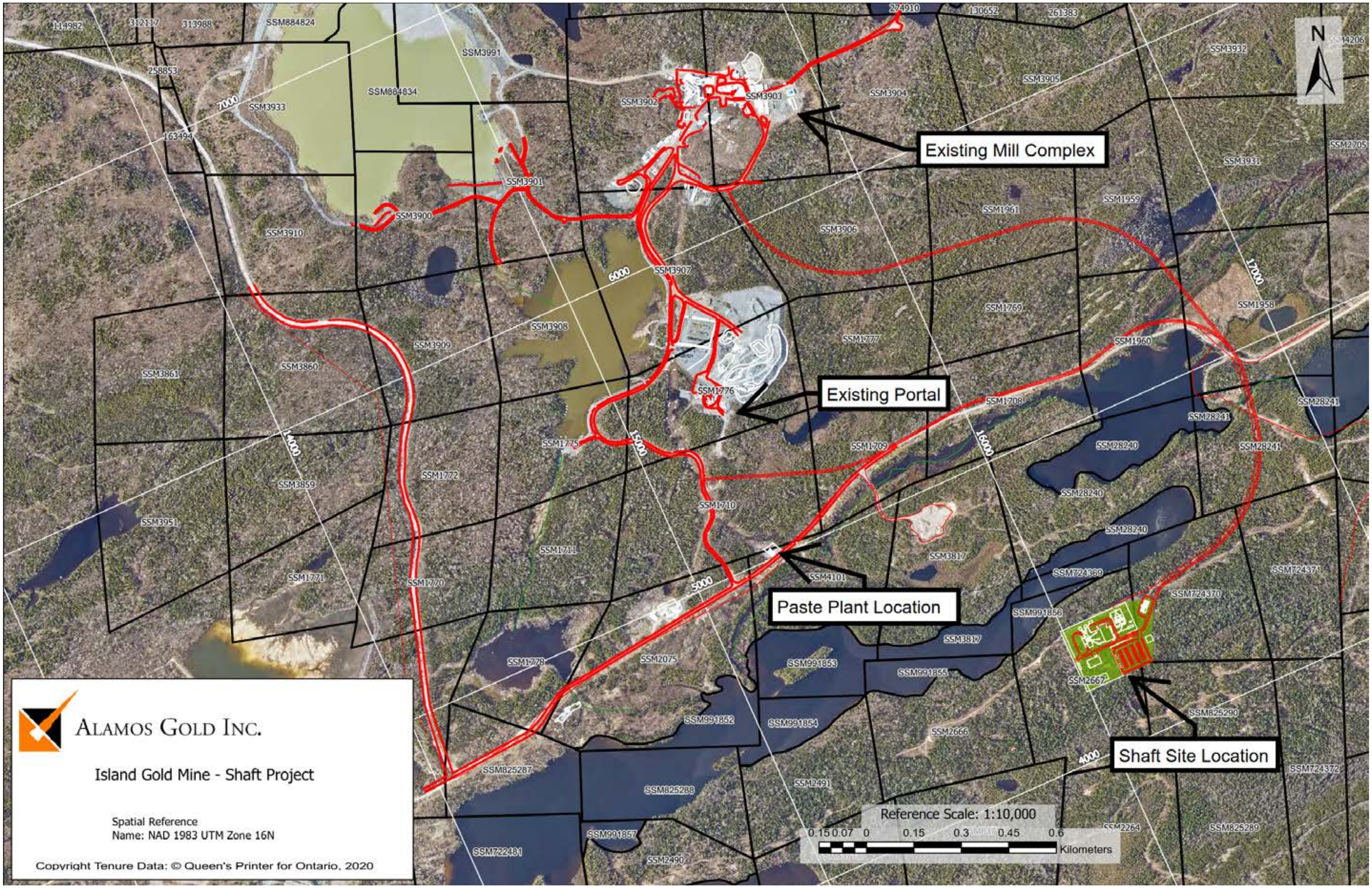


Figure 18-3 Phase III Expansion - Surface Infrastructure Location

The new shaft is the foundation for accessing the orebodies at depth. This single plant is designed for future capability of a higher production duty and an increase in ultimate depth from the current plan of 1,373 m to 2,000 m. Figure 18-4 displays the new mine design and underground infrastructure required to support the planned expansion (Orange is existing development; green is planned development).

The shaft location was chosen based on surface topography/bedrock profile along with optimal placement underground. The shaft will cut across the orebody near the 840 Level, within an area that has been delineated as an uneconomic zone. It is also positioned east of the centroid of the orebody once the shaft comes online, positioning in prime location based on the eastward trend of the deposit for any future Mineral Resources and Mineral Reserves that are added into the Life of Mine plan from exploration results.

18.3.1 Shaft Site

The shaft site is located approximately 2 km away from the existing mill complex and will be accessed via a 5 km access road (combination of existing roads and new access road). The site will house the required infrastructure to support operations and maintenance of the shaft, an ore and waste handling system as well as basic infrastructure to support a dry and possible office complex. Figure 18-5 displays the planned infrastructure to be located on the shaft site.

The shaft site is composed of the shaft complex (hoist house, headframe, collar house) as well as a new substation and electrical supply, ventilation plenum and office/maintenance complex.

18.3.1.1 *Shaft Complex*

The shaft complex is composed of the headframe, hoist house and collar house. The hoist house will be composed of an insulated pre engineered building and will house the electrical room and two hoists (one production and one service hoist). The electrical room will not only feed the shaft complex, but also be the main underground feed for the deep portion of the mine, complementing the already existing electrical system underground. The production hoist will be centered square to the shaft whilst the service hoist will be flanked. Figure 18-6 shows the general arrangement of the hoist house with respect to the shaft and collar house. Room has been allocated in the north end of the hoist house for temporary sinking compressors.

The hoisting/conveyance system will be designed for 2000m in depth operating at 3,500 tonnes per day (ore and waste). At the initial planned sinking depth of 1373m, it will have a 4,500 tpd operating capacity, more then enough to withstand peak mining rates. The service hoist will allow all underground mine personnel to access the underground workings in under 30 minutes, greatly increasing underground productivity when compared to the current ramp access system. Table 18-2 presents key data on the hoisting plant.

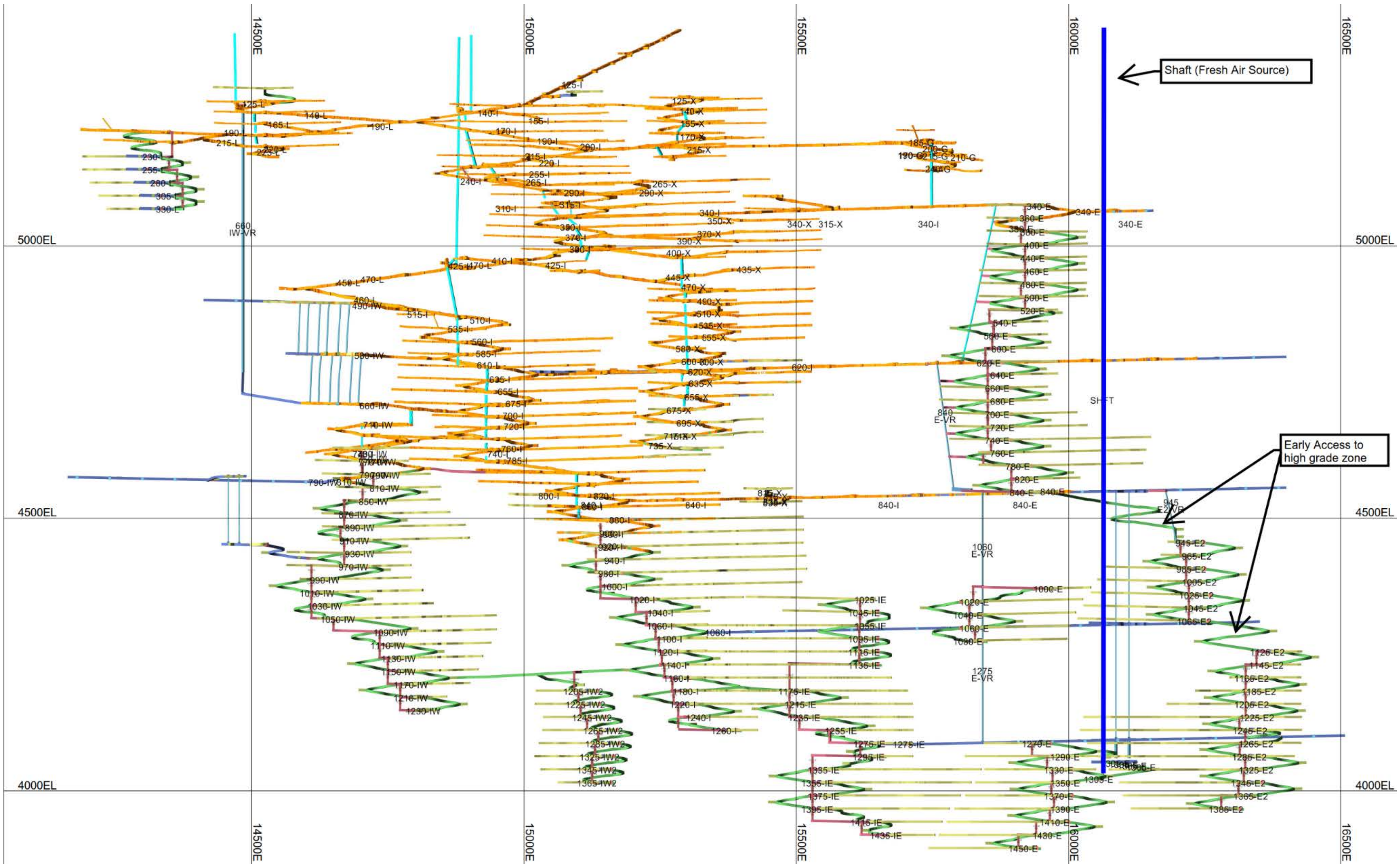


Figure 18-4 Phase III Expansion – Underground Development and Infrastructure

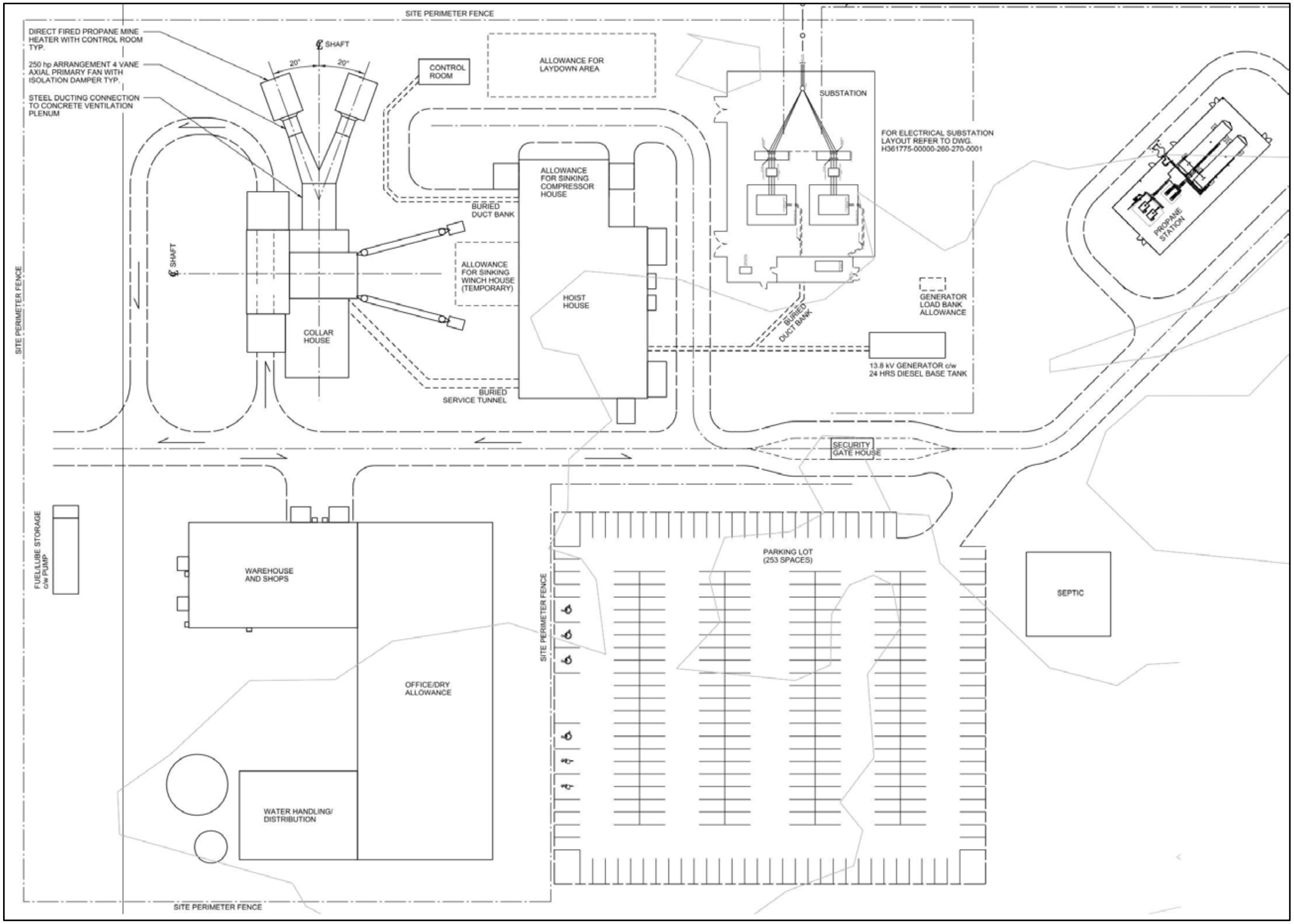


Figure 18-5 Shaft Site General Arrangement

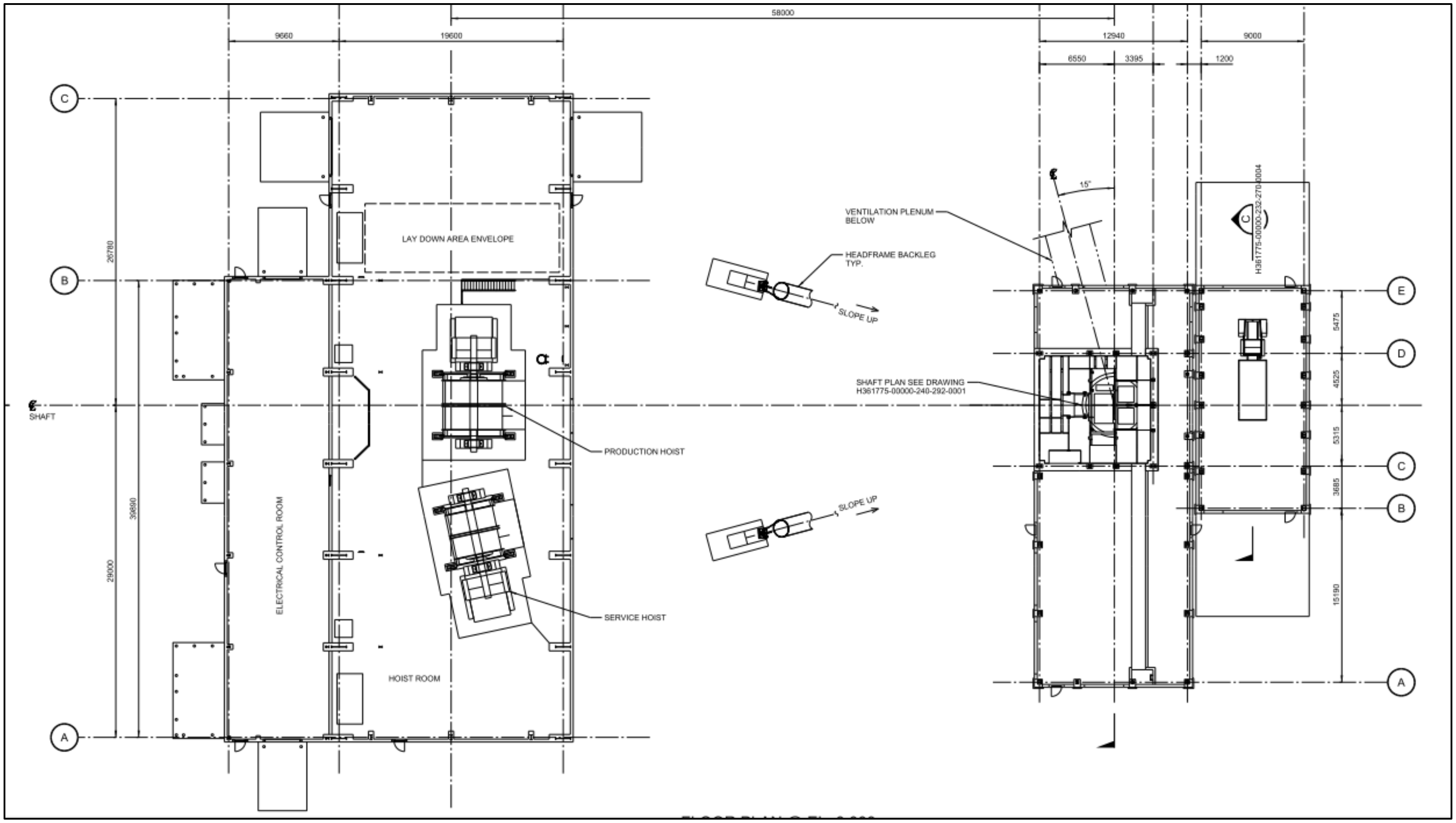


Figure 18-6 Shaft Complex General Arrangement

Table 18-2 Hoisting Plant Key Data (Production and Service Hoists/Plants)

Hoisting Plant Key Data	
Production Hoist	
Maximum Hoisting Depth	2,000 m
Maximum Hoisting Capacity at Depth:	
Ore	2,000 tonnes/day
Waste	1,500 tonnes/day
Total	3,500 tonnes/day
Hoist Availability	16 h/day. Dedicated production hoist in shared-duty shaft.
Production Hoist	5 m x 2 m double-drum, single clutch, 4,200 kW RMS.
Skips	2 x 12 tonnes capacity
Hoisting Speed	15 m/s
Hoisting Cycle and Capacity from 2,000 m	198s, 3,500 tonnes/day
Hoisting Cycle and Capacity from 1505 Loading Pocket	154s, 4,500 tonnes/day
Skip Chairing	Fixed chairs with buffers
Applicable Safety Factors	Ontario standard (SANS exception not applied)
Service Hoist	
Maximum Hoisting Depth	2,000 m
Maximum Payload at Depth	5 tonnes
Hoist Availability	20 h/day. Bratticed shaft to allow concurrent production and service hoisting
Service Hoist Layout	4 m x 1.8 m double-drum, single clutch, 1,200 kW RMS.
Cage	1 x 5 tonnes double deck. 22 persons/deck
Counterweight	1 x 7.5 tonnes
Hoisting Speed	7.5 m/s
Trips per Hour to 1275 Level	8 trip/hour
Cage Charing	Cage-mounted guide clamps
Applicable Safety Factors	Ontario standard (SANS exception not applied)

The shaft will house two 12 tonne skips in dedicated compartments for ore and waste movement, along with a double deck service cage for the transport of personnel and materials.

The steel headframe will be erected at 59m in height, enough to for allow the addition of ore/waste bins in future design upgrades and will be insulated. It will have two sheave deck levels to serve the production and service hoists, as well as the sinking winches with one set of rear structural supports. The service hoist sheave deck will be located at 42m in elevation while the production hoist sheave deck will be located at 53m in elevation. Modularization of the headframe is being investigated to improve schedule and decrease on site construction/congestion during the construction phase. Figure 18-7 and Figure 18-8 display plan and isometric views of the headframe and hoist house.

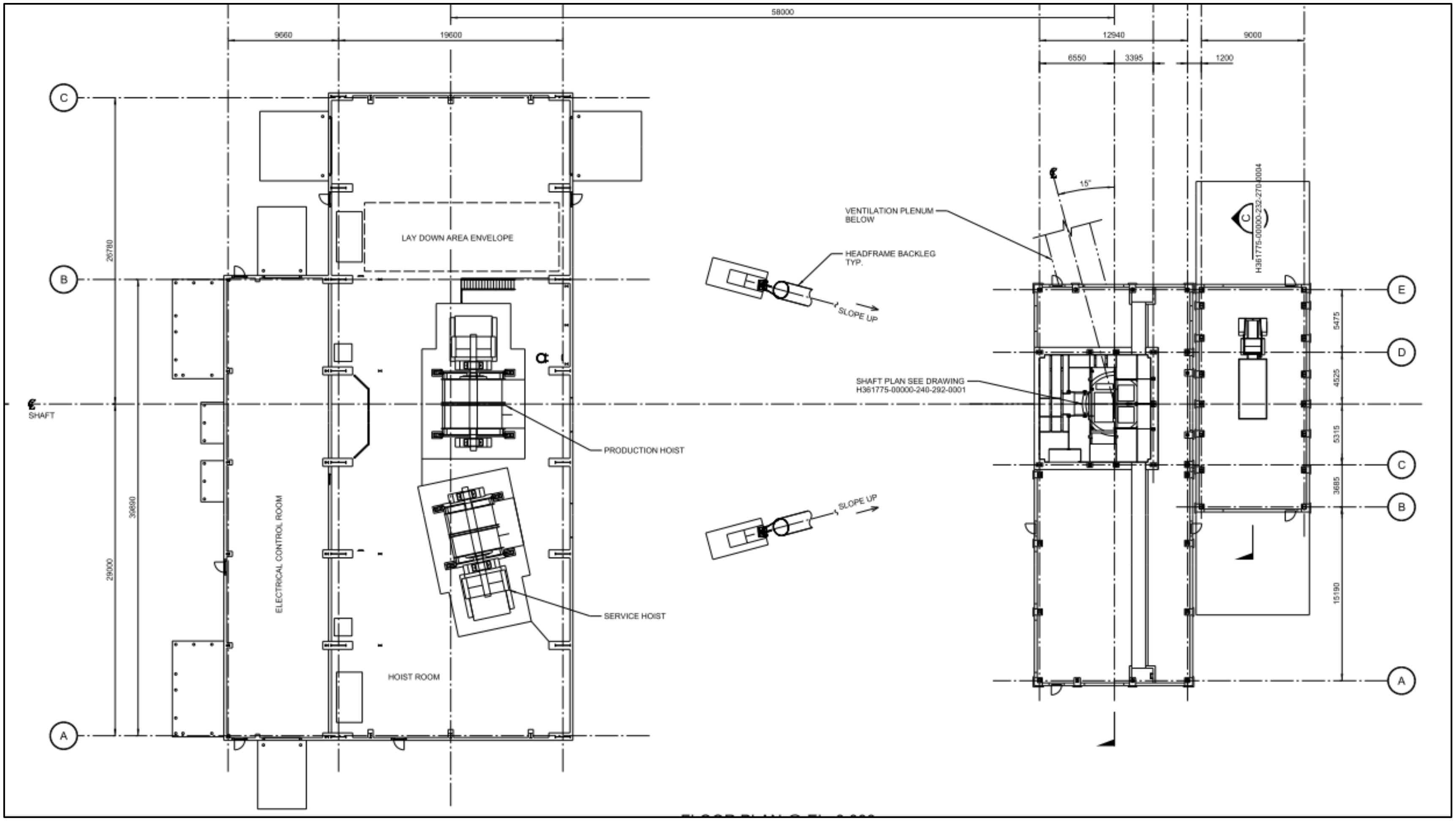


Figure 18-7 Headframe and Hoisting Plant Layout

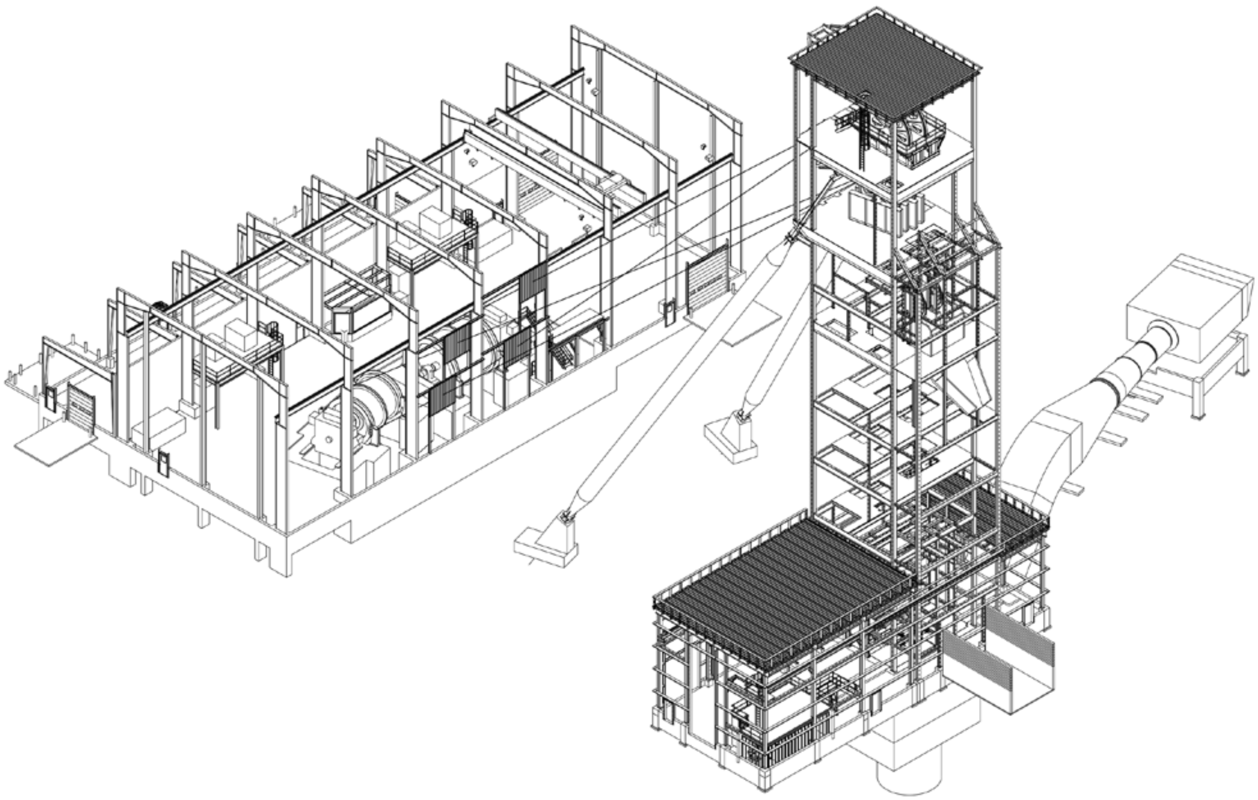


Figure 18-8 Headframe and Hoisting Plant Isometric

The concrete shaft sub collar will be primarily used for routing services in and out of the shaft, as well as for the ventilation plenum. The collar house will be constructed with metal cladding and will be insulated. It will be located on the cage side of the shaft and will be the primary access point for personnel and material.

18.3.1.2 *Shaft and Shaft Stations*

The shaft layout is shown in Figure 18-9. The shaft will be concrete lined, measuring 5 m internal finished diameter. The shaft size has been determined based on several parameters including ore and waste production requirements, intake ventilation, installed permanent services, service hoisting and constructability during shaft sinking.

The shaft will have three shaft stations (840 Level, 1060 Level, 1275 Level) as well as a Loading Pocket on 1305L. Each shaft station will be utilized to access the main mine horizons and coincide with the main exploration drifts underground. Figure 18-10 displays a shaft riser diagram.

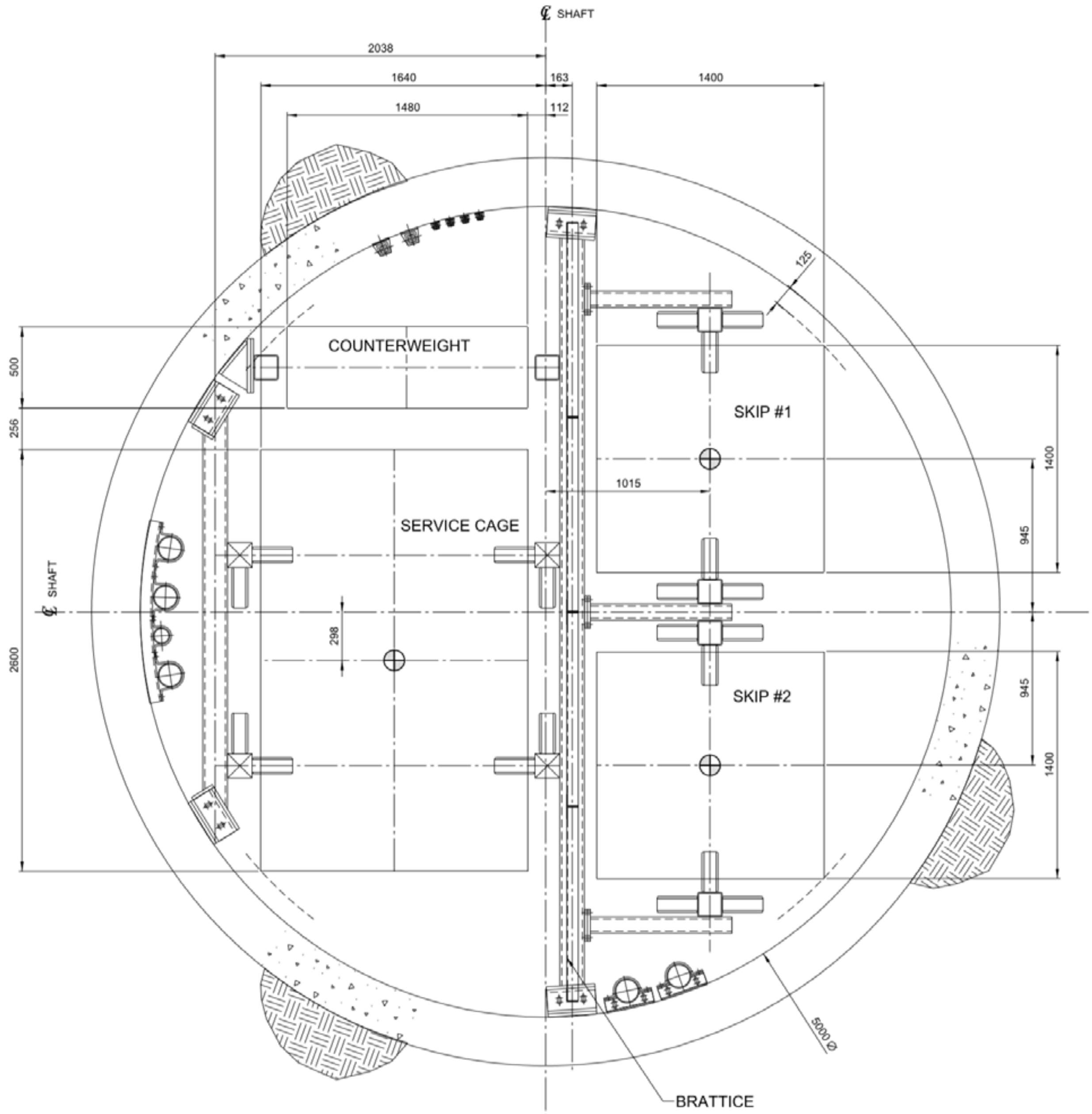


Figure 18-9 Production Configuration Shaft cross Section

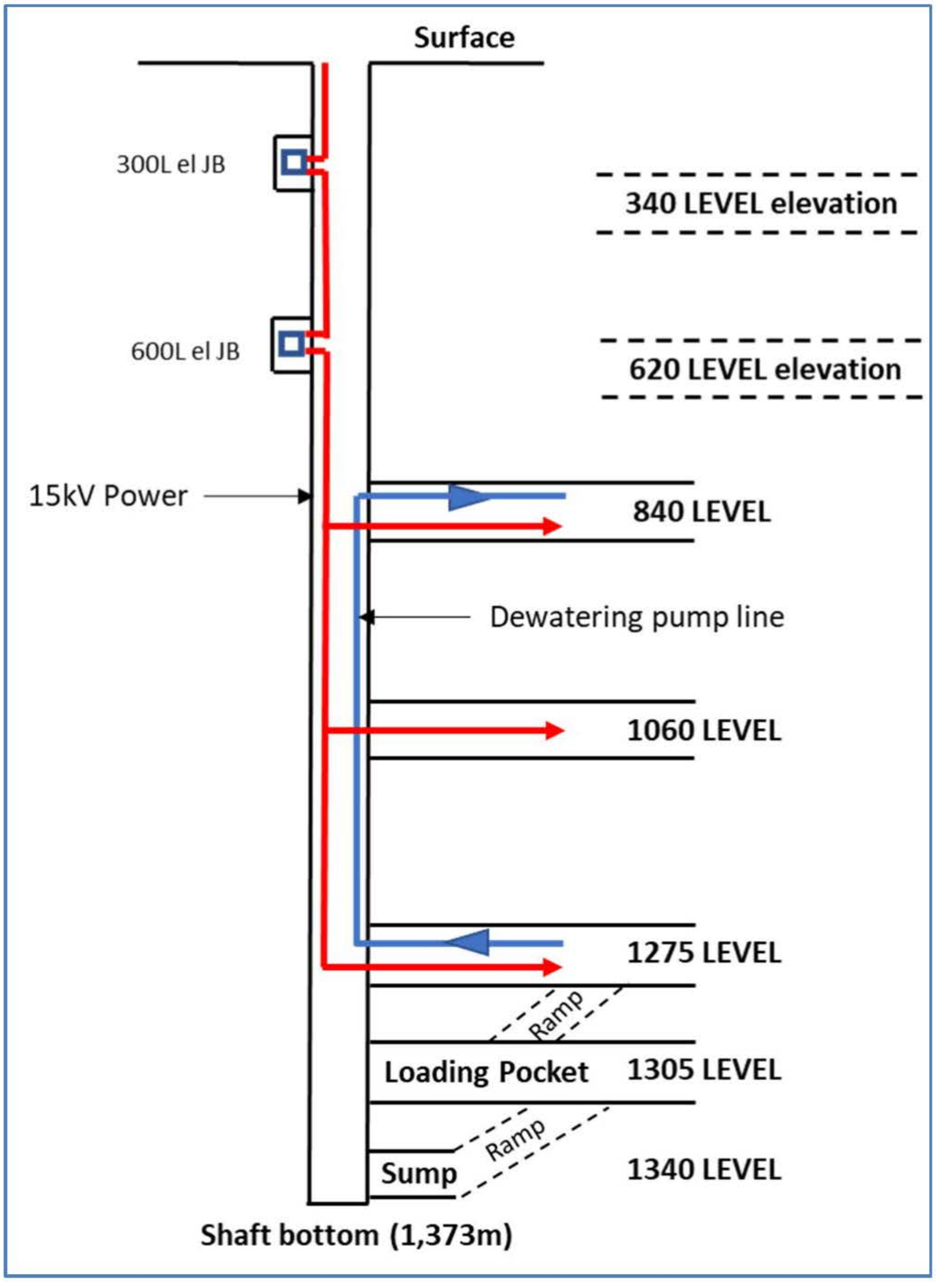


Figure 18-10 Shaft Riser Diagram (Note: Shaft Bottom 1373 m and 1340 Level are Same Elevation)

All shaft stations will have an electrical substation as well as other main mine services. The shaft will have a single loading pocket located on 1305L and the shaft bottom will be accessed via a ramp.

The initial sinking depth will be set at 1,373 m from the collar, with the loading pocket set at the 1305 Level. It is important to note that Island Gold is not limited to this initial sinking depth and has the option of extending the shaft bottom to as deep as 2,000 m, with the possibility of repositioning the loading pocket/bin arrangement to a deeper level, should the orebody prove out at depth (beyond 1,500 m).

A conventional blind sinking method was chosen to minimize any negative impact the project would have on Island Gold's current operations. Options such as raise boring and/or internal winzes were examined but were deemed to risky to current operations and would result in a lowered mining rate to accommodate any extra waste or raise bore cuttings requiring trucking to surface from underground.

18.3.1.3 *Ore & Waste Handling System*

The underground ore and waste handling system is designed to accommodate 2,000 tpd of ore and an additional 1,500 tpd of waste for any future mine expansion. This system is designed to transport the mine ore and waste rock from all underground mining zones to one common rock breaking station. In general, the material will be moved through the respective passes with dump access and finger raises (intermediate station) to the rock breaker station.

The underground ore and waste handling system will be composed of one loading pocket, one underground bin arrangement and three primary dump points in ore and waste passes. The ore and waste passes will be excavated between the main exploration levels. Figure 18-11 depicts the process flow diagram for the system.

The ore and waste handling system will be sized for hoisting at the 1275 Level rock breaker station. This will be fed directly by the ore pass system above the level and will be located above the bin. The bin collar will be on the 1275 Level and the bin bottom on the 1305 Level. The rock breaker station will consist of a recessed grizzly, scalping bars, rock breaker and picking arm, with a feed chute complete with press frame and control chains (Figure 18-12).

The material sized through the rock breaker station will be dropped into the underground bins to then discharge onto the 1305 Level apron feeder. This will then discharge onto the loadout conveyor and subsequently to the loading pocket. The grizzly will be sized to 400 mm x 400 mm.

The loading pocket will be a conventional design, similar to those in use at Alamos' other Ontario operation Young-Davidson. The conveyor will discharge to a transfer car to alternatively divert material to one of two measuring flasks. Each measuring box discharges into the parked skip in the shaft via dedicated discharge gates and arc gate controls.

Both the ore/waste bin and the loading pockets will have load cells and volumetric measurements to ensure optimal loading of skips that will be monitored remotely and locally.

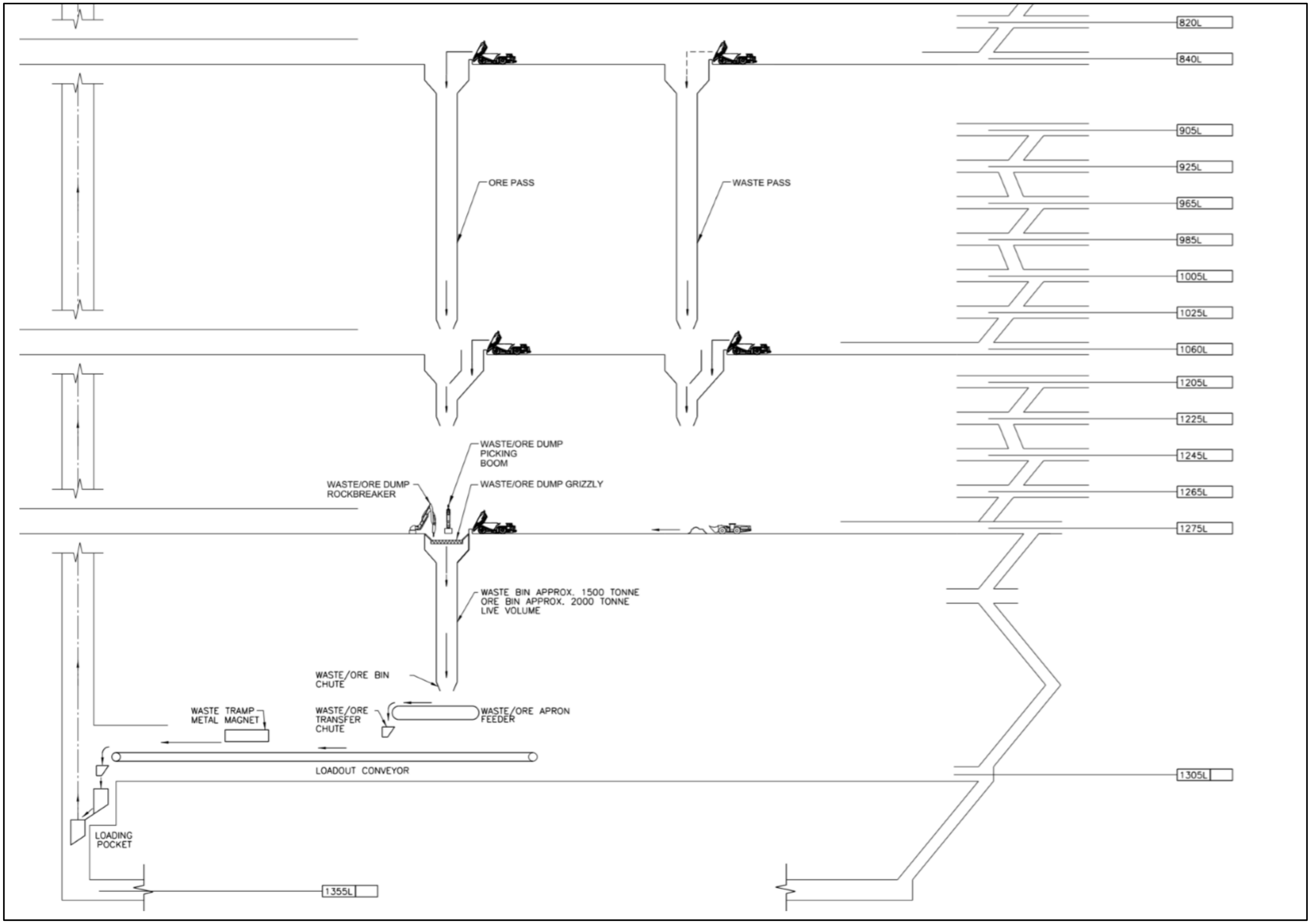


Figure 18-11 Underground Ore and Waste Handling System Process Flow Diagram

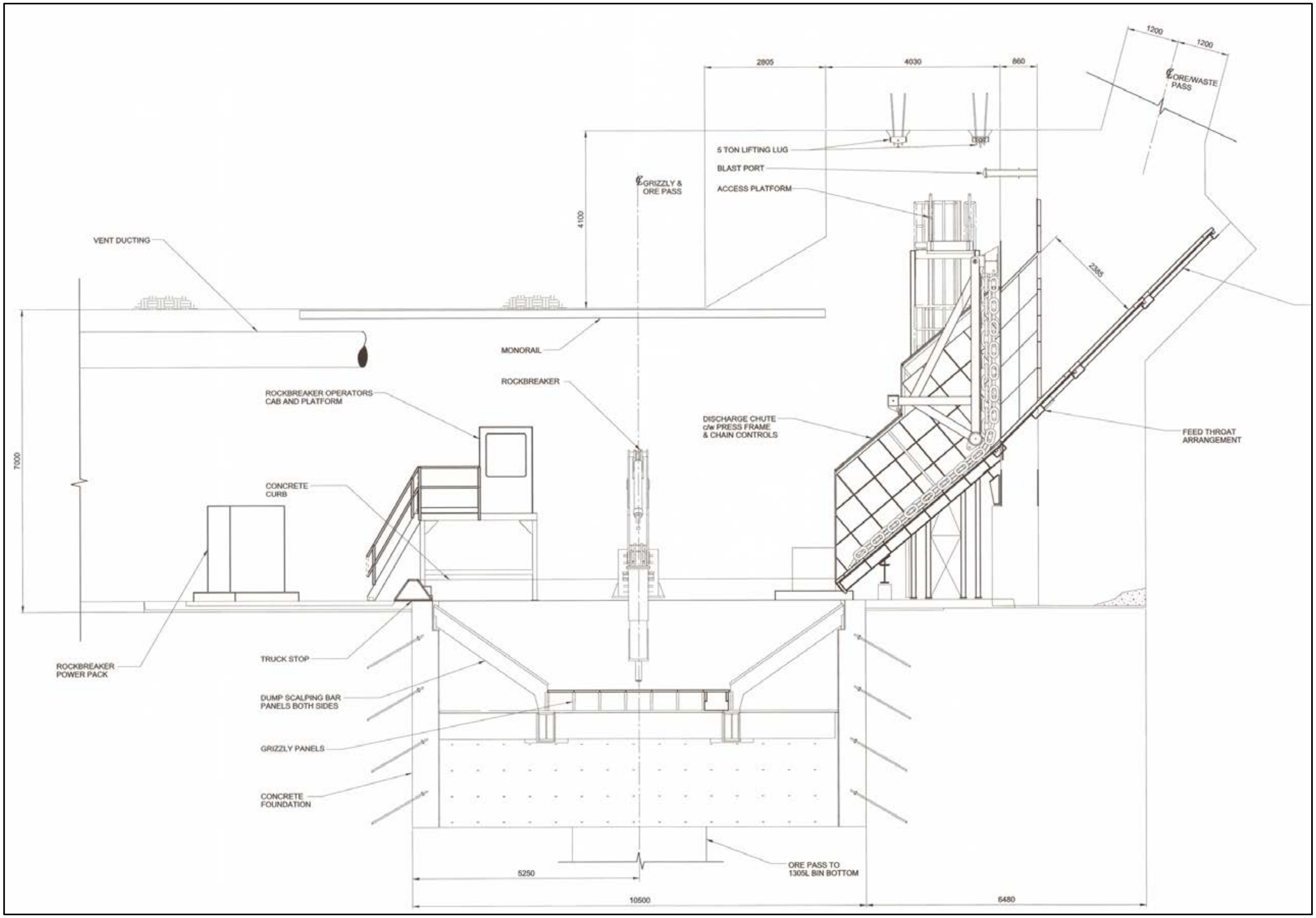


Figure 18-12 1275 Level Rock Breaker Station – Section View

The material sized through the rock breaker station will be dropped into the underground bins to then discharge onto the 1305 Level apron feeder. This will then discharge onto the loadout conveyor and subsequently to the loading pocket. The grizzly will be sized to 400 mm x 400 mm.

The loading pocket will be a conventional design, similar to those in use at Alamos' other Ontario operation Young-Davidson. The conveyor will discharge to a transfer car to alternatively divert material to one of two measuring flasks. Each measuring box discharges into the parked skip in the shaft via dedicated discharge gates and arc gate controls.

Both the ore/waste bin and the loading pockets will have load cells and volumetric measurements to ensure optimal loading of skips that will be monitored remotely and locally.

18.3.1.4 *Electrical Upgrades*

A new 15 kV substation as well as a pole line tying into the Algoma Power supply will be installed and commissioned on the new shaft site. The substation will provide power to the surface infrastructure on the shaft site, as well as provide power underground to the deeper portion of the mine. The substation will be designed in such a way as to not only provide power to the deep portions of the mine, but also to support existing operations if the existing substation would fail, by back feeding the underground circuit. This provides redundancy to the underground 15 kV supply, thereby de-risking the underground operation substantially.

An emergency diesel generator will also be installed to supply power to the service hoist for emergency back up power, should the mine site loser power and need to power up the hoist to bring the cage to surface.

18.3.1.5 *Ventilation Upgrades*

The shaft will also be a new source of fresh air for the deep portion of the mine. A plenum will be driven from surface to tie into the shaft just beneath the sub collar. Two axial fans in parallel will be used to supply approximately 300,000 cfm to the bottom of the shaft. An underground booster fan station will also be commissioned to help overcome the shaft and mine resistance. Direct fired propane burners will also be installed on the intake portion of the fans to heat the air during winter months.

A new series of internal return/fresh air raises will be driven to accommodate the new influx of fresh air from the shaft. These raises will tie together the main exploration drifts, reducing the air velocities in the ramp, mitigating dust related issues in the ramp.

18.3.2 Site Power Transmission Upgrade

Island Gold is currently tied into API's 44 kV powerline running from Hawk Junction to site. This line currently supplies power to a neighbouring project (Magino), as well as a limited amount to back country residential properties.

Island Gold is currently allocated approximately 12 MW and utilizes 9.5 MW on average per year. With the Phase III Expansion, Island is expecting to draw an additional 17.5 MW, totaling 27 MW at its peak productive years. The existing transmission line does not have sufficient capacity to supply the additional 17.5 MW required for the project.

Island Gold has provided API with its forecasted load demand (connected and average) and is in the process of discussing the power upgrade alternatives and execution schedule to meet expected power demand at site.

18.3.3 Paste Backfill

As a result of the study carried out for establishing stope stability, it was demonstrated that backfilling was necessary as mining of different zones will be performed on several levels. The recommended backfill is paste backfill.

Filtered tailings from the process plant will be used as aggregate for paste backfill. The paste plant is incorporated into the process tailings dewatering circuit and includes thickening, filtration, mixing, and batching equipment. Paste will be gravity-fed to the stopes via the underground distribution system (UDS).

The following factors were considered when selecting the type of paste backfill circuit suitable for the mine:

- testwork results for material characterization, dewatering, rheological characterization, flow loop testing and unconfined compressive strength (UCS) testing,
- tailings production will be nominally 88 tph based on a 2,000 average tpd ore processing rate with 94.5% Mill availability,
- the average stope size is 6 m wide, 25 m high and 28 m long,
- the backfill UCS required for mining was estimated based on the average stope dimensions and using the Mitchell Equation, and
- mining will be longitudinal retreat in a bottom-up sequence, with only sill extraction mining occurring under backfill.

18.3.3.1 *Filtration and Mixing*

Filtering tailings and mixing the constituents of paste are critical stages in the production of paste backfill. These stages affect the strength and quality of the paste produced, therefore, several options for filtering and mixing were studied. Testwork was performed to determine the most suitable method for filtration and mixing for this application.

Results from testwork determined that a paste backfill plant with a pressure filter and batch mixer are most suitable for this application. The principal reason pressure filtration is preferred to vacuum filtration has to do with the filter cake solids content and the effect it has on the paste slump. The key reasons batch mixing is preferred to continuous mixing has to do with the tailings' sensitivity to water content, the friction factors in the UDS from the slump variability, precision of slump control and the relatively low throughput which lends itself to a batch mixing process.

Filter cake solids content (75.8 – 78.2 wt% solids) from vacuum disc filtration is close to that of the solids content of 254 mm (10-inch) slump paste (75.5 wt% solids). This facilitates little room for accurate slump control with vacuum filtration, considering the possible variability associated with the moisture content of the filter cake. Pressure filtration results indicated filter cake solids content can achieve 86.6 – 91.7 wt% solids with air drying, which allows an acceptable buffer to the paste slump and will allow for adequate process control. It is also important to note that to maintain a gravity UDS, inadequate process control will affect the friction factors of the system. The flow model indicates that, especially during delivery to the extremities of the mining area, an increase in the friction factor associated with the paste slump, could inevitably result in system blockage. This makes the solids content in the filter cake a critical consideration when selecting a paste flowsheet.

Results from testwork show that the tailings are sensitive to water content. The high level of sensitivity effects the consistency of the paste produced and will potentially cause significant friction losses in the delivery pipelines. Mixing in batches allows for a greater degree of accuracy when measuring the quantity of tailings, water, and binder in each batch. This permits more accurate slump control compared to continuous mixing.

Batch mixing mitigates off-spec paste from entering the UDS, while continuous mixing has a period of adjustment where some off-spec paste may enter the UDS before the system corrects the slump, and/or operators stop the system.

At the relatively low throughput of 88 dry tonnes per hour, mixing in batches is a suitable method for this application.

18.3.3.2 *Paste Plant Process Overview*

An overview of the process components of the paste plant follows (Figure 18-13 and Figure 18-14):

Tailings from the mill will be pumped to the thickener feed box at the paste plant. Thickened tailings from the thickener are pumped to the filter feed tank, which acts as a buffer between the thickener and the filter. The filter feed tank will normally be full prior to the start of production of backfill and effectively acts as a storage tank. During paste production, the filter feed tank continues to be fed with the thickener underflow to extend paste production operation time.

From the filter feed tank, a portion of tailings will be pumped to the pressure filter to produce a high-density filter cake with the remaining portion sent directly to the batch mixer. The proportion of thickened tailings sent to the filter and bypass sent to the mixer is determined based on the desired backfill slump and target solids content. The filter cake is then transported to a hopper located on top of a live bottom feeder via a filter cake conveyor. There is approximately 40 minutes of storage capacity in the hopper above the live bottom feeder.

The live bottom feeder is intended to break up the chunks of filter cake and prevent bridging. The discharge rate of the live bottom feeder will be measured and controlled by a weightometer on the mixer conveyor, which will increase or decrease the motor speed of the live bottom feeder to maintain a constant mass flowrate of tailings on the conveyor.

A batch mixer is used to combine the various batch constituents into the final paste product where the filter cake is mixed with a set ratio of ground iron blast furnace slag, Portland cement and tailings slurry, to produce a consistent paste slump. The batch mixer power draw is constantly measured, and tailings slurry is added to the mixer to adjust the actual power draw required to obtain the desired slump.

The paste is then discharged from the batch mixer to a paste hopper. The paste hopper provides surge capacity for the discharge of the batch mixer to keep paste continuously entering the UDS, thereby ensuring the underground system does not run empty. Load cells on the paste hopper ensure that the material in the hopper is maintained above a minimum level to prevent the risk of air entering the distribution system.

A mixer dust collector attached to the batch mixer will prevent the release of any cement dust from the mixer, with the dust falling into a binder screw conveyor to be re-used in the process.

Three binder silos have been included adjacent to the paste plant, allowing for the storage of 750 tonnes of binder. The 750 tonnes capacity offer approximately seven days of storage when the plant is operating continuously at 2,000 tpd, with a nominal 4 wt% binder addition rate.

To ensure paste quality and strengths are consistent and meet the required strength targets, quality assurance and control functions will include periodic slump, filter cake moisture content and UCS cylinders testing at set intervals.

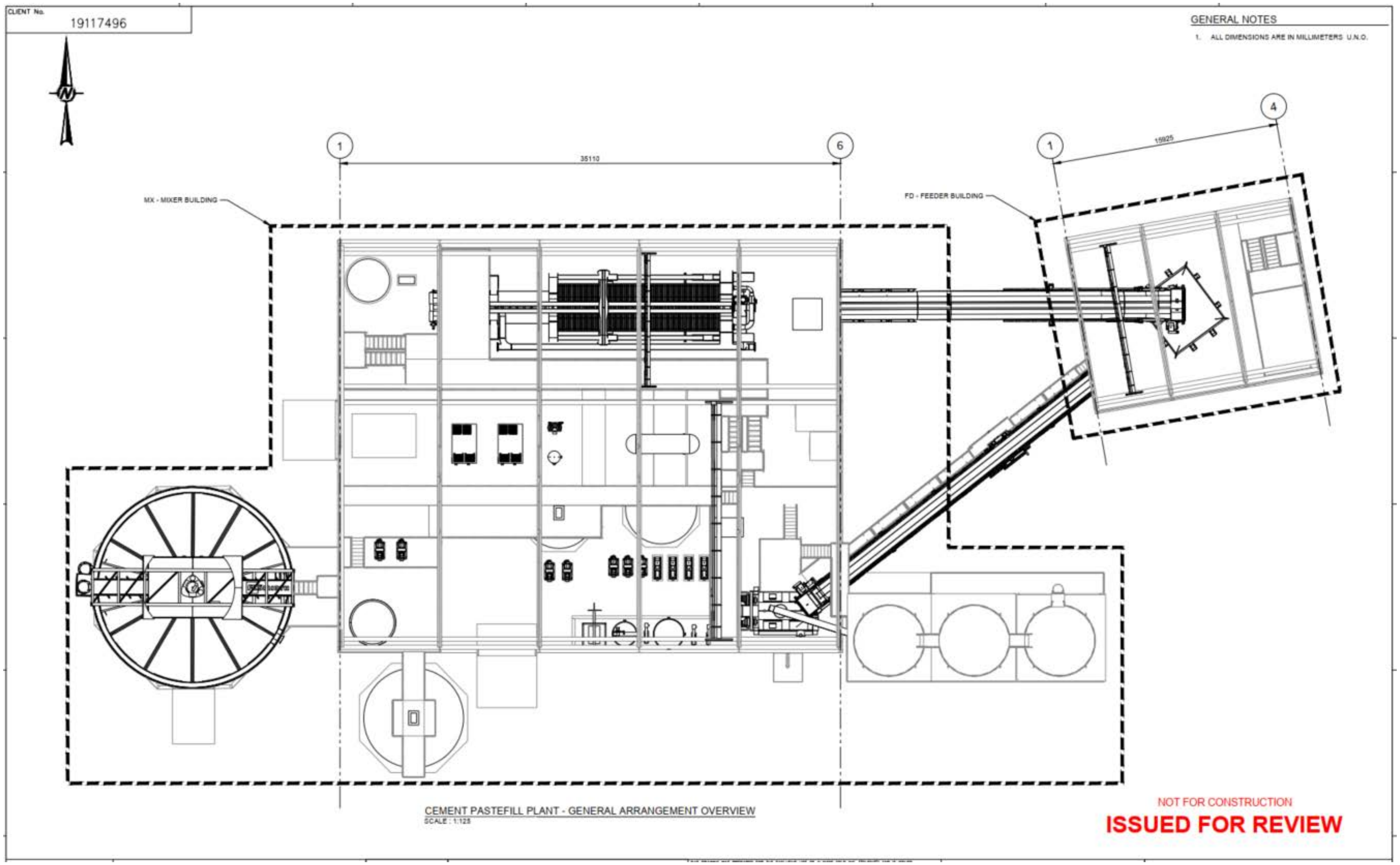


Figure 18-13 Paste Plant General Arrangement Overview

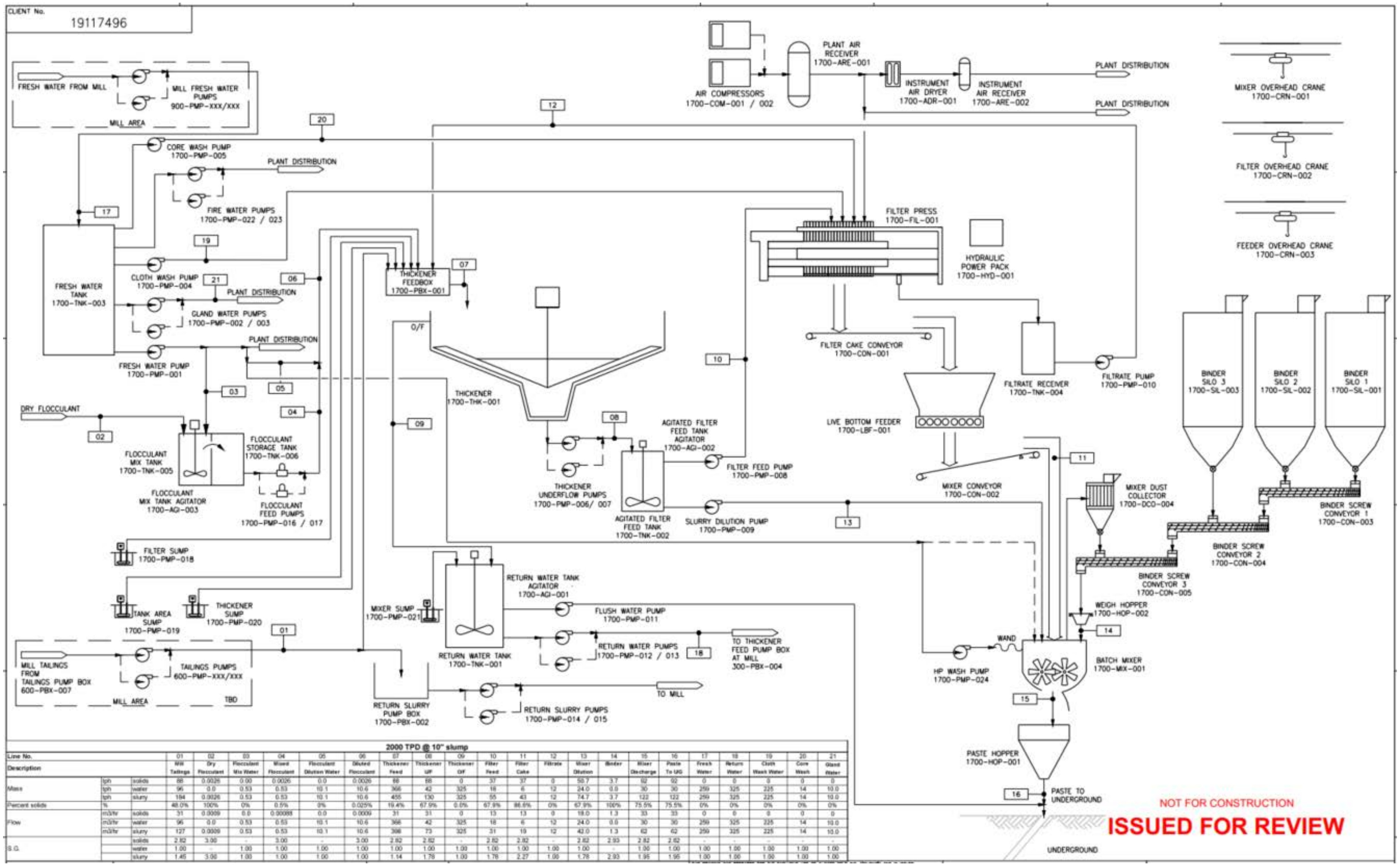


Figure 18-14 Paste Plant Process Flow Diagram

18.3.3.3 *Paste Plant Location*

Locating the paste plant near the existing 13.8 kV substation was determined to be the most suitable position for the plant (Figure 18-15). The key elements for selecting this site include the proximity to an electrical supply, the surface paste boreholes will be directly adjacent to the paste plant, the surface borehole target level on the 340 Level and the associated lower capital and operating costs.

The nearby electrical substation will supply the required 2,200 kW (connected power) to operate the paste plant. The proximity to the substation mitigates the cost of overhead powerlines and/or long cables between the substation and the paste plant's motor control centre.

The paste plant will be located next to the surface paste boreholes which allows for approximately 64° to 65° dip on the holes which is closer to the ideal angle for paste backfill (70°) than other options that were studied.

The selected location for the paste plant is advantageous as it allows for filling the stopes to the 340 Level level which offers greater coverage than other options considered without the use of a booster station.

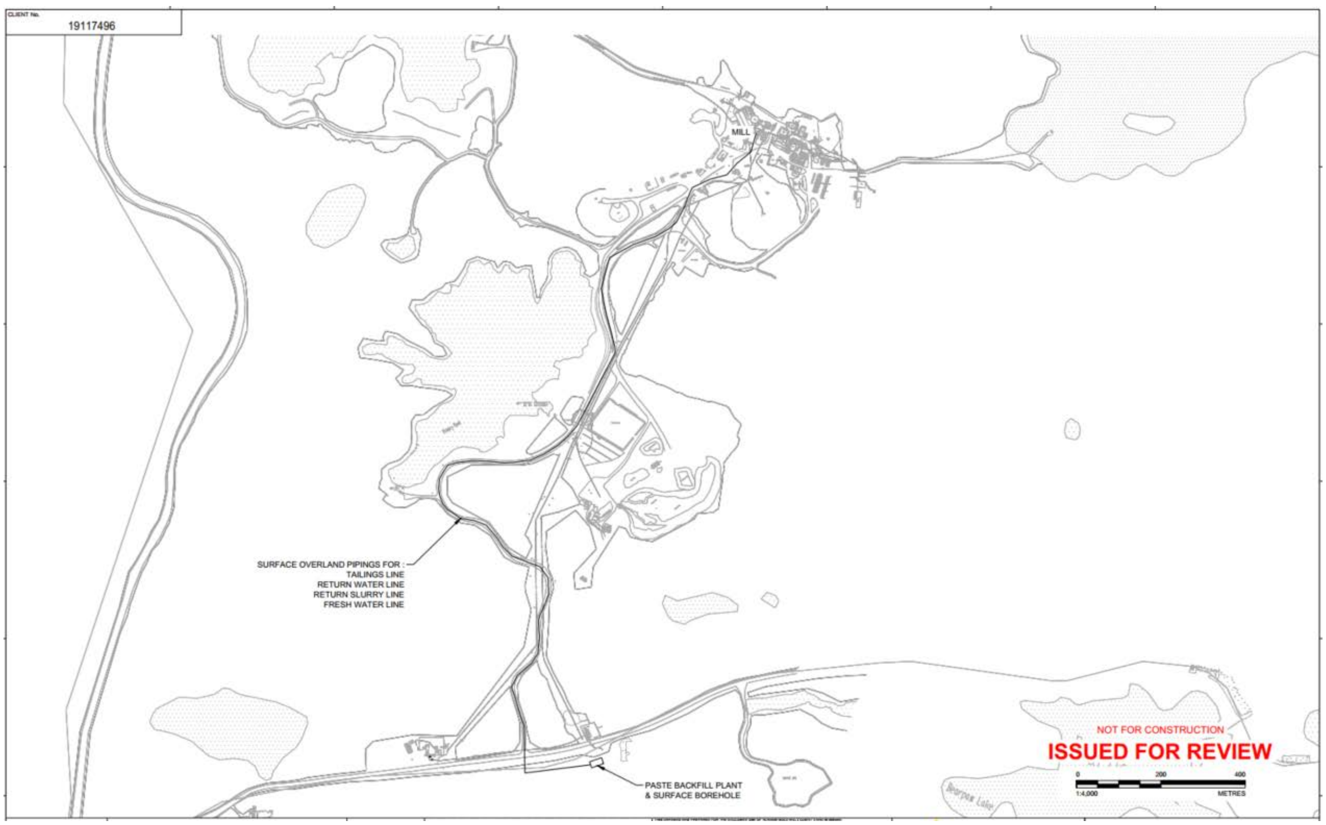


Figure 18-15 Paste Backfill Plant Site Plan

18.3.3.4 *Underground Distribution System (UDS)*

The UDS has been designed to accommodate the current and future mine design (Figure 18-16).

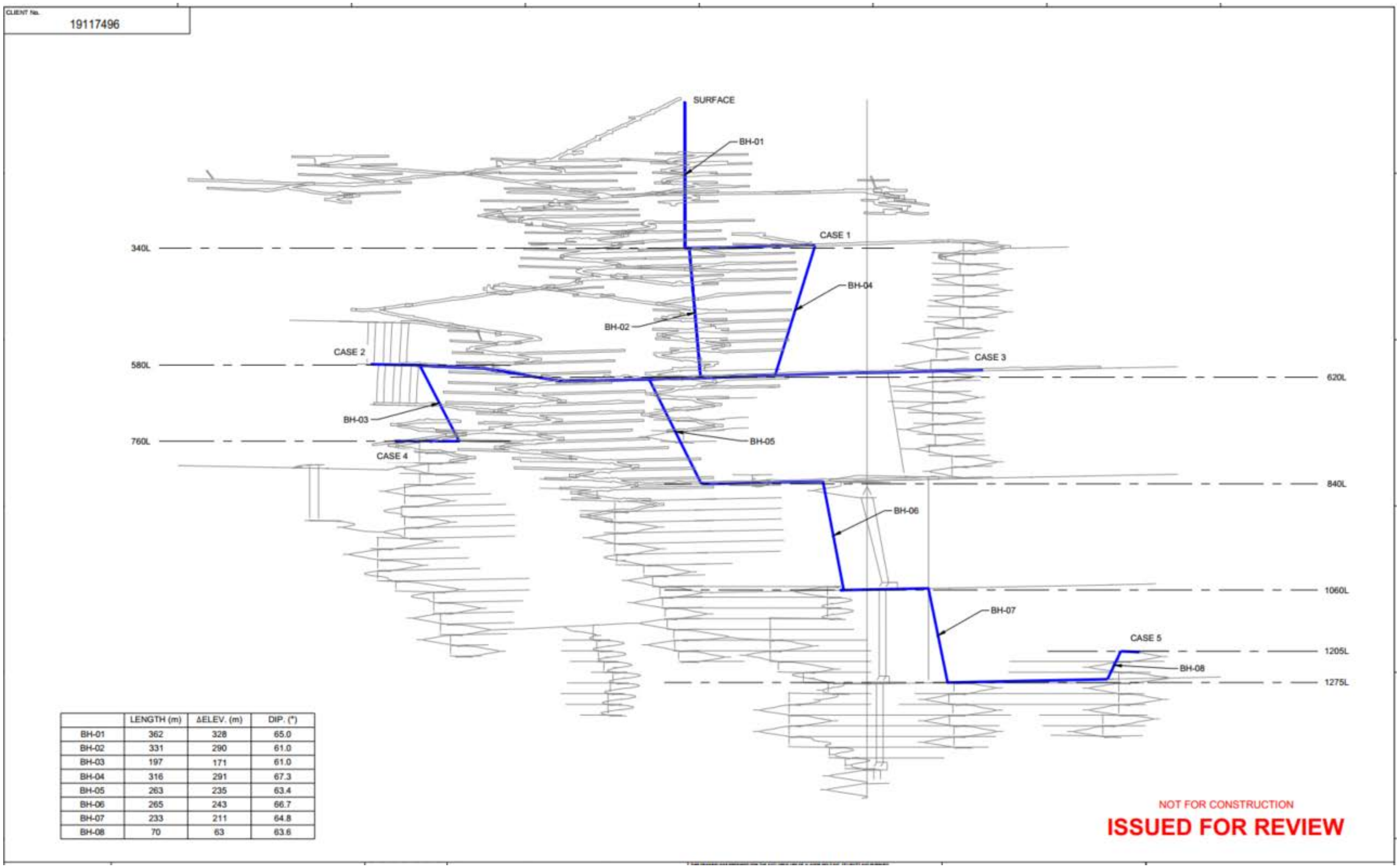
The system will operate by gravity using 150 mm (6") boreholes and pipelines. The paste will be delivered at a 254 mm (10-inch) slump and a nominal 4 wt% binder addition rate. The design flow rate for the system is based on 92 tph (2,000 tpd) of solids (tailings and binder combined) reporting the UDS.

The UDS will be composed of permanent main line sections, which include the main borehole from surface, piping on the main levels, interconnecting underground boreholes, sub-level piping and semi-permanent branch lines, which extend from a main line to the stopes.

The main boreholes will be routed from surface to 340 Level. The main surface boreholes will be provided with two additional standby boreholes, while the reticulation underground will consist of one operating borehole. The boreholes will not be cased since they are assumed to be geotechnically stable and not subject to stresses that would result in deformation or irreparable damage.

It was determined that the most effective means of delivering paste to the stopes would be to maximize the number of interconnecting boreholes between levels. The boreholes were kept at an angle between 60° and 70° from the horizontal.

The longest distribution system route to the bottom of the mine in the flow model is about 3,435 m, resulting in a paste transit time of about 60 minutes to travel from the paste plant to the stope. This is at the upper recommended cemented paste residence time in a UDS. Should the paste residence time increase beyond this point, consideration should be given to the introduction of a hydration retarder to the paste mixture.



	LENGTH (m)	ΔELEV. (m)	DIP. (°)
BH-01	362	328	65.0
BH-02	331	290	61.0
BH-03	197	171	61.0
BH-04	316	291	67.3
BH-05	263	235	63.4
BH-06	265	243	66.7
BH-07	233	211	64.8
BH-08	70	63	63.6

Figure 18-16 Underground Distribution System (Long Section View)

18.3.4 Tailings Management under Phase III Expansion

This section summarizes the work undertaken to analyze and compare the potentially viable tailings disposal options for Island Gold as part of the Phase III Expansion project. The tailings disposal options considered included the following:

- Conventional disposal within the Primary Pond with no cemented paste backfill
- Conventional disposal within the Primary Pond with cemented paste backfill
- Thickened tailings disposal within the Primary Pond with no cemented paste backfill
- Thickened / Filtered tailings disposal within the Primary Pond with cemented paste backfill
- Filtered tailings disposal within a new “dry-stack” facility with no cemented paste backfill
- Filtered tailings disposal within a new “dry-stack” facility with cemented paste backfill

For the purposes of this study, it was assumed that the earliest the cemented paste backfill plant would start operation would be at the beginning of 2024. Therefore, with respect to Primary Pond construction, it was assumed that dyke raises to elevation 427 m would be required in 2020 and that a dyke raise to elevation 430 m will be required sometime between 2023 and 2025 depending on the disposal option considered. For the cases that consider the use of cemented paste backfill, the average percentage tailings reporting to surface versus underground (beginning in 2024) varied depending on the production rate, as follows:

- 1,200 TPD maximum – 42% to underground
- 1,600 TPD maximum – 48% to underground
- 2,000 TPD maximum – 48% to underground

No changes to the Secondary Pond capacity and general water management strategy were considered with respect to its use as a secondary clarifier of tailings pond water prior to discharge to the environment.

A summary of the dyke raising requirements for each of the disposal options within the Primary Pond are provided in Table 18-3. Table 18-4 summarizes general characteristics of the filtered tailings dry stack option.

Based on a comparison of each option against various technical, environmental, and socio-economic criteria, the option involving conventional disposal within the Primary Pond in combination with cemented paste backfill underground was chosen as the preferred option. For the conventional disposal with cemented paste backfill option, only two additional dam raises above elevation 427 m would be required (Stages 5 and 6a) to an ultimate crest elevation of 432 m to store the projected life of mine tailings. Figure 18-17 provides the ultimate configuration of the Primary Pond TSF for the preferred option. Dykes 1, 3 and 4 would be raised via the downstream method of construction, while Dykes 2 and 5 would be raised via the centre-line method. In general, it was determined that this option would be the simplest of the technologies to implement and requires the least intensive effort from an operational oversight perspective. Raising of Dykes 2 and 5 by the centre-line method would also save on some earthworks quantities as compared with downstream raising, while satisfying stability requirements.

Table 18-3 TSF Dam Construction Timelines and Storage Capacity Summary

Construction Stage	Maximum Daily Production Rate (tpd)	Average Daily Production Rate (tpd)	Maximum Dam Crest Elevation (m)	Storage Capacity for Tailings above Elev. 424 m (M-m^3)	Dyke Raise Timelines			
					Conventional Disposal with No Paste Backfill	Conventional Disposal with Paste Backfill	Thickened Tailings Disposal with No Paste Backfill	Thickened Tailings Disposal with Paste Backfill
Stage 4	1,200	1,200	427	1.47	2020			
Stage 5	1,200	1,200	430	3.12	2023	2024	2024	2025
	1,600	1,400						
	2,000	1,478						
Stage 6a	1,200	1,200	432	4.12	N/A	2033	N/A	2036
	1,600	1,400				2030		2033
	2,000	1,478				2029		2032
Stage 6b	1,200	1,200	433	4.62	2028		2031	N/A
	1,600	1,400			2027		2029	
	2,000	1,478			2027		2029	
Stage 7a	1,200	1,200	435	5.62	N/A	N/A	2036	N/A
	1,600	1,400					2033	
	2,000	1,478					2032	
Stage 7b	1,200	1,200	436.5	6.32	2033	N/A	N/A	N/A
	1,600	1,400			2031			
	2,000	1,478			2030			

Table 18-4 Filtered Tailings Dry Stack Options – Storage Capacity and Annual Rate of Rise

Maximum Daily Production Rate (tpd)	Average Daily Production Rate (tpd)	Total Volume to be Deposited (M-m^3)		Average Rate of Rise (m/yr)		Maximum Height (m)		Maximum Elevation (masl)	
		No Paste Backfill	With Paste Backfill	No Paste Backfill	With Paste Backfill	No Paste Backfill	With Paste Backfill	No Paste Backfill	With Paste Backfill
1,200	1,200	4.1	2.5	1.00	0.94	16	15	409	408
1,600	1,400			1.23	1.15				
2,000	1,478			1.33	1.25				

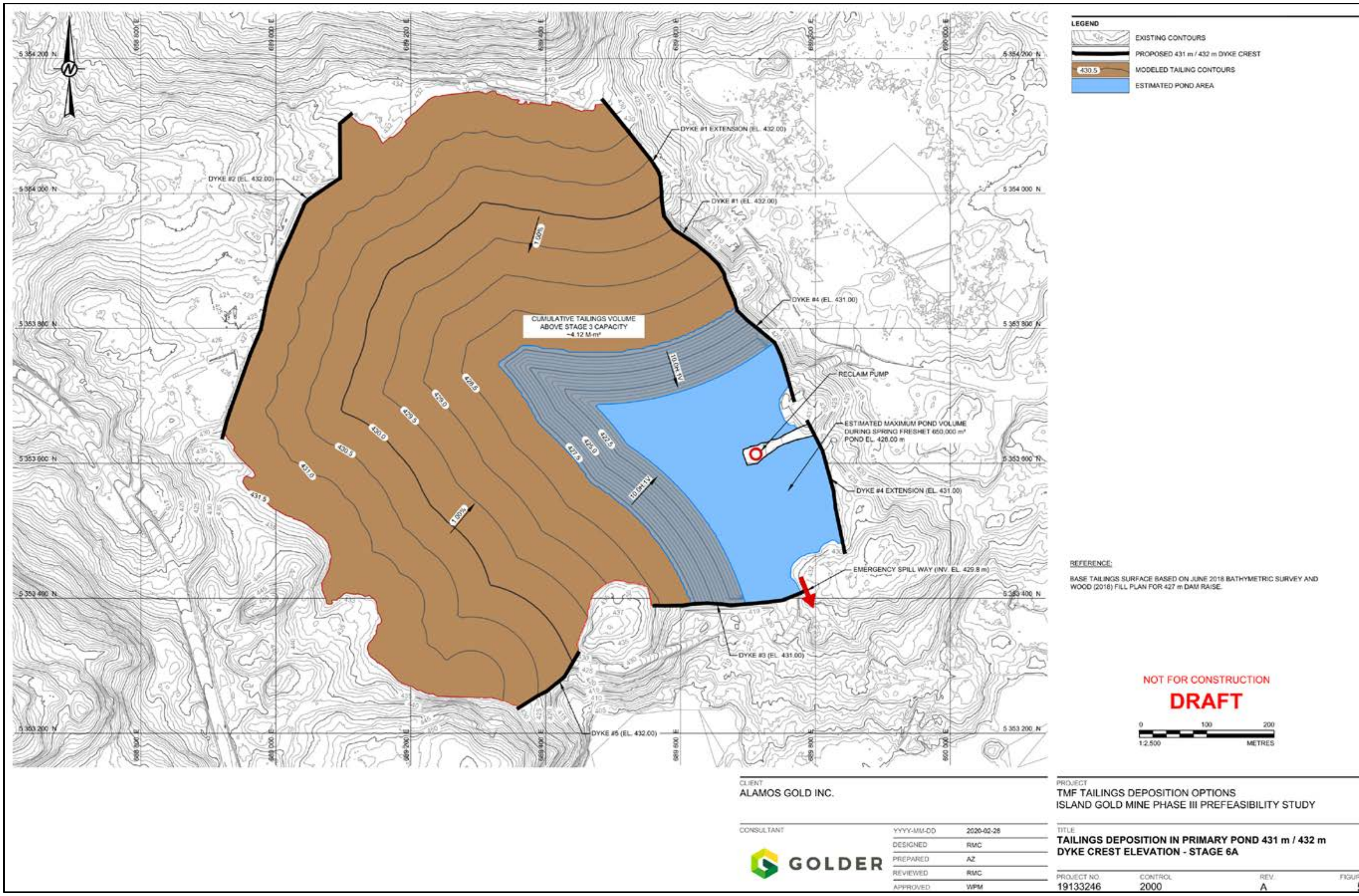


Figure 18-17 Ultimate Configuration of the Primary Pond TSF

18.3.5 Water Treatment

This section describes the water treatment plan for the Phase III Expansion. Golder Associates Ltd. ("Golder") conducted an alternatives assessment to select a preferred water treatment alternative as part of a pre-feasibility level study for tailings and water management (Golder 2020a). This section describes what was considered for the water treatment alternatives assessment and what alternative was selected.

18.3.5.1 *Design Flow and Water Management Options*

Water and mass balances were prepared for each of the following production cases:

- 1,200 tpd (current production)
- 1,600 tpd
- 2,000 tpd

For the assessment, mine production was assumed to be level on a monthly average basis. The analysis considered both seasonal treatment, reflecting the existing operations, and continuous treatment of pond water.

A summary of the annual pond transfer flows is provided in Table 18-5.

Table 18-5 Summary of Island Gold Water Flows

Parameter	Units	1,200 TPD Case	1,600 TPD Case	2,000 TPD Case
Total annual transfer flows from Primary Pond to Secondary Pond (average year)	m^3/yr	1,310,000	1,295,000	1,285,000
Total annual environmental discharge flows from Secondary Pond (average year)	m^3/yr	2,506,000	2,478,000	2,471,000

Notes:

- Annual transfer flows include approximately 650,000 m3/yr of mine water discharged to the Primary Pond. In the selected alternative, this flow will be eliminated.

Water treatment scenarios were developed using current and predicted loadings from operations to develop mass balances for key constituents of potential concern at a conceptual level. Key flow parameters from the water balance are provided in Table 18-6.

Table 18-6 Water Balance Parameters for Water Treatment Design– Average Years

Parameter	Units	1,200 TPD Case	1,600 TPD Case	2,000 TPD Case
Mine annual dewatering flows	m^3/yr	651,525	651,525	651,525
Total discharge from mill to tailings facility	m^3/yr	446,837	522,923	551,945
Reclaim water volume	m^3/yr	455,885	535,090	565,861
Precipitation inputs to Primary Pond, net of evaporation	m^3/yr	484,080	484,080	484,080
Precipitation inputs to Secondary Pond, net of evaporation	m^3/yr	1,184,151	1,184,151	1,184,151

Ammonia sources were based on the mine dewatering flow and historical water quality, combined with the ammonia generated from cyanide destruction. Cyanide sources were based on historical values in tailings and estimates of the residual after the cyanide destruction process. Cyanide destruction was applied selectively if applicable.

18.3.5.2 *Design Effluent Design Basis*

The values shown in Table 18-7 illustrate the water quality targets for the water being discharged into the environment from the Secondary Pond under the existing authorization. The treatment systems are designed to meet the effluent targets for water entering the Secondary Pond, thus this pond is used for polishing and as a buffer. Work is under way to update the discharge permit.

Table 18-7 Island Gold Mine Effluent Design Basis

Parameters	Effluent Design Basis	
	Daily	Monthly
Total Ammonia (TAN)	10 mg/L	
Free Ammonia	0.2	0.1
pH	6.0–9.5	
Total Cyanide	2 mg/L	1 mg/L
Total Phosphorus	1 mg/L	
Total Copper	0.6 mg/L	0.3 mg/L
Total Iron	1 mg/L	
Total Suspended Solids	30 mg/L	15 mg/L
Acute Toxicity *(daphnia magna and rainbow trout)*	Non-toxic	Non-toxic

18.3.5.3 *Water Treatment Alternatives*

Based on the evaluation of historical water quality for the Primary and Secondary Ponds, the removal of cyanide and nitrogen species is expected to be the principal driver for the selection of treatment technologies, with a secondary emphasis on removal of Total Suspended Solids (TSS) and trace metals. The following constituents were considered in the selection of treatment technologies:

- Nitrogen species, including ammonia (NH_3/NH_4^+), nitrite (NO_2^-) and nitrate (NO_3^-); and
- Cyanide species, broadly classified as free cyanide, weak-acid-dissociable (WAD) cyanide, and total cyanide.

Screening of alternatives considered a range of factors including seasonality, mill throughput, type of tailings management and the effects on the site water balance, tailings solid content, impact on water quality of cyanide detox, and seasonal natural degradation effects. The screening matrix of options considered whether a cyanide detox process would be implemented, and whether a paste backfill plant would be implemented and whether discharge to the environment is seasonal or continuous. The current operation discharges seasonally. The screening process consisted of:

- Initially fourteen water treatment scenarios were considered, and mass balances were developed for each of three production cases (1,200, 1,600, 2,000 tpd) resulting in 42 mass balances;
- Mass balances were used to reject options that represent the highest loading (and highest cost) for water treatment systems;

- At a secondary level, twelve options were considered with the three production cases and were subjected to peer review, considering: interface with production, complexity, operability and other measures; and
- Finally, four options focusing on the 1600 production case were carried forward to Class 4 cost estimates.

For example, if a paste backfill plant were selected, then the paste thickener provides an opportunity to recycle post-leach cyanide values and will reduce loading in ponds or treatment systems. Screening led to selection of four water treatment options to be carried forward. Capital and operating cost estimates were prepared to a Class 4 level for treatment systems needed under these options.

- **Option 1A Conventional Tailings with Continuous Mine Water Treatment and without Paste Backfill Thickener, without Detox.** This reflects the tailings management system and water balance that is currently practiced, considering increased mill throughput, and with a new treatment plant for underground mine water. This option reduces the inflows to the Primary Pond, and therefore increases retention time in that pond.
- **Option 1B Conventional Tailings with Paste Backfill Thickener, Mine Water Treatment, without Detox.** This option is the same as Option 1A, but with the addition of the thickener (assumed to be part of a paste backfill plant). The capital cost is similar to Option 1A, but with the addition of an allowance for pumping. This option is applicable to conventional tailings and does not consider a cyanide detox system. The implementation of paste backfill without the implementation of cyanide detox is subject to further work.
- **Option 2A Seasonal Treatment with Paste Backfill Thickener, and Detox, and Primary Pond Water Treatment.** This option considered the case that paste backfill and detox of tailings is implemented for the proportion of tailings used in backfill. This option assumes a portion of the post-leach cyanide can be recovered, upstream of detox. This option considers providing seasonal treatment, at a higher capacity. Seasonal treatment assumes natural degradation of cyanides and ammonia can take place in the Primary Pond within the ice-free periods. Seasonal treatment therefore considers a higher flow and a lower complexity of treatment.
- **Option 2B Continuous Primary Pond Treatment with Paste Backfill Thickener, with Detox.** This option is similar to Option 2A, but treatment systems are sized to run year round, without reliance on natural degradation.

18.3.5.4 *Water Treatment Upgrades*

Option 1B was selected by Island Gold as the preferred option for the water treatment plant (WTP) upgrades, with the assumption that the mine will continue to use conventional tailings, with paste backfill for 48% of the tailings, and assuming cyanide detox upstream of paste will not be required. These assumptions will be validated through further work prior to being implemented. The treatment plant capacity is assumed to be up to 1,800 m^3/d, based on historical flows in the mine water. The capacity of the WTP will be reviewed with hydrogeological predictions for the future mine water production, since as the underground mine deepens and expands, flows could increase. The treatment plant is not sized to manage loadings in the Primary Pond, and natural degradation in that pond will continue to be relied on. The proposed WTP consists of:

- Slimes removal pond for underground mine water, using an existing bermed area, insulated to retain heat for subsequent treatment;

- Physical-Chemical pre-treatment plant, consisting of a reactor tank with iron salt addition and pH control, sludge recycle, and a compact clarifier;
- Plant makeup water storage tank and pump package;
- Reagent makeup systems including: sodium hydroxide tank, bulk bag handler, mixer, pump, polymer make-up and dosing unit, phosphoric acid dosing pump, and storage tote; and
- A Submerged, Aerobic, Gravel Bed Reactor (SAGR) for continuous year-round biological oxidation of ammonia and nitrite to nitrate in underground mine water, including: feed pump, recycle pump, effluent pump, inlet distribution gallery, blowers, manifold piping and fine bubble diffuser distribution piping.

19 MARKET STUDIES AND CONTRACTS

19.1 Market studies

No market studies were conducted by Alamos. Gold is a freely traded commodity on the world market for which there is a steady demand from numerous buyers.

19.2 Metal Pricing

Revenues were calculated using a gold price of USD$1,450 per ounce at an exchange rate of $0.75 USD/CAD.

20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

From exploration to operations to closure, one of the goals at the Island Gold Mine is to safeguard the environment, educate its employees and the communities about the mine's environmental programs and commitments, and apply best management practices to prevent or mitigate any potential environmental impacts. The operations at Island Gold use a range of materials and consumables that includes explosives, chemicals, and fuels.

This section will provide a description of the environmental, permitting, social and community, and sustainability components relating to the Island Gold Mine operations, and will also cover mine closure and reclamation at Island Gold.

20.1 Existing Conditions

20.1.1 Past and Current Land Use

The Goudreau area has a history of mining dating back to the discovery of gold in the early 1900s. Several small gold mines and open pit pyrite mines have been active in the area in the past. Between the late 1920s and early 1940s, the area was also subjected to intensive prospecting for gold. There had been historic mining operations discharging tailings into lakes including Goudreau Lake, resulting in an alteration of water and sediment quality.

Current land use in the Island Gold Mine area consists primarily of forestry operations, mining and exploration activities, tourism, and recreation. The project area is occupied and surrounded by historically and periodically harvested forest lands.

Exploration programs have periodically occurred throughout the region's past to support potential future mining operations.

Recreational activity consists primarily of fishing, hunting, and snowmobiling. A hunting/fishing camp, for summer cottagers, is in the Lochalsh town site, approximately 15 km north east of the project site. Summer cottage homes also exist approximately 8 km west of the mine site.

There are no permanent residences located in proximity to the mine area.

20.1.2 Topography and Soils

The site is located within a physiographical region described as a bedrock-drift complex. Regional topography is bedrock-controlled and is characterized by a sequence of east-northeast trending rounded hills and ridges. The valleys and low-lying areas between ridges are generally characterized by the presence of interconnected wetlands, streams, and lakes (such as Maskinonge Lake and Goudreau Lake). Site relief is generally low, with low to moderate surface slopes and elevation differentials typically in the range of 5 m to 10 m. The site's highest elevations are encountered north of the primary pond area (approximately 470 masl) and the site's lowest elevation is at Goudreau Lake (381 masl).

Overburden soils are relatively uniform with types generally being topsoil, sand, and till. These overlay bedrock at greater depths.

20.1.3 Climate

The Wawa region climate is humid continental. Temperature extremes are moderated and precipitation patterns are altered by its proximity to Lake Superior. 2019's average annual temperature was 1.1 °C with a monthly average minimum temperature of -16.5°C recorded in January and a monthly average maximum temperature of 15.2 °C recorded in July, respectively. Daily extreme temperatures of -40.8 °C and 27.4 °C were recorded at Environment Canada's Wawa A station (ID 6059413).

Average total annual precipitation is estimated around 980 mm, of which approximately 70% falls as rain and 30% as snow. Total average evaporation is projected to be approximately 520mm. The precipitation and evaporation vary year-over-year and can fluctuate based on numerous factors. Nearly half of the annual snowfall occurs in December and January, while maximum rainfall occurs from June to October. Snow is generally present on the ground from November to April. Ice on Primary and Secondary Ponds do not completely dissipate until Mid-May.

20.1.4 Water

The Island Gold Mine is located within the Maskinonge Lake and Goudreau Lake sub-watersheds (total area of 48.2 km^2), approximately 40 km south of the Arctic drainage divide. Both sub-watersheds are part of the Michipicoten-Magpie watershed and Lake Superior Drainage Basin. Surface water drainage at the site is bedrock-controlled, generally flowing from northeast to southwest within the valleys between the elongated hills and ridges.

The Maskinonge Lake catchment covers the northwest part of the mine site. Drainage from the northeast part of the mine site reports to this catchment, including drainage north of the mill and the wetland area to the northeast of the primary pond. The water flows in a southerly direction through the upper stretches of Goudreau Creek via meandering stream and wetland, eventually reporting to Bearpaw Lake and, ultimately, to Goudreau Lake. The Goudreau Lake catchment covers the entire site, including both the tailings management facility and Maskinonge Lake catchments, and drainage areas to the east of the site. Goudreau Lake outflows to a creek in a southerly direction towards the Michipicoten river and ultimately discharges to Lake Superior.

Water depths in Goudreau Lake vary substantially. A 2019 bathymetry was conducted on the Goudreau Lake. Goudreau Lake can be divided into two distinct sections based on its bathymetry; an upstream basin, where depths between 14 m and 23 m are observed in deeper pool sections, and a second, much shallower basin, where depths do not exceed 2 m. The second basin is connected to the lake discharge and to the first deeper basin by a narrow and shallow corridor.

Water quality studies have been conducted since 1985 and they show some alteration in water quality in Goudreau Lake as a result of the impact of two historical mining operations in the area. Historically, sampling at stations upstream of Goudreau Lake (i.e., Maskinonge Lake, Miller Lake and Goudreau Creek) showed lower background levels of pH, conductivity, and alkalinity similar to the Goudreau lake downstream stations. Additionally, the former Magino Gold mine discharged tailings directly to the west of the upper basin of Goudreau Lake during the middle to late 1930s. Sediments in this portion of the lake are composed of natural sediments and historic tailings. Despite these increased loadings, data has indicated that the water quality in the upper basin of Goudreau Lake was quite good. Historic tailings have been also deposited into Pine Lake from the operations of the Edwards Mine.

The mine is required to have an on-going water balance model which tracks all inputs and outputs out of the system on a monthly basis.

Final treated effluent from the mine flows into the upper portion of Goudreau Lake via Goudreau Creek. Fresh water is taken from Maskinonge Lake, which is then treated via a domestic water treatment plant (WTP) to provide water for the mine and makeup water for processing. Water for mill use is reclaimed from the Primary Pond of the Tailings Management Facility. Water in the mine is currently reused, any excess is pumped, via a multi-stage pumping system (comprised of sumps/pumps at various levels in the mine) to the Primary Pond on the surface. Underground water from the Lochalsh is pumped to either the Primary or Secondary Pond. A visual representation of the site's hydrologic system site is shown in Figure 20-1.

Tailings, water management and final effluent monitoring and quality requirements are regulated under an amended ECA (No. 9118-B9CM3R) which was issued in May 2019. This ECA also allows for a mill production rate of up to 38,480 tonnes per month.

Additional monthly surface water quality monitoring is conducted by Island Gold Mine at two locations in Goudreau Lake (the receiving water body), one on Maskinonge Lake and one on Pine Lake. Both Maskinonge Lake and the upper basins of Goudreau Lake would be characterized as meeting provincial objectives. For the most part, metal concentrations were below their respective Provincial Water Quality Objectives (PWQO), with levels of many metals below the Method Detection Limit (MDL). Annual results have been comparable from 2007 to 2019.

In addition to the monitoring completed in conjunction with Environmental Compliance Approval (ECA) requirements, the site is subject to the Federal *Metal and Diamond Mining Effluent Regulations (MDMER).* As required under MDMER, Environmental Effects Monitoring (EEM), studies started in 2005 and have continued since then, with the most recent field program for the Cycle 5 EEM study completed in the fall of 2019 (final report is expected in late 2020).

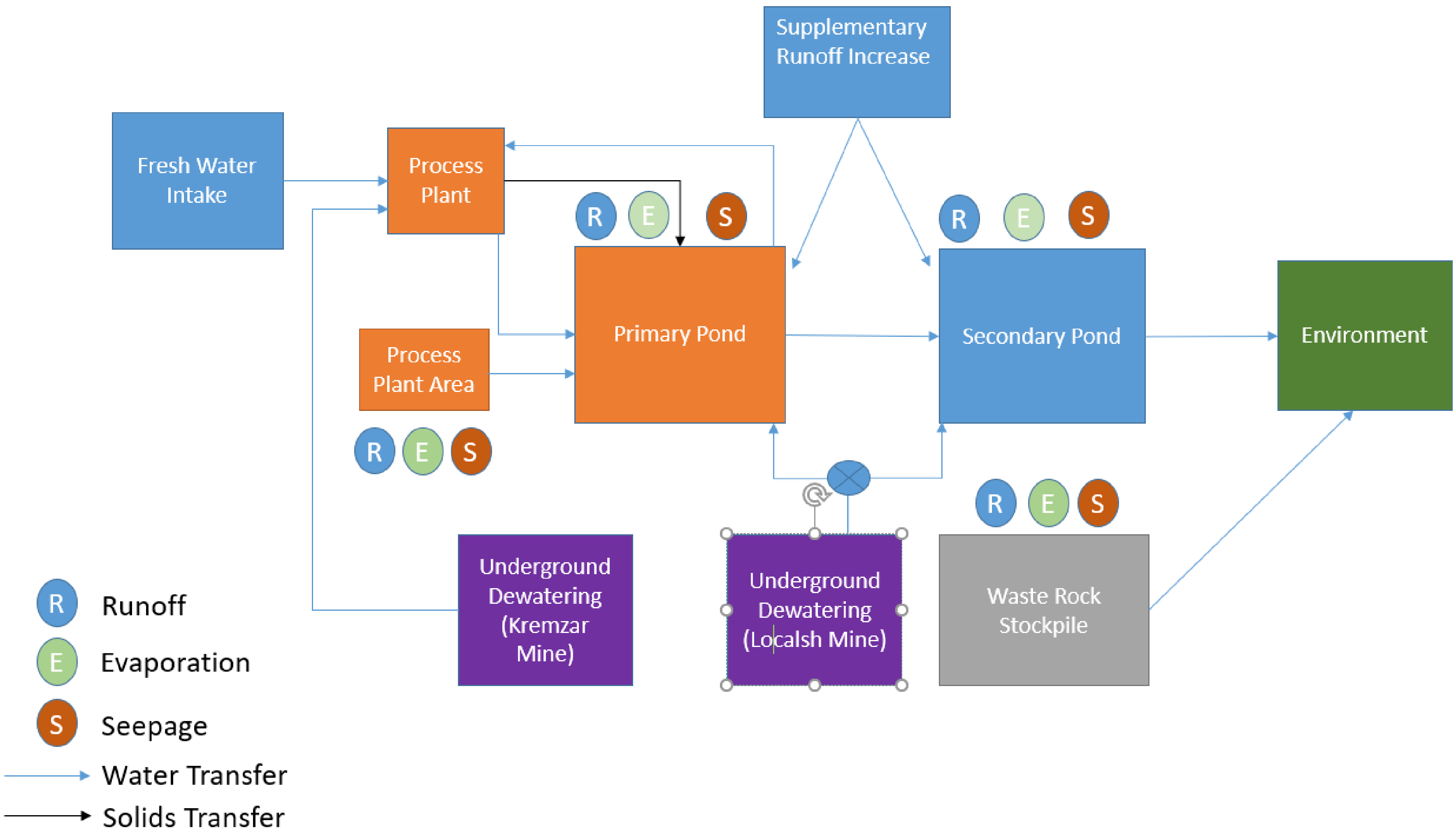


Figure 20-1 Island Gold Hydrologic System

20.1.5 Groundwater

The site is located within a bedrock-drift complex physiographical region characterized by thin overburden or exposed bedrock in the highland areas and waterlogged wetlands in low-lying areas. There are no known or potential groundwater users within several kilometres of the site. There is no current usage of groundwater resources on site.

A hydrogeological study of the Island Gold Mine site was conducted by Exp Services Inc. ("Exp") in 2013 with additional monitoring wells drilled in 2017. This included installation of ten groundwater monitoring wells across the site. Depth to groundwater ranged from 1.32 m to 11.7 m below ground surface. Regional groundwater flow direction in both overburden and bedrock is southward toward Goudreau Lake.

A groundwater monitoring program has been in place since 2013 with regular monitoring of groundwater levels and quality. Samples from the groundwater wells have been tested for various parameters including metals, cyanide, hydrocarbons, and anions, with no exceedances of the Ontario drinking water quality guidelines.

20.1.6 Air

Air and noise discharges are regulated under an amended ECA, No. 1821 BAWLAC which was issued in May 2019 to the Island Gold Mine, allowing for an annual ore processing rate of 461,760 tonnes per year.

The ECA requires that the Island Gold Mine be in compliance with Ontario Regulation 419/05, applicable MECP Guidelines for Air and Noise, and other performance requirements as specified in their conditions. It allows modifications such as process changes, de-bottlenecking, or addition of new equipment subject to limits on operational flexibility.

Emission Summary and Dispersion Modelling (ESDM) reports have been prepared in accordance with Section 26 of Ontario Reg. 419/05 in 2009 by Blue Heron Environmental ("Blue Heron") and in 2014 and annually thereafter by Golder Associates Ltd ("Golder"). These ESDM reports were prepared to support applications for the Air ECA and to demonstrate ongoing compliance. ESDM considers the potential contaminants from the various air emission sources generated at site, modelled downstream effects along the Island Gold property boundary and is updated annually to include additions/deletions of equipment across the site. The potential contaminants included ammonia, carbon monoxide (CO), copper, lead, nickel, nitrogen oxides (NOx), sulphur dioxides (SOx) and total suspended particulates (TSP). All modelled potential contaminants were compared against MECP criteria, with all below their respective limits.

The Province of Ontario and Federal government have released different GHG management programs; Ontario with the Emission Performance Standards and Federal government with the Output Based Pricing system (OPBS) with the goal to encourage industries to transition from high-intensity to low-intensity GHG emissions generation. The goal is to tax all carbon-based fuels the facility will consume based on their annual GHG emissions levels either opting in (if generation is greater than 10,000 tonnes CO_{2e} but less than 50,000 tonnes CO_{2e}) or mandatory participation (emissions generation greater than 50 000 tonnes CO_{2e}). In 2019 Island Gold mine generated 12,740 tonnes CO_{2e}, and qualifies for opting-in, which Island Gold is in the process of registering to remove the carbon tax from its invoices.

20.1.7 Terrestrial Plant and Animal Life

The area is largely composed of trembling aspen, white birch, balsam poplar, black spruce, white spruce, balsam fir, and jack pine.

Wildlife populations in the area are regionally typical with the noted presence of moose, wolves, foxes, black bears, beavers, otters, muskrats, mink, snowshoe hares and red squirrels.

Habitats are generally favourable to moose because of past and ongoing forestry operations. Local moose populations are subject to considerable hunting pressure because of easy road access. Black bears and moose are prominent in the mine area and are sighted regularly. The beaver, otter and mink that inhabit the local area are the focus of trapping activity. Other organisms like owls have been reported.

Tree clearing occurred in 2018 around the footprint of the tailings area in preparation of the 2019 and 2020 tailings dam expansions. Blue Heron and Golder completed the Species at Risk ("SAR") screening survey in June 2015, with a desktop review to compile data from the area to assess the potential for SAR to utilize the habitat. Based on the desktop review, there was a potential for thirty-four designated species to occur within the Wawa District. Seven of these species have a moderate potential to inhabit the study area and twenty-seven species have a low potential to inhabit the site. Three of the species with moderate potential to occur on site have been listed as either endangered or threatened under both the Species at Risk Act (SARA) and the Endangered Species Act (ESA). These species are Whip-Poor-Will, Northern Myotis and Little Brown Myotis bats, with field surveys conducted by Golder and Blue Heron at the Island Gold Mine site in June and July 2015. Northern Myotis and Little Brown Myotis were introduced onto the SAR list both federally and provincially in 2014.

Results for the Whip-Poor-Will surveys indicated that these birds were not heard at the site during the time of the survey. Results from the acoustic bat surveys indicated the presence of the Little Brown Myotis, but no Northern Myotis were detected. Although the presence of the Little Brown Myotis was detected, biologists concluded it is unlikely these bats are using the habitat for roosting since their activity was very low (Golder, 2015).

An expanded desktop study was conducted by Golder in 2020 as part of the Phase III Expansion Study. Golder's study area covers approximately 3,800 ha. During this study and from a review of historical information for neighbouring mines the potential habitat areas for Species at Risk were identified. The potential SARS are found in Table 20-1.Further fieldwork will follow to assess the potential habitat if SARS are found within the area.

Table 20-1 Identified Species at Risk (SAR)

Species at Risk Observed	Ontario ESA Status	Federal SARA Status
Bald eagle	Special concern	Not listed
Canada warbler	Special concern	Threatened
Chimney swift	Threatened	Threatened
Common nighthawk	Special concern	Special concern
Eastern whip-poor-will	Threatened	Threatened
Little brown bat	Endangered	Endangered
Northern long-eared bat	Endangered	Endangered
Olive-sided flycatcher	Special concern	Special concern

20.1.8 Aquatic Life

Lake trout are restricted to Mountain Lake, where a self-sustaining population exists. Walleye has been introduced into both Pine and Goudreau Lakes. Goudreau Lake, which constitutes the receiving water body for the treated effluent discharge from the Secondary Pond, supports northern pike, white suckers, and various minnow species. Perch occur in Pine Lake. Maskinonge Lake supports a northern pike population.

Fish surveys have been conducted as part of on-going EEM studies, in Goudreau Lake, Maskinonge Lake and Pine Lake. Based on the field program conducted in 2019 the most abundant species found in Goudreau Lake was the common shiner and secondly was the yellow perch. Occasional white sucker, walleye and pike were collected. In Maskinonge Lake, yellow perch was the most abundant fish species and secondly was the common shiner. Occasional white suckers, pike and walleye were collected.

20.1.9 Waste Management

Alamos Gold's strategy is to reduce consumption, reuse any waste generated, and dispose final waste in a safe and responsible manner. A Waste Management Procedure ("WMP") has been developed and implemented for the site; it provides guidance to site and non-site personnel on the handling, processing and disposal of waste, including hazardous waste and domestic materials generated during the normal operations of the facility.

The WMP is consistent with the requirements of Reg. 347 (Waste Management), Reg. 207/96 (burning of domestic waste), and Dubreuilville By-Law No. 2012-44 (domestic waste produced by the mine site and the camp).

20.1.10 Geochemistry of Waste Rock and Tailings

Excess underground waste rock is transported to the surface and stockpiled for use as future backfill and for constructing site roads and ongoing/future dam raise projects for the tailings facility.

In 2019, Golder was subcontracted to conduct an assessment on the geochemistry of Island Gold tailings and waste rock. Historical documentation, from Wood PLC, (formerly AMEC) was also reviewed. Golder determined that the waste rock did not generate any ARD nor metal leaching and recommended reducing the sample analyses to monthly.

Weekly analyses were conducted for tailings and ore for metal leaching and acid-rock drainage ("ARD"). The tailings did not generate any mobile metals, but results show an unknown potential to generate acid due to static Neutralization Potential Ratio (NPR) testing. The NPR is a ratio of the Neutralizing Potential (NP) to Acid Potential (AP) driven by the concentration of sulphides. Acid generation criteria are discussed in Table 20-2.

Table 20-2 Acid Generation Criteria

Acid Generation Potential	Criteria	Comments
Potentially Acid Generating (PAG)	NPR<1	Potentially acid generating, unless sulphide minerals are non-reactive
Uncertain	1<NPR<2	Possibly acid generating, if NP is insufficiently reactive or is depleted at a rate faster than sulphides
Non-Potentially Acid Generating (non-PAG)	NPR>2	Not expected to generate acidity.

From the 75 results analyzed, 54% of the samples are classified as non-PAG while 46% are classified as uncertain or PAG. Therefore Golder recommended to continue weekly analysis of tailings static geochemistry and initiate four 60-week humidity cells, two if NPR less than 1 and two when NPR is between 1 and 2. Two humidity cell tests have started with one on week 20 and the second on week 15. Preliminary results indicate that no acid generation has been observed. This may change as the humidity cell tests continue.

20.2 Anticipated Permitting Activities

Relevant regulatory agencies for the anticipated Phase III permitting needs include the Federal Department of Fisheries and Oceans (DFO), the provincial Ministry of the Environment and Conservation and Parks (MECP), Ministry of Natural Resources and Forestry (MNRF), and Ministry of Energy, Northern Development and Mines (ENDM).

All permitting activities will cover modifications and/or additions to the site including but not limited to: increased production rates, updated water management and effluent discharge strategies, new air and noise discharges, infrastructure additions/modifications related to the paste fill plant and new shaft area, new access roads, aggregate sources and potential impacts to terrestrial habitats and natural water bodies including related fisheries resources.

In order to facilitate the Phase III expansion, Alamos would be required to amend some existing operational permits and acquire a series of new permits and/or authorizations for both future operational requirements and Phase III construction related activities.

Currently, Island Gold is fully permitted to be operated at a production rate of 461,760 tonnes per year (not to exceed 38,480 tonnes per month) of gold-bearing ore. An amended ECA for Air & Noise (No. 1821 BAWLAC) was issued in May 2019 allowing for an annual ore processing rate of 461,760 tonnes per year. The ECA requires that the Island Gold Mine be in compliance with Ontario Regulation 419/05, applicable MECP Guidelines for Air and Noise, and other performance requirements as specified in permit conditions. It also allows modifications such as process changes, de-bottlenecking, or addition of new equipment subject to limits on operational flexibility.

An amended ECA for Industrial Sewage Works (No. 9118-B9CM3R) was also issued in May 2019 and recently amended in April 2020 to allow for a mill production rate of up to 38,480 tonnes per month. This permit includes all components for site water management, tailings management and domestic sewage treatment. (Note: The April 2020 amendment was considered administrative in nature to reflect the 2020 dam raise project to a crest elevation of 427masl)

In addition to ECA's the site is permitted for water taking activities under various Permits to Take Water (PTTW). Table 20-3 lists the PTTWs for the various locations.

Table 20-3 List of Permits to Take Water (PTTWs)

Permit Id	Location	Maximum Allowable Water Taking (litres/day)	Expiry
8571-8PENN8	Lochalsh	10,000,000	September 8, 2027
6138-9ABJ9Z	Kremzar	1,500,000	August 7, 2023
4231-A8BNM7	Maskinonge Lake	434,500	April 5, 2026
6551-8U3H95	Exploration Drills	280,000	December 20, 2021

Within Ontario, both ECA's and PTTW's fall under the regulatory mandate of the Ministry of Environment, Conservation and Parks (MECP). Environmental Compliance Approvals (ECAs) are issued under the *Environmental Protection Act.* Permits to Take Water (PTTW) are issued under the *Ontario Water Resources Act.*

Proponents in Ontario are required to file and maintain an updated Closure Plan under the authority of the *Mining Act,* which falls under the mandate of the Ministry of Energy, Northern Development & Mines. The latest version of the complete and consolidated Island Gold Mine Closure Plan ("Closure Plan") was filed in February 2020 with a more recent amendment in May 2020 to append the technical supporting information for the 2020 Dam Raising Project. he

The current Closure Plan details the decommissioning strategy for the Island Gold Mine. It reflects the current and expected site conditions and defines a program which ensures the long-term chemical and physical stability of the site. The goal of the Closure Plan is to ensure that chemical and physical impacts to the site are minimized during operations and that the site is returned as closely as possible to pre-development conditions at close-out. The Closure Plan has been developed using data collected during physical, chemical, and biological studies of the site (treated effluent, surface water, ground water, ore/waste rock characterization, etc) and the surrounding environment during the production phases. As detailed in the Closure Plan the total cost estimate for remediation of the Island Gold Mine in its current state stands at $6,345,369 CAD.

As part of the Phase III expansion, Alamos will be required to amend both Island Gold ECA's and complete a comprehensive update of the Island Gold Closure Plan.

In addition to amending these operational permits, Alamos will likely be required to acquire new permits or authorizations for future operations and to support construction activities outside the scope of operational permits.

Alamos would be required to obtain a new Permit to Take Water for any domestic water supply needed to service the shaft surface facilities and potentially a new Permit to Take Water for dewatering of the shaft during construction. In addition, given the potential for new disturbance associated with the shaft area, access roads, and aggregate sources there may be permits required under the Ontario *Endangered Species Act*. These permitting activities fall under the regulatory authority of the Ministry of Environment, Conservation and Parks (MECP).

Additional permits or authorizations would also need to be acquired through the different legislative requirements that fall under the mandate of the ministry of Natural Resources and Forestry (MNRF). Included within the MNRF mandate would be aggregate permits for materials such as sand for ongoing maintenance of Goudreau Road and till for tailings dam lifts. These types of materials would typically be reserved to the Crown (i.e. Ontario) and their use is regulated under the *Aggregate Resources Act.* Other approvals include Forest Resource

Licenses (tree clearing activities) issued under the *Crown Forest Sustainability Act*, Work Permits issued under the *Public Lands Act* for activities such as culvert installations or repair or constructing portions of the new access road where it crosses public lands. There may also be a requirement for Land Use Permits under the *Public Lands Act* to allow temporary occupation of Crown Land for site development activities.

Alamos may also require an authorization issued under Section 35 the Federal *Fisheries Act* from the Federal Department of Fisheries and Oceans (DFO). It is not confirmed at this time whether this authorization is needed for Phase III as design details for project development activities that may have impacts to fisheries resources have not been advanced sufficiently. Submission of a formal “request for review” to DFO will initiate this process.

The Phase III expansion as proposed is expected to be permitted within a 24-month timeframe once formally initiated.

20.3 Environmental Emergency Response

Island Gold’s environmental programs are designed with the goal of preventing all environmental incidents. However, in the event of unplanned incidents, the mine maintains a high degree of emergency preparedness with appropriate plans, resources, and training to minimize the impact on workers, operations, the environment, and the community should an unplanned incident occur. A Spill Prevention and Control Plan (SPCP) is mandated under the regulatory requirements of Ontario Reg. 224/07 Spill Prevention and Contingency Plans, the primary purpose of which is to prevent and reduce the risk of spills of pollutants, and to prevent, eliminate or ameliorate any adverse effects that result from spills of pollutants.

A SPCP, as part of the environmental emergency response program, is in place for the overall Island Gold site. It outlines/mandates response to a leak or spill, to limit effects on employees, the community, and the environment.

It also includes roles and responsibilities of all employees, containment procedures, reporting aspects (both to internal management and external agencies), and follow-up/close-out procedures. Additional steps are taken to complete remediation and clean-up of a spill once the emergency containment has been completed.

20.4 Social and Community Considerations

20.4.1 Communities

The two most significant communities in the vicinity of the Island Gold Mine are the Town of Dubreuilville (closest to the mine) and the Municipality of Wawa, both in the Algoma District. Two other communities situated in the Algoma District include the Township of White River, which is 93 km north of Wawa, and the small community of Hawk Junction, which is approximately 30 km northeast of Wawa.

The Mine is located 17km from the Town of Dubreuilville which has a population of approximately 635 permanent residents. The Island Gold site is accessible from Dubreuilville by an all-weather road from Highway 519. The town contains accommodations for some mine personnel. Dubreuilville is accessible by car or train.

Historically, forestry and to a lesser degree mining have been major contributors to Dubreuilville’s economy. In November 2007, Dubreuil Lumber Inc. (“Dubreuil”) filed for bankruptcy protection and ceased its logging operations. In 2008, Dubreuil was reduced to four employees. The collapse of the forestry industry dramatically impacted the town, leaving hundreds without work.

Statistics Canada data shows that Dubreuilville's population steadily decreased from 990 people in 1996 to 613 people in 2011 (a decline of 38%). The median age of the total population in 2016 was 42 years. The majority of the Town's citizens are bilingual and speak French as their primary language.

Educational facilities include a Catholic elementary school and a public high school, both of which are francophone and have small class sizes. Students must travel to Wawa for English education. Daycare services are also offered. Residents have access to Contact North, which offers access to university and college courses through distance learning and online education.

The Dubreuilville Health Centre has two full-time registered nurses and receives six physician visits per month. The community also offers homecare, tele-health video consultations and mental health referrals. Dubreuilville provides community support services such as a food bank. The nearest hospital is the Lady Dunn Health Centre, approximately 75 km away by road in Wawa.

20.4.2 Industry

The Island Gold Mine is the primary mining operation in the area. but other junior exploration programs are on-going. Previous operations include the Kremzar, the Magino, the Edwards, and the Cline Lake Gold mines.

The Island Gold Mine is in the southeast corner of the timber management area controlled by Dubreuil Forest Products, of Dubreuilville. No forestry operations are taking place in the mine area at present and none are expected un the near term as the area has been extensively harvested. There is a local sawmill located in Dubreuilville which has been closed since 2008.

20.4.3 Recreation

Within 100km of the Town of Dubreuilville there are numerous lakes that provide for recreational boating and fishing opportunities. Locally, fishing has been restricted on Goudreau Lake in recent years following the stocking of the lake with walleye by local conservation organizations, limiting fishing in the immediate mine area to Pine Lake, which has reasonable public access. Maskinonge Lake is restricted by access through the mine site. All three lakes support northern pike, white sucker, common shiner, and a variety of minnow species. Yellow perch also occur in Pine Lake, as well as walleye. Relatively easy access has resulted in intense fishing pressure by residents, as well as the presence of some non-resident anglers who return to the area annually.

Moose and partridge are the primary game animals and hunting pressure is considerable by both residents of Dubreuilville and non-residents. A grouse population also attracts hunters. Black bear hunting is popular in the area with a local outfitter operating out of Dubreuilville.

The project area is adjacent to a provincial snowmobile trail route, with lodging in Dubreuilville, resulting in increased traffic in the area during winter.

20.4.4 Community and Benefits

Island Gold's philosophy is to maximize local hiring of employees from the labour pool in the surrounding communities. This has increased the economic stability of the local communities of Dubreuilville, Wawa and White River who have been hit hard by the downturn of the forestry industry.

As of end of June 2020 there were 416 employees and approximately 100 contractors employed by Island Gold. Island Gold's employees have significantly augmented the local economy by living locally or supporting the local businesses when residing in at the mine workforce accommodation facilities in Dubreuilville for approximately six months out of the year.

Island Gold supports the local businesses and various non-profit organizations through its substantial local donations, purchase of goods, services, and materials, use of area motels and many home and apartment rentals for workforce accommodations. Support is also reflected through company programs such as the health and wellness program which provides yearly funds to encourage employees to join a fitness centre along with rental of local facilities such as the arena and school gym for employee activities or events. The recreational committee's various activities with the local communities (weekly sport night events, curling & golfing tournaments) aid in developing relations with the town and supporting their economic developments.

Island Gold encourages employees to relocate to the local communities by offering a moving and a house purchase program. Island Gold helps to supplement the local health care system by securing the services of a registered nurse on-site to provide health care services and health and wellness programs onsite for our employees to promote a healthy lifestyle. The services include health care, referrals to local doctors, awareness training and a vaccination program (that includes hepatitis, twinRix and flu shots).

The mine has made donations to various initiatives in the communities, most recently with support for meals-on wheels and funding and providing supplies during the COVID-19 pandemic.

Public consultation activities are ongoing. Several information sessions are held in Dubreuilville, to provide updates of mine activities and to outline any proposed changes to the mine. Feedback garnered from consultation activities have been incorporated into the decision-making processes. Primary feedback has been related to employment opportunities at the mine for residents of Dubreuilville.

There have also been regular meetings with the Dubreuilville Town Council to discuss common interests such as the Town's land fill and incentives to Island Gold's employees to buy a house in Dubreuilville

The construction of a 98-unit bunkhouse complex within the community was undertaken in the fall of 2015. A further expansion in bunkhouse access is partially complete and it includes adding four 44 bed-bunkhouses and one 38 bed bunkhouse with a new kitchen and recreational facility. Phase I was completed in December 2019 which included commissioning one half of the bunkhouse capacity and a fully operational kitchen. The Phase II expansion will continue in 2020 and finish in 2021 which will include the final phase of the bunkhouses and removal of old facilities.

20.5 Indigenous Engagement

Aboriginal engagement initiatives for Island Gold were initiated in December 2003 by Patricia and continued with Richmont Mines. Alamos has increased Indigenous engagement efforts since acquiring the mine in 2017. The corporation's site and executive management team is actively engaged with all Indigenous engagement initiatives.

To date the following Indigenous groups have been identified as having varying degrees of interest in the area of the Island Gold Mine: Michipicoten First Nation (MFN), Missanabie Cree First Nation (MCFN), Batchewana First Nation (BFN), the Garden River First Nation (GRFN). Other Indigenous groups that may have interest in the mine include the Métis Nation of Ontario (MNO).

There have also been engagement activities to outline any proposed significant changes to the project. Discussions have centered on the opportunities for employment, contracting, training, environmental effects of the project, and community development.

Alamos is committed to working with all affected Indigenous groups as Island Gold operations progress with the objective of arriving at mutually beneficial arrangements with appropriate Indigenous communities. A Community Benefits Agreement (CBA) was signed with the Missanabie Cree First Nation in March 2017 and is valid until March 2024. Alamos will renegotiate a new CBA prior to its expiry. Alamos is currently working towards a similar Benefits Agreement with Michipicoten First Nation.

21 CAPITAL AND OPERATING COSTS

21.1 Capital Cost Estimate Input

The capital costs for the Study have been estimated based on the scope of work defined in the sections below. The parties below have contributed to the preparation of the capital cost estimate in specific areas, as listed.

- Hatch:
  - Administration building, warehouse, and mine dry;
  - Shaft headframe and hoist house;
  - Underground ore and waste handling system;
  - Underground infrastructure, including dewatering and electrical;
  - Mobile equipment requirements;
  - EPCM; and
  - Contingency.
- Cementation
  - Shaft sinking, support and lining.
- Halyard
  - Process plant expansion.
- Golder
  - Tailings management facility expansion;
  - Mine water treatment plant; and
  - Paste fill plant.
- Alamos
  - Camp and kitchen;
  - Powerline upgrade;
  - Delineation drilling; and
  - Underground capital development.

21.2 Capital Cost Estimate Summary

The capital estimates conform, unless otherwise noted, to AACE Class 3 guidelines for a PFS Estimate with a -10% to +30% accuracy. The estimate is based on an EPCM execution approach.

The following parameters and qualifications were considered:

- The estimate was based on Q2 2020 pricing;
- All mining equipment would be purchased;

- A $0.75 USD/CAD exchange rate was assumed, and no allowance has been made for exchange rate fluctuations; and
- There is no escalation added to the estimate.

Data for the estimates have been obtained from numerous sources, including:

- Pre-feasibility level engineering design;
- Mine schedules;
- Topographical information obtained from site survey;
- Budgetary equipment quotes;
- Budgetary unit costs from local contractors for civil, concrete, steel, electrical and mechanical works; and
- Data from similar recently completed studies and projects.

Major cost categories (permanent equipment, material purchase, installation, subcontracts, indirect costs, and Owner's costs) were identified and analyzed. To each of these categories on a line item basis, a contingency was allocated based on the accuracy of the data, and an overall contingency amount was derived in this fashion.

21.3 Capital Expenditures

As this report covers an expansion scenario at Island Gold, capital expenditures are divided into two distinct categories: growth capital and sustaining capital.

Growth capital expenses are defined as expenditures that allow the mine to expand from the current throughput of 1,200 tpd to 2,000 tpd. Once the Shaft Expansion is completed and production has sustainably reached the targeted tonnage for a period of three months, all further capital expenditures are classified as sustaining capital.

Sustaining capital expenditures are expenditures related to sustaining the existing production and operating plan and allow Island Gold to mine its current Mineral Reserves, and a portion of its Mineral Resources, during, and post, the project period. The project period is defined as 2020 to 2025 and the post project period is defined as 2026 to the end of the life of the mine.

As the Life of Mine plan detailed in this study incorporates Mineable Resources, which is 165% larger than the current Mineral Reserve, the life of mine has grown significantly from the current 8 year Mineral Reserves life to a 16 year mine life with a substantially deeper mine. As a result, Island Gold will be required to invest in certain key areas to allow sustained production through 2035.

21.3.1 Sustaining Capital Investment

The sustaining capital requirements reported in the Study for the Shaft Expansion total $736 million and include $6 million of reclamation costs, $29 million of contractor indirects, $27 million of contingency, and $26 million of delineation drilling. In the Shaft Expansion mine development will require the largest sustaining capital investment, totaling $373 million from 2020 to 2033. Table 21-1 presents the life of mine sustaining capital expenditures for the R1200 (Basecase) and S2000 (Shaft Expansion) scenarios. The Shaft Expansion has $268 million less sustaining capital principally due the purchase of less mobile equipment (trucks) and less capital development.

Table 21-1 Sustaining Capital Investment (2020 – 2036)

Sustaining Costs (C$ million)	R1200	S2000	Difference
TSF Earthworks	$13	$13	$0
Miscellaneous U/G Infrastructure	$17	$14	-$3
U/G Mine Dewatering	$23	$23	$0
U/G Power	$58	$58	$0
General UG Facilities	$35	$24	-$11
Mobile Equipment	$234	$144	-$90
Subtotal Direct Costs	**$379**	**$276**	**-$104**
Indirect Costs	$29	$29	$0
Contingency	$20	$27	$7
Delineation Drilling	$29	$26	-$3
Capital Development	$541	$373	-$168
Total Sustaining Capital	**$998**	**$730**	**-$268**
Reclamation	$6	$6	$0
Total (including Reclamation, C$ millions)	**$1,004**	**$736**	**-$268**
Total (including Reclamation, US$ millions)	**$753**	**$552**	**-$201**

Annual sustaining capital is detailed in Table 21-2.

Table 21-2 Annual Sustaining Capital

Sustaining Capital Expenditure	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	Total
TSF	6	-	-	-	4	-	-	-	-	-	-	-	-	3	-	-	-	13
General Underground	3	3	5	3	4	2	2	5	3	1	2	2	2	2	-	-	-	38
UG Dewatering	4	3	2	2	2	4	1	1	1	1	1	1	1	1	-	-	-	23
UG Power	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-	-	-	58
Mobile Equipment	7	13	18	14	11	10	9	11	11	9	10	10	6	5	-	-	-	144
Subtotal	**24**	**22**	**29**	**22**	**26**	**20**	**15**	**21**	**20**	**15**	**17**	**17**	**12**	**15**	-	-	-	**276**
Indirects	2	2	2	2	4	3	2	2	2	2	2	2	2	2	-	-	-	29
Contingency	2	5	5	5	5	5	-	-	-	-	-	-	-	1	-	-	-	27
Delineation Drilling	4	3	3	2	1	1	1	1	1	1	1	1	1	1	1	-	-	26
Capital Development	23	23	24	26	28	30	35	45	41	38	27	21	4	-	-	-	-	373
Total Sustaining Capital	**55**	**57**	**64**	**60**	**66**	**59**	**53**	**70**	**64**	**56**	**47**	**41**	**18**	**20**	**1**	-	-	**730**
Reclamation																	6	6
Total (including Reclamation, C$ millions)	**55**	**57**	**64**	**60**	**66**	**59**	**53**	**70**	**64**	**56**	**47**	**40**	**18**	**20**	**1**	-	**6**	**736**
Total (including Reclamation, US$ millions)	**41**	**43**	**48**	**45**	**49**	**44**	**40**	**52**	**48**	**42**	**35**	**30**	**14**	**15**	**1**	-	**4**	**552**

21.3.2 Growth Capital Investment

The Island Gold growth capital expenditures for the Shaft Expansion are estimated to be $685 million, including; $315 million of direct costs, $133 million of indirect costs (contractor indirects, EPCM, and owner's costs), $70 million of contingency, and $166 million of capital development (Table 21-3). This is expected to be spent between 2020 and 2025, until the completion of the shaft and mill expansion by 2025 with the bulk of this spending occurring between 2021 and 2024.

The $315 million of direct costs are associated with common infrastructure projects, mill expansion and shaft installation. The $204 million of indirect costs and contingency are comprised of contractor indirect costs, EPCM, Owner's Cost and contingency applied on a package by package basis. The $166 million of capital development is associated with shaft installation specific lateral & vertical development (shaft stations, ore/waste pass, bin, etc.) and accelerated development required to support the higher throughput.

Total growth capital for the Shaft Expansion includes $139 million of capital, including contingency and indirects, for infrastructure projects that would be required under all mining scenarios including the base case scenario of maintaining the current 1,200 tpd operation. These common infrastructure projects include the following;

- Addition of a paste plant;
- Power line upgrade;
- Surface infrastructure upgrades including, an employee camp expansion, a kitchen replacement, and a new administration building and warehouse; and
- Tailings expansion.

Other significant capital items include $53 million, including contingency and indirects, for the mill expansion and $310 million, including contingency and indirects, for shaft sinking and shaft infrastructure (Table 21-4). Annual growth capital expenditures for the project period, 2020 to 2025 are presented in Table 21-5.

Table 21-3 Growth Capital Investment

Growth Capital (C$ millions)	R1200	S2000	Difference
Site Wide Surface Works	$43	$41	-$2
Power Upgrade	$18	$18	$0
Mill Expansion	–	$36	$36
Paste Plant	$38	$38	$0
Shaft Surface Works	–	$9	$9
Headframe and Hoisting Plant	–	$59	$59
Shaft Sinking and Equipping	–	$78	$78
U/G Ore and Waste Handling	–	$13	$13
U/G Misc.	$16	$18	$2
Other	$6	$6	$0
Subtotal Direct Costs	**$121**	**$315**	**$194**
Indirect Costs	$21	$104	$83
EPCM	$4	$22	$18
Owner's Costs	$1	$7	$6
Contingency	$8	$70	$62
Capital Development	$105	$166	$61
Total Costs (C$ millions)	**$260**	**$685**	**$425**
Total Costs (US$ millions)	**$195**	**$514**	**$319**

Table 21-4 Shaft Capital Including Indirects and Contingency

Shaft Capital (C$ millions)	
Shaft Surface Works	$9
Headframe & Hoist House	$59
Shaft Sinking & Equipping	$78
UG Ore/Waste Handling	$13
Subtotal Direct Costs	**$159**
Indirect Costs	$72
EPCM	$22
Owner's Costs	$5
Contingency	$53
Total Costs (C$ millions)	**$310**
Total Costs (US$ millions)	**$232**

Table 21-5 Annual Growth Capital Expenditure

Growth Capital Expenditure (C$ millions)	2020	2021	2022	2023	2024	2025	Total
Site Wide Surface Works	10	8	11	1	11	1	41
Power Supply Upgrades	-	5	14	-	-	-	18
Mill Expansion	-	-	-	-	36	-	36
Paste Plant (incl. UG Network)	-	-	2	35	-	-	38
Shaft Surface Works	-	1	2	3	3	-	9
Headframe and Hoisting Plant	-	18	39	1	0	1	59
Shaft Sinking & Equipping	1	14	15	23	21	4	78
Underground Ore and Waste Handling	-	-	-	5	7	1	13
Underground Miscellaneous	8	2	2	1	2	4	18
Other	6	-	-	-	-	-	6
Subtotal Direct Costs	**24**	**47**	**85**	**68**	**80**	**11**	**315**
Indirects	7	23	38	30	30	6	133
Contingency	1	12	21	11	21	3	70
Capital Development	16	26	42	47	28	7	166
Total Growth Capital (C$, millions)	**48**	**109**	**185**	**156**	**160**	**28**	**685**
Total Growth Capital (US$, millions)	**36**	**82**	**139**	**117**	**120**	**21**	**514**

21.4 Operating Expenses

Operating expenses were calculated using the Island Gold's 2020 budget as a reference point where applicable and were developed from first principles when budgetary items were not available. The 2020 budget costs were adjusted to reflect increases related to mining at greater depths, increased operational efficiencies associated with shaft access and higher underground throughput. Fixed and variable components of cost centers were considered. Costs were adjusted to reflect the total volume of material moved (waste and ore) per year. Costs were also adjusted to reflect the reduction in labour related to the completion of capital development activities. This approach was developed by Hatch and Island Gold.

The summarized cost structure consists of the following categories and sub-categories:

- Mining
  - Administration and Haulage;
  - Ore Development;
  - Stoping;
  - Geology;
  - Engineering;
  - Maintenance;
  - Mechanical/Electrical; and
  - Engineering/Geology.
- Milling
- G&A
  - Administration;

- o Human Resources;
- o IT;
- o Environment;
- o Heath and Safety;
- o Lodging and Transportation;
- o Warehouse and Purchasing; and
- o Surface Maintenance.

- Royalty

21.4.1 Mining Costs

Mining costs were generated on a departmental basis. Table 21-6 summarize the underground departmental mining costs for the R1200 and S2000 scenario in project and post project periods. In the R1200 scenario, it is evident that haulage costs increase over time as the mine deepens. Maintenance costs also increase as more trucks are added to the fleet due to the increased cycle times. In the S2000 scenario, haulage and maintenance costs remain relatively flat lined after the commissioning of the shaft.

Some of the fixed costs, on a unit cost basis, increase toward the end of the mine as less capital development is undertaken. Island Gold uses an allocation system to allocate a portion of overheads to capital costs, and as capital development decreases, more of these costs stay with operating costs.

Table 21-6 R1200 versus S2000 Unit Mining Costs

Department	R1200			S2000		
	2020 - 2025	2026 - 2042	LOM	2020 - 2025	2026 -2035	LOM
Overhead and Haulage	29.59	41.67	38.39	25.57	23.75	24.27
Development	14.81	7.64	9.59	16.68	5.57	8.73
Stoping	33.89	39.44	37.93	33.30	34.37	34.07
Geology	5.56	7.46	6.94	4.50	5.85	5.46
Engineering	5.80	7.03	6.70	4.80	5.11	5.02
Maintenance	23.45	29.56	27.90	20.47	20.15	20.24
Total ($/t mined)	113.08	132.80	127.45	105.31	94.81	97.79

21.4.2 Processing Cost

The mill expansion from 1,200 tpd to 2,000 tpd in the Shaft Expansion mainly benefits the labour unit costs as labour is predominantly a fixed cost. Most consumables are utilized at approximately the same rate post and pre project completion. Table 21-7 presents a comparison of the R1200 and S2000 processing costs.

Table 21-7 R1200 versus S2000 Unit Processing Costs

	R1200			S2000		
	2020-2025	2026-2042	LOM	2020-2025	2026-2035	LOM
Labour	13.99	14.38	14.28	13.26	9.05	10.25
Electricity	2.42	2.53	2.50	2.49	2.82	2.73
Reagents	3.69	3.68	3.68	3.69	3.68	3.68
Propane	0.36	0.36	0.36	0.35	0.33	0.34
Balls and Liners	1.40	1.39	1.39	1.45	1.62	1.57
Maintenance	8.05	8.00	8.01	8.12	8.36	8.29
Mill Haulage	4.50	4.50	4.50	4.50	4.50	4.50
Total ($/t milled)	34.41	34.84	34.72	33.85	30.36	31.36

21.4.3 General and Administrative Costs

As many general and administrative (G&A) costs are fixed costs, the G&A unit costs tend to decrease with an increase in tonnage rates. As well, with the mine life reduced by seven years with the higher extraction rate under the S2000 scenario, total life of mine G&A costs drop significantly. Table 21-8 presents a comparison of the R1200 and S2000 processing costs.

Table 21-8 R1200 versus S2000 General and Administrative Cost

	R1200			S2000		
	2020-2025	2026-2042	LOM	2020-2025	2026-2035	LOM
Administration	8.20	9.96	9.48	7.23	7.60	7.50
Human Resources	2.31	2.44	2.40	2.33	1.61	1.82
IT	3.46	3.79	3.70	3.18	2.31	2.56
Health and Safety	8.71	9.49	9.28	8.19	5.81	6.49
Lodging and Transportation	11.08	12.67	12.24	11.25	7.11	8.28
Warehouse and Purchasing	2.14	2.35	2.30	2.06	2.39	2.29
Surface Maintenance	7.85	8.78	8.53	7.36	5.99	6.38
Environmental	5.05	5.58	5.44	4.64	3.65	3.93
Total ($/t milled)	48.80	55.06	53.36	46.23	36.47	39.24

21.4.4 Total LOM Operating Costs

Total life of mine operating costs of $1,747 million with the Shaft Expansion are significantly lower than all the other scenarios evaluated (Table 21-9). Total operating costs are expected to average $176 per tonne of mill feed post completion of the shaft and mill expansion by 2025. This includes average mining costs of $95 per tonne. Both are the lowest of any scenario evaluated. This becomes even more significant as mining moves deeper with unit mining costs remaining relatively stable under the Shaft Expansion, while steadily increasing with the ramp scenarios

Table 21-9 R1200 versus S2000 Life of Mine Operating Costs

Operating Cost	R1200			S2000		
	LOM $/t	2026-2042 $/t	Total LOM C$M	LOM $/t	2026-2035 $/t	Total LOM C$M
Mining	127	133	1,220	98	95	936
Processing	35	35	332	31	30	300
General and Administrative	53	55	511	39	36	377
Royalties	15	15	146	15	15	146
Silver Credit	-1	-1	-12	-1	-1	-12
Total Operating Cost	**229**	**237**	**2,197**	**182**	**176**	**1,747**

Annual mining, process and G&A costs are presented in Table 21-10, Table 21-11,and Table 21-12.

Table 21-10 S2000 Scenario Annual Unit Mining Costs

	LOM	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Overhead and Haulage	24.27	28.74	24.93	23.64	22.68	28.59	25.14	20.90	19.14	19.85	21.74	23.55	24.50	27.67	28.14	26.62	27.77
Development	8.73	19.42	18.38	10.27	14.75	21.15	16.35	12.10	4.15	6.92	9.32	9.36	4.55	5.03	1.04	0.00	0.00
Stoping	34.07	32.20	29.22	34.91	34.09	35.34	33.80	33.76	35.09	33.42	32.29	32.15	34.82	34.53	36.73	37.21	32.89
Geology	5.46	5.35	4.60	3.85	3.59	4.41	5.10	5.08	4.50	4.72	4.90	5.48	5.87	7.07	7.40	7.45	6.23
Engineering	5.02	5.65	5.00	4.19	3.90	4.79	5.20	4.50	3.97	4.16	4.33	4.84	5.18	6.24	6.53	6.60	4.15
Maintenance	20.24	22.65	20.48	18.66	17.64	21.15	21.96	19.28	16.90	17.53	18.08	19.75	20.52	22.94	23.01	23.21	20.64
Total ($/t mined)	**97.79**	**114.02**	**102.62**	**95.51**	**96.65**	**115.43**	**107.55**	**95.62**	**83.74**	**86.59**	**90.67**	**95.12**	**95.44**	**103.48**	**102.85**	**101.09**	**91.68**

Table 21-11 S2000 Scenario Annual Unit Processing Costs

	LOM	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Labour	10.25	16.41	12.79	12.79	12.79	13.68	11.72	9.07	8.94	8.92	8.94	8.94	8.94	8.92	8.94	9.05	11.00
Electricity	2.73	2.10	2.48	2.48	2.48	2.47	2.80	2.83	2.79	2.78	2.79	2.79	2.79	2.78	2.79	2.82	3.43
Reagents	3.68	3.72	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68	3.68
Propane	0.34	0.36	0.36	0.36	0.36	0.36	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Balls and Liners	1.57	1.45	1.39	1.39	1.39	1.39	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62	1.62
Maintenance	8.29	8.30	8.00	8.00	8.00	8.00	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36	8.36
Mill Haulage	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Total ($/t milled)	**31.36**	**36.84**	**33.20**	**33.20**	**33.20**	**34.08**	**33.01**	**30.39**	**30.22**	**30.19**	**30.22**	**30.22**	**30.22**	**30.19**	**30.22**	**30.37**	**32.92**

Table 21-12 S2000 Scenario Annual Unit General and Administrative Costs

	LOM	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Administration	7.50	8.14	7.86	6.98	6.86	7.23	6.54	7.01	6.58	6.69	6.81	7.14	7.27	8.05	8.26	8.37	13.12
Human Resources	1.82	2.25	2.18	2.43	2.39	2.55	2.21	1.69	1.57	1.59	1.61	1.66	1.69	1.59	1.61	1.61	1.28
IT	2.56	3.40	3.29	3.20	3.14	3.33	2.84	2.21	2.07	2.10	2.13	2.23	2.29	2.49	2.55	2.57	2.71
Health and Safety	6.49	8.50	8.21	8.31	8.17	8.67	7.48	5.76	5.38	5.46	5.54	5.76	5.70	6.16	6.26	6.31	5.83
Lodging and Transportation	8.28	11.45	11.06	11.62	11.53	12.09	10.05	7.70	6.95	6.98	7.05	7.14	7.13	7.37	7.30	7.22	4.93
Warehouse and Purchasing	2.29	2.11	2.04	1.97	1.94	2.04	2.22	2.23	2.13	2.17	2.20	2.31	2.38	2.61	2.67	2.67	2.67
Surface Maintenance	6.38	7.88	7.62	7.42	7.31	7.64	6.53	5.64	5.32	5.40	5.49	5.73	5.89	6.41	6.57	6.65	8.05
Environmental	3.93	4.96	4.79	4.63	4.56	4.80	4.23	3.42	3.22	3.27	3.33	3.49	3.60	3.94	4.04	4.08	4.65
Total ($/t milled)	**39.24**	**48.69**	**47.04**	**46.56**	**45.91**	**48.35**	**42.11**	**35.65**	**33.22**	**33.66**	**34.16**	**35.46**	**35.95**	**38.63**	**39.25**	**39.49**	**43.23**

22 ECONOMIC ANALYSIS

An engineering economic model was developed to estimate annual cash flows and sensitivities for Island Gold. After-tax estimates were developed to approximate the true investment value.

Sensitivity analyses were performed for variation in metal prices, foreign exchange rate, operating costs, capital costs, and discount rates to determine their relative importance as value drivers.

The estimates of capital and operating costs have been developed specifically for Island Gold and are summarized in Section 21 of this report. They are presented in Q2, 2020 Canadian dollars unless otherwise stated. The economic analysis has been run with no inflation (constant dollar basis).

22.1 Assumptions

All costs and economic results are reported as CAD$, unless otherwise noted. Table 22-1 outlines the planned LOM tonnage and grade estimates.

Table 22-1 Life of Mine Plan Summary

Parameters	Unit	Value
Mine Life[1]	Years	16
Total Mill Feed	Kt	9,572
Processing Rate[2]	tpd	2,000
Average Au Head Grade	g/t	10.45
Total Au Production over Life of Mine	koz	3,104
Au Production (Years 2020 to 2034)	Average koz/a	201
Au Production (Years 2026 to 2034)[3]	Average koz/a	237

Notes:

1. *2020 to 2035*
2. *1,200 tpd from 2020 until shaft completion in 2025, after which the mill ramps up to 2,000 tpd by 2026*
3. *Post-shaft completion in 2025*

Other economic factors and assumptions used in the economic analysis include the following:

- US $1,450/oz gold, US $16.00/oz silver and a $0.75 USD/CAD were used in the cash flow model;
- Discount rate of 5%;
- Closure cost of $5.7M (US $4.3M);
- No salvage assumed at the end of mine life; and
- Exclusion of all costs prior to 2020. However, 60% of Alamos' Canadian tax pools at December 31, 2019 are utilized in the tax calculations.

22.2 Revenue and Working Capital

Working capital assumptions were not included in the economic analysis as the mine is currently operating with adequate working capital.

Mine revenue is derived from the sale of gold doré into the international marketplace. The mine has contractual arrangements for refining. The parameters used in the economic analysis are consistent with current agreements, as shown in Table 22-2.

Figure 22-1 illustrates the annual recovered gold and cumulative recovered gold by project year.

Table 22-2 NSR Assumptions Used in the Economic Analysis

Assumptions	Unit	Value
Au Payable	%	99.96%
Au Refining and Transportation Charge	$/oz	3.25

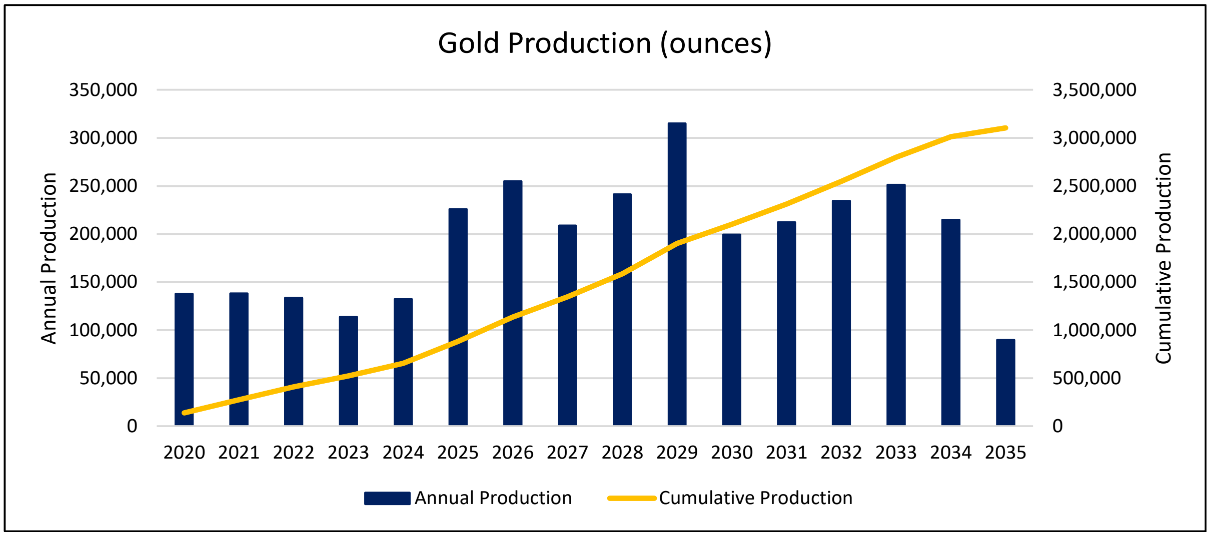


Figure 22-1 Annual and Cumulative Gold Production

22.3 Summary of Operating Costs

Total LOM operating costs, as presented in Table 22-3, amount to $1,747M (US $1,310M), including silver by-product credits, royalties and refining and transportation charges. This translates into an average cost of $182/t processed over the life of mine ($176/t from 2026 to 2035 when the mine is at 2,000 tpd). A detailed analysis of the operating costs can be found in Section 21.4 of this report.

Table 22-3 Summary of Operating Costs

Operating Cost	C$/t Processed	LOM C$M	US$/t Processed	LOM US$M
Mining	$98	$936	$73	$702
Processing	$31	$300	$24	$225
G&A	$39	$377	$29	$283
Subtotal	**$168**	**$1,613**	**$126**	**$1,210**
Silver Credit	-$1	-$12	-$1	-$9
Royalties	$15	$146	$11	$109
TOTAL Operating Costs	**$182**	**$1,747**	**$137**	**$1,310**

22.4 Summary of Capital Costs

The capital costs used for the economic analysis are set out below. Table 22-4 summarizes the capital costs used in the economic analysis, and Table 22-5 and Table 22-6 show a breakdown by sustaining and growth capital. Detailed information can be found in Section 21 of this report.

Table 22-4 Total Capital Costs

Total Capital Cost	LOM C$M	LOM US$M
Sustaining Capital	$736	$552
Growth Capital	$685	$514
Total Capital Costs	**$1,421**	**$1,066**

Table 22-5 Sustaining Capital Costs

Sustaining Capital Cost	LOM C$M	LOM US$M
TSF Earthworks	$13	$10
Misc. U/G Infrastructure	$14	$10
U/G Mine Dewatering	$23	$17
U/G Power	$58	$43
General UG Facilities	$24	$18
Mobile Equipment	$144	$108
Sub-total Direct costs	**$276**	**$207**
Indirects	$29	$21
Contingency	$27	$21
Delineation Drilling	$26	$20
Capital Development	$373	$280
Total Sustaining Capital	**$730**	**$548**
Reclamation	$6	$4
Total Sustaining Capital (including Reclamation)	**$736**	**$552**

Table 22-6 Growth Capital Costs

Growth Capital Cost	LOM C$M	LOM US$M
Site Wide Surface Works	$41	$31
Power Upgrade	$18	$14
Mill Expansion	$36	$27
Paste Plant	$38	$28
Shaft Surface Works	$9	$7
Headframe and Hoisting Plant	$59	$44
Shaft Sinking and Equipping	$78	$59
U/G Ore and Waste Handling	$13	$9
U/G Misc.	$18	$14
Other	$6	$5
Subtotal Direct Costs	**$315**	**$236**
Indirect Costs	$104	$78
EPCM	$22	$17
Owner's Costs	$7	$5
Contingency	$70	$52
Capital Development	$166	$125
Total Growth Capital	**$685**	**$514**

22.5 Reclamation and Mine Closure Plan

The Closure Plan anticipates a cost of $5.7M (US $4.3M) for reclamation and closure. The bulk of the closure costs and reclamation activity will occur beyond 2035, after mining and processing have been completed at Island Gold.

22.6 Taxes

Island Gold will be subject to provincial, federal, and mining taxes as follows:

- Ontario Mining Tax: 10%;
- Ontario Provincial Income Tax: 10%; and
- Federal Income Tax: 15%.

The rates above are current as of the date of this report and are subject to change in the future. Based on these rates and the financial assumptions used in this report, Island Gold is expected to have payable income and mining taxes of $620M (US$465M) over its 16-year life. Alamos has various Canadian tax pools that could be applied against future income from its Canadian operations, and 60% of the tax pools as of December 31, 2019 were used in this study to reduce taxes payable at Island Gold in the economic analysis.

22.7 Royalties

Island Gold is subject to third-party royalties that range between 0.6% and 3.0% on certain claims, with an average royalty rate of 2.4% over the mine life. Total royalties included in this report are $146M (US$109M).

22.8 Economic Analysis

The Shaft Expansion option is economically viable with an after-tax internal rate of return (IRR) of 17% IRR which is calculated on the differential after-tax cash flow between the Shaft Expansion scenario and the Basecase scenario of continuing to mine at 1,200 tpd with ramp only access. After-tax net present value at 5% ($NPV^{5\%}$) is $1,359M (US $1,019M).

Figure 22-2 shows the projected cash flows used in the economic analysis and based on the assumptions in Section 22.1. Table 22-7 shows the detailed results of this evaluation.

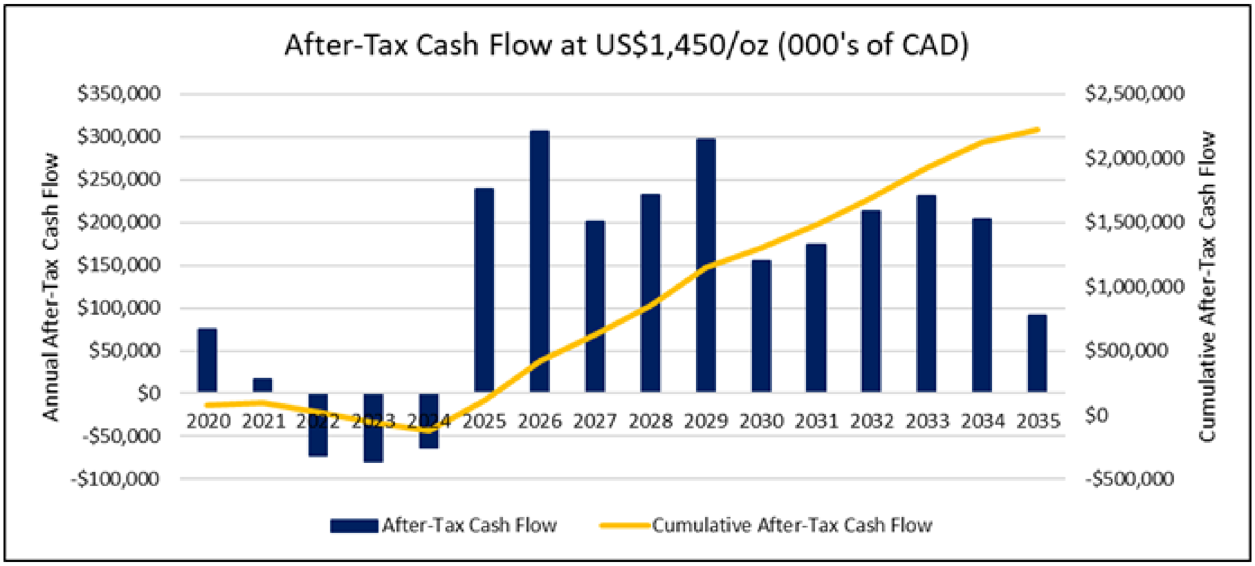


Figure 22-2 Annual and Cumulative After-Tax Cash Flow at USD $1,450 Gold

Table 22-7 Summary of Economic Results

Category	Unit	Value (C$)	Value (US$)
Net Revenues	$M	$6,000	$4,500
Operating Costs[1]	$M	$1,747	$1,310
After-Tax Cash Flow from Operations[2]	$M	$4,253	$3,190
Total Capital & Closure Costs	$M	$1,421	$1,066
Total Cash Cost (2020-2035)	$/oz	$562	$422
Mine Site All-In Sustaining Cost (2020-2035)	$/oz	$798	$598
Total Cash Cost (2026-2035)[3]	$/oz	$542	$406
Mine Site All-In Sustaining Cost (2026-2035)[3]	$/oz	$708	$531
Net After-Tax Cash Flow	$M	$2,212	$1,659
After-Tax NPV[5%]	$M	$1,359	$1,019
After-Tax IRR[4]	%	17%	17%

Notes:

1. *Operating Costs include mining, processing, G&A, royalties, transport & refining costs, and silver credit.*
2. *Cash Flow from Operations includes payable taxes.*
3. *Post-shaft completion in 2025.*
4. *IRR is calculated on the differential after-tax cash flow between the Shaft Expansion scenario and the Basecase of continuing to mine at 1,200 tpd with ramp only access.*

22.9 Sensitivities

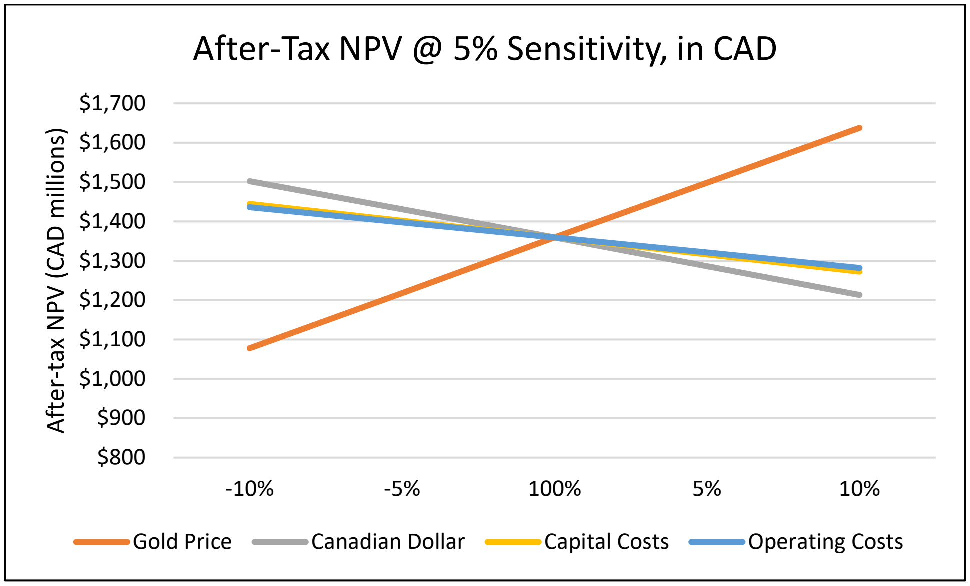
A sensitivity analysis was performed to test value drivers on Island Gold's NPV using a 5% discount rate. The results of this analysis are demonstrated in Table 22-8 and Table 22-9 and illustrated in Figure 22-3. Island Gold proved to be most sensitive to changes in metal price followed by foreign exchange, capital costs and operating costs. A sensitivity analysis of the after-tax results was performed using various gold prices.

Figure 22-4 represents the annual after-tax cash flow and cumulative cash flow at a gold price of USD $1,750.

Table 22-8 After-Tax $NPV^{5\%}$ Sensitivity Results

($M of CAD)	-10%	-5%	100%	5%	10%
Gold Price	$1,078	$1,218	$1,359	$1,499	$1,638
Canadian Dollar	$1,502	$1,431	$1,359	$1,286	$1,213
Capital Costs	$1,445	$1,402	$1,359	$1,317	$1,273
Operating Costs	$1,436	$1,398	$1,359	$1,321	$1,282

($M of USD)	-10%	-5%	100%	5%	10%
Gold Price	$808	$914	$1,019	$1,124	$1,228
Canadian Dollar	$1,127	$1,073	$1,019	$964	$910
Capital Costs	$1,083	$1,051	$1,019	$988	$954
Operating Costs	$1,077	$1,048	$1,019	$991	$961



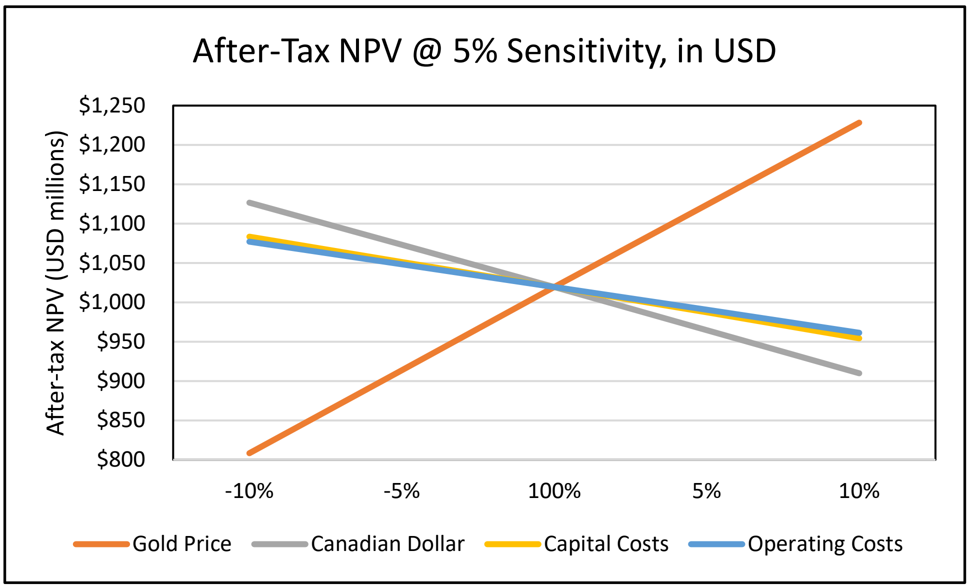


Figure 22-3 After-Tax NPV$^{5\%}$ Sensitivity Results

Table 22-9 Gold Price Sensitivity on NPV

Gold Price	After-Tax NPV (C$M)	After-Tax NPV (US$M)	After-Tax IRR[1] (%)
$1,250	$969	$727	14%
$1,350	$1,165	$874	16%
$1,450	**$1,359**	**$1,019**	**17%**
$1,550	$1,552	$1,164	19%
$1,650	$1,744	$1,308	20%
$1,750	$1,934	$1,450	22%
$1,850	$2,124	$1,593	24%

Notes:

1. *IRR is calculated on the differential after-tax cash flow between the Shaft Expansion scenario and the Basecase of continuing to mine at 1,200 tpd with ramp only access*

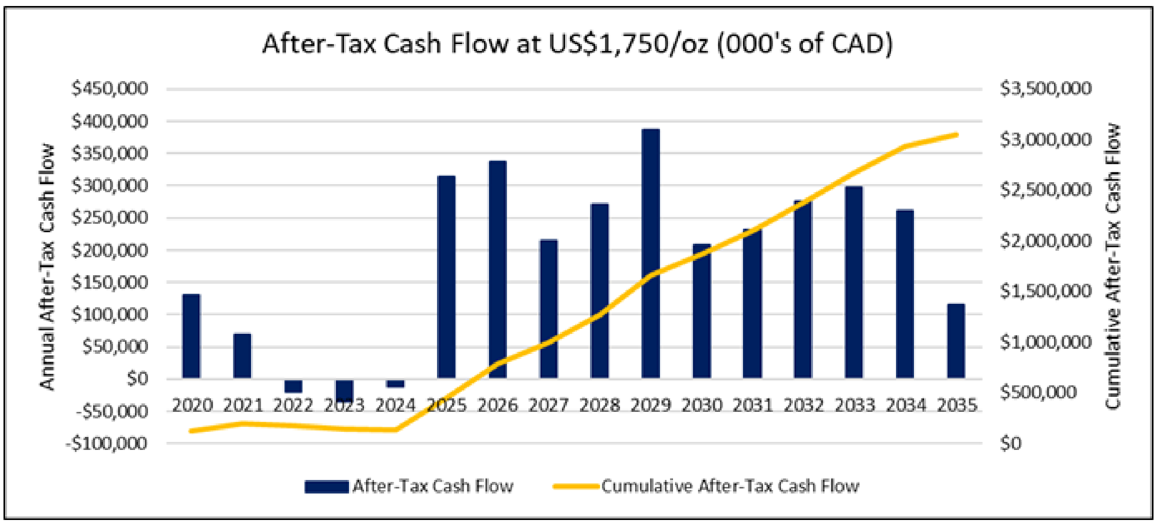


Figure 22-4 Annual and Cumulative After-Tax Cash Flow at USD $1,750 Gold

A summary of the Island Gold financial model is shown in Table 22-10.

Table 22-10 Island Gold Financial Model Summary

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total
Mill Feed Mined (tonnes)	410,593	438,000	437,999	437,994	439,198	557,150	719,805	730,000	731,957	729,934	729,951	730,000	731,947	730,000	721,154	296,654	9,572,336
Waste Mined (tonnes)	342,999	440,063	611,313	688,082	478,034	317,066	336,839	471,093	414,888	371,636	255,838	190,337	32,774	571	-	-	4,951,533
Total Tonnes mined	753,592	878,063	1,049,312	1,126,076	917,233	874,216	1,056,643	1,201,093	1,146,845	1,101,570	985,789	920,337	764,721	730,571	721,154	296,654	14,523,869
Grades (g/t Au)	10.87	10.17	9.85	8.37	9.7	13.08	11.41	9.22	10.62	13.91	8.81	9.37	10.32	11.09	9.6	9.77	10.45
Gold Production (oz)	137,720	138,231	133,802	113,743	132,131	226,081	254,866	208,849	241,279	314,971	199,445	212,271	234,370	251,179	214,715	89,925	3,103,578
Operating Costs																	
Unit Mining Costs (C$/tonne)	$114	$103	$96	$97	$115	$108	$96	$84	$87	$91	$95	$95	$103	$103	$101	$92	$98
Unit Milling Costs (C$/tonne)	$37	$33	$33	$33	$34	$33	$30	$30	$30	$30	$30	$30	$30	$30	$30	$33	$31
Unit G&A Costs (C$/tonne)	$49	$47	$47	$46	$48	$42	$36	$33	$34	$34	$35	$36	$39	$39	$39	$43	$30
Total Unit Operating Costs[1] (C$/tonne)	$214	$195	$188	$188	$211	$200	$177	$159	$165	$175	$173	$174	$187	$187	$183	$179	$182
Total Cash Costs (US$/oz)	$478	$464	$460	$542	$527	$370	$375	$418	$375	$304	$475	$449	$438	$408	$460	$442	$422
Mine-site AISC (US$/oz)	$779	$771	$818	$941	$899	$566	$531	$668	$573	$437	$651	$592	$497	$469	$465	$442	$598
Capital Expenditures																	
Sustaining Capex (US$ M)	$41	$43	$48	$45	$49	$44	$40	$52	$48	$42	$35	$30	$14	$15	$1	-	$548
Growth Capex (US$ M)	$36	$82	$139	$117	$120	$21	-	-	-	-	-	-	-	-	-	-	$514

Notes:

1. *Total unit costs are inclusive of royalties and silver credits.*

23 ADJACENT PROPERTIES

23.1 Magino Mine

The first discovery of gold in the area was in 1918 by J. W. Webb on what is now referred to as the Magino deposit, located about 1 km to the southwest of Island Gold's western property boundary. The deposit is reported to be hosted in the Webb Lake Stock, a quartz porphyritic granodiorite, which intrudes mafic volcanic rocks. Both lithologies occur within the GLDZ and have been highly altered as a result of deformation associated with this structure. Gold is present within subparallel grey quartz veins and in silicified wall rocks of east-west striking shear zones in granodiorite within the GLDZ. According to public records, the Magino mine operated intermittently between 1933 and 1939 during which time 105,792 tonnes of ore at a grade of 2.57 g/t Au were mined producing approximately 8,700 ounces. The mine was closed from 1940 until 1988, when it was reopened by McNellen Resources Inc. ("McNellen") and Muscocho Exploration Ltd. ("Muscocho"). During the 1988 to 1992 period, a total of 696,413 tonnes of ore averaging 4.56 g/t Au was mined using bulk mining methods, producing 105,543 ounces of gold. Golden Goose Resources Inc. ("Golden Goose") acquired the Magino mine property in 1996. In April 2004, Golden Goose filed a Mineral Resource estimate to verify the potential for a large tonnage low grade gold mineralization amenable to open pit mining.

This property was later acquired by Prodigy Gold Inc. ("Prodigy Gold", formed through a union between Golden Goose and Kodiak Exploration Ltd.), which did further exploration and defined an open pit Mineral Resource of 223 million tonnes averaging 0.87 g/t Au for 6.25 million ounces of gold.

In 2012, Argonaut Gold acquired 100% of all issued and outstanding shares of Prodigy Gold. On December 2013, Argonaut announced pre-feasibility study results for the Magino project with after-tax IRR of 18% and total cash flow of US$350 million.

In February 2016, Argonaut announced pre-feasibility study results for the Magino project with after-tax IRR of 22.9% (at a foreign exchange rate (US$: CAD$) of 0.78) and total cash flow of US$715 million. As of February 22, 2016, the Probable Mineral Reserves were 105.4 million tonnes at 0.89 g/t Au for 3.019 million ounces of gold. (JDS Energy & Mining Inc., 2016).

In December 2017, Argonaut released the results of a feasibility study for the Magino Project with after-tax IRR of 19.5% (at a foreign exchange rate (US$: CAD$) of 0.78) and total cash flow of US$540 million. As of December 21, 2017, the Total Proven and Probable Mineral Reserves were 59.0 million tonnes at 1.13 g/t Au for 2.137 million ounces of gold. (JDS Energy & Mining Inc., 2017).

Argonaut is currently conducting an exploration drilling program at Magino focused on targeting high-grade mineralization below the proposed open pit. As of July 28, 2020, Argonaut had completed 34,852 m of drilling as part of the Phase 1 and Phase 2 drill programs (Argonaut Press release dated July 28, 2020).

Argonaut's Magino Property consists of seven patented mining claims, four leases claims, and 69 unpatented mining claims totalling 2,204.5 hectares (Argonaut Gold, https://www.argonautgold.com/English/assets/development/magino/default.aspx).

23.2 Edwards Mine and Cline Mines

The Edwards and Cline Mines are currently owned by Trillium Mining as part of a 5,700 hectare property to the east of the Island Gold Property. No recent work has been reported by Trillium.

23.2.1 Edwards Mine

The Edwards mine property is located to the northeast of Island Gold's eastern boundary and is currently owned by Trillium Mining. The property was originally staked in 1924 by Peter Edwards. In 1933 Gold Lands Syndicate optioned the property and sunk an inclined shaft to a depth of 105 feet. In 1935 Edwards Gold Mines Ltd. acquired the property and deepened the shaft to 300 feet and erected a 75 ton per day mill. During this period 1,573 tons of ore were milled producing 435 ounces of gold (at a recovered grade of 0.31 ounces per ton). Between 1939 and 1960 the property laid dormant, until staked by A. Paquette followed by a number of other company options, until 1986 when it was acquired by Spirit Lake Explorations Ltd. ("Spirit Lake"). In late 1996, River Gold Mines Ltd. ("River Gold") agreed to purchase the two leasehold mining claims comprising the Edwards mine from VenCan Gold Corporation ("VenCan Gold" was formerly Spirit Lake). From 1996 to 2001, River Gold exploited three zones on which VenCan Gold had concentrated its drilling. River Gold ramped down to a depth of 300 m extracting 144,000 ounces of gold. The Edwards mine zones consist of a series of steeply dipping, sub-parallel, mineralized shoots hosted within deformed rocks of the GLDZ. The zones vary in width from 1 m to 5 m and are reported to extend to depth. The deposit was being mined as a low tonnage, high grade operation by River Gold. Ore was stockpiled on site and trucked to River Gold's mill located to the west of Wawa. In July 2001, River Gold closed the Edwards mine and put it on care and maintenance.

In July 2002, The Edwards mine was sold to Strike Minerals Inc. ("Strike"). Strike conducted more than 40,000 feet of drilling on the property that delineated several parallel auriferous quartz vein systems in addition to the vein systems mined in early 2000.

In 2012, Strike dewatered the mine and did some development in the upper portion of the deposit. The deposit has been dewatered to the 140 metre level. Development of the cross-cut on the 60 metre level intersected the Edwards #1 and Edwards #5 zones and Strike planned to continue development on the 60 metre level past the Rusty Weathered Zone to the Plowman #1 and #3 zones. On the 90 metre level, Strike planned to develop the cross-cut through the New North 2, New North 1, Edwards #1, Edwards #5, Rusty Weathered, Plowman #1 and Plowman #3 zones.

In March 2013, Strike announced sampling results from the first lift on the Edwards #1 zone above the 60 metre level. The lift created approximately 225 tonnes of mineralized material. Muck samples at 8 foot intervals from the first lift returned an average grade of 38.98 g/t Au over a 1.5 m width for a length of 24 m. Chip samples taken across the back after removal of the first lift returned a weighted average grade of 15.39 g/t Au over 1.5 m for a length of 24 m. Initial back sampling of the Edwards #1 zone on the 60 metre level returned a weighted average grade of 25.45 g/t Au over 1.5 m for a length of 21 m.

23.2.1.1 *Cline Mine*

The Cline mine, currently owned by Trillium Mining, is located approximately two kilometres northeast of Island Gold's eastern boundary and is northeast of the Edwards mine. The Cline mine zones comprise a series of steeply dipping quartz veins that are hosted by highly carbonated and silicified sheared granodiorite, felsic porphyry, and intermediate volcanic rocks. Deformation is related to splays developing off the of east-west trending Edwards-Cline shear. The gold bearing zone has been identified along a strike length of 150 m and to vertical depths exceeding 200 m. Gold bearing mineralization was discovered on the Cline property in 1918 and extensively explored during the 1920's via two openings. During this period, the No. 1 vertical shaft was sunk to a depth of approximately 45 m and the No. 2 inclined shaft to a depth of approximately 60 m. During the period from 1936 to 1942, additional works on the Cline deposit included development and mining from the No. 4 shaft, sunk to a depth of approximately 360 m. During 1965-1966, a shallower shaft, No. 3, was sunk to a depth of approximately 35 m to complete further exploration. Production from the property is reported at 63,328 ounces of gold and 10,598 ounces of silver from 301,000 tonnes of ore.

23.3 Goudreau Property

The Goudreau property is owned by Manitou Gold Inc. ("Manitou"), and consists of 22,500 hectares consolidated prospective gold properties (Manitou Gold, https://www.manitougold.com/projects/goudreau-property/overview/). The Goudreau Property is located to the east of Trillium Mining's property and extends approximately 37km east towards the past producing Renabie Mine.

24 OTHER RELEVANT DATA AND INFORMATION

There is no other relevant data or information that is material to this report.

25 INTERPRETATIONS AND CONCLUSIONS

25.1 Summary

The completion of the Phase III Shaft Study confirms the technical feasibility and economic viability of the Shaft Expansion.

25.2 Geology and Mineral Resource Estimate

Alamos personnel reviewed and audited the historical exploration data available for the Island Gold Mine as well as the exploration methodologies adopted to generate the data. Exploration work is professionally managed, and procedures are adopted that meet accepted industry best practices. The author is of the opinion that the exploration data is sufficiently reliable to interpret with confidence the boundaries of the gold mineralization and support evaluation and classification of Mineral Resources in accordance with generally accepted CIM Estimation of Mineral Resource and Mineral Reserve Best Practices Guidelines and CIM Definition Standards for Mineral Resources and Mineral Reserves.

The drilling database includes information from 6,411 drill holes (831 form surface and 5,580 from underground) comprising 1,363,350 m of drilling. The Mineral Resource statement effective December 31, 2019 is provided in Table 25-1.

Table 25-1 Island Gold Mineral Resource Estimate Summary as of Dec 31, 2019

Mineral Resource	Tonnes	Grade (g/t Au)	Ounces
Measured	25,200	4.52	3,700
Indicated	853,400	6.57	180,300
Total Measured and Indicated	**878,600**	**6.51**	**184,000**
Inferred	5,392,300	13.26	2,298,000

Notes:

- *CIM definitions of Mineral Resources were followed.*
- *Mineral Resources are estimated at a cut-off grade of 4.03 g/t Au.*
- *High-grade samples were capped at 75 g/t Au for most of the Upper Island Gold zones except IG-E1E and IG-C capped at 100 g/t Au, most of the Goudreau zones except for G2 and G6 capped at 100 g/t Au.*
- *High-grade samples in Lochalsh were capped at 75 g/t Au for E1E, 45 g/t Au for D, 60 g/t Au for C and 55 g/t Au for E2.*
- *In the Lower mine high-grade samples were capped at 90 g/t Au for B, 70 g/t Au for G and GNW, 45 g/t for G1, 50 g/t Au for D and STH, 40 g/t Au for D1, and 160 g/t Au for E1E zones.*
- *Lower C zone has 2 capping grades, at 300 g/t Au inside the HG domain and at 225 g/t Au everywhere else.*
- *Mineral Resources are estimated using a long-term gold price of $1,250 per ounce.*
- *A minimum mining width of 2.00 m was used.*
- *A specific gravity value of 2.78 t/m^3 was used in the Lower Zones and 2.82 t/m^3 otherwise.*
- *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.*
- *Totals may not match due to rounding.*

25.3 Mining Methods and Reserves

The mining methods used at Island Golf include longitudinal open stoping and transverse open stoping and are deemed suitable considering the geometry of the orebody. The summary of Mineral Reserves is contained in Table 25-2.

Table 25-2 Island Gold – Combined Mineral Reserve Estimate as of Dec 31, 2019

Mineral Reserve	Tonnes	Grade (g/t Au)	Ounces
Proven	786,000	13.48	341,000
Probable	2,857,000	9.52	874,000
Total Proven and Probable	**3,643,000**	**10.37**	**1,215,000**

Notes:

- *CIM definitions of Mineral Reserves were followed.*
- *Mineral Reserves are estimated at a cut-off grade of 4.03 g/t Au.*
- *High-grade samples were capped at 75 g/t Au for most of the Upper Island Gold zones except IG-E1E and IG-C capped at 100 g/t Au, most of the Goudreau zones except for G2 and G6 capped at 100 g/t Au.*
- *High-grade samples in Lochalsh were capped at 75 g/t Au for E1E, 45 g/t Au for D, 60 g/t Au for C and 55 g/t Au for E2.*
- *In the Lower mine high-grade samples were capped at 90 g/t Au for B, 70 g/t Au for G and GNW, 45 g/t for G1, 50 g/t Au for D and STH, 40 g/t Au for D1, and 160 g/t Au for E1E zones.*
- *Lower C zone has 2 capping grades, at 300 g/t Au inside the HG domain and at 225 g/t Au everywhere else.*
- *Mineral Reserves are estimated using a long-term gold price of $1,250 per ounce.*
- *A minimum mining width of 2.00 m was used.*
- *A specific gravity value of 2.78 t/m^3 was used in the Lower Zones and 2.82 t/m^3 otherwise.*
- *Totals may not match due to rounding.*

Island Gold performs regular reconciliations between production and the reserve block model and results have generally been within industry acceptable ranges. Island Gold uses the reconciliation process to validate its Mineral Resource estimation parameters and procedures.

Island Gold has undertaken a detailed engineering and economic study of five possible scenarios to mine the Mineral Reserves and Mineral Resources. Island Gold has concluded that constructing a shaft to a depth of 1,373 m and expanding the mining and milling capacity to 2,000 tpd is the best way to proceed.

25.4 Processing

The current 1,200 tpd mill consistently achieves recoveries of greater than 96%. In undertaking the Shaft Expansion, the mill will be expanded to 2,000 tpd with the addition of an additional primary ball mill, modification to the crushing circuit and other upgrades, additions, and expansions within the circuit.

25.5 Infrastructure

As part of the Shaft Expansion and to support sustainable development of mine going forward the following infrastructure upgrade will be undertaken:

- Development of a new production/service shaft down to 1,373 m in depth (initial depth);
- Development/implementation of a new ore and waste handling system underground;

- Upgrade to the main site power supply;
- Constructions of a paste plant and underground distribution system;
- Upgrade to the Tailings Management Facility to suit longer LOM production; and
- Upgrade to mine dewatering and water treatment system.

25.6 Environmental Considerations

The Island Gold Mine is operating within environmental compliance.

A number of operational permits will need to be amended to allow for the expansion up to 2,000 tpd. In addition, a number of other permits will need to be acquired for construction activities. Permitting is expected to take between 18 and 24 months.

The Island Gold Mine has been and will continue to be major contributor to the local economy. Alamos will continue to engage and work with area Indigenous communities and other communities of interest.

25.7 Capital and Operating Costs

Capital and operating costs have been undertaken to a pre-feasibility study level of detail. LOM capital costs for the Shaft Expansion are summarized in Table 25-3. LOM unit operating costs are summarized in Table 25-4.

Table 25-3 Total Capital Costs

Total Capital Cost	LOM C$M	LOM US$M
Sustaining Capital	$736	$552
Growth Capital	$685	$514
Total Capital Costs	**$1,421**	**$1,066**

Table 25-4 Summary of Operating Costs

Operating Cost	C$/t Processed	LOM C$M	US$/t Processed	LOM US$M
Mining	$98	$936	$73	$702
Processing	$31	$300	$24	$225
G&A	$39	$377	$29	$283
Silver Credit	**$168**	**$1,613**	**$126**	**$1,210**
Silver Credit	-$1	-$12	-$1	-$9
Royalties	$15	$146	$11	$109
TOTAL Operating Costs	**$182**	**$1,747**	**$137**	**$1,310**

25.8 Economic Analysis

The Shaft Expansion option is economically viable with an after-tax internal rate of return (IRR) of 17% IRR, which is calculated on the differential after-tax cash flow between the Shaft Expansion scenario and the Basecase scenario of continuing to mine at 1,200 tpd with ramp only access. After-tax net present value at 5% ($NPV^{5\%}$) is $1,359M (US $1,019M).

26 RECOMMENDATIONS

At the conclusion of the Phase III Expansion Study the following recommendations are being made:

- Continue to invest in the surface exploration drilling program to potentially add to the Mineral Resource base.
- Continue with the underground delineation drilling program to convert Inferred Mineral Resources to Indicated Mineral Resources.
- Complete the geology model and deploy it to aid in identifying additional targets on the Island Gold Property.
- Continue with the production to Mineral Reserve reconciliations to further refine Mineral Resource estimation parameters and methodologies.
- Proceed with the paste fill plant construction
- Proceed with the Shaft Expansion project
- Start early works engineering as soon as possible to advance the procurement of long lead time items and help inform the permitting process.
- Continue with the environmental baseline program to support the permitting program.
- Initiate the process of amending existing operational permits and acquire a series of new permits and/or authorizations for both future operational requirements and Phase III construction related activities.

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28 UNITS OF MEASURE, ABBREVIATIONS, ACRONYMS

Abbreviations and Acronyms

AACE	Association for the Advancement of Cost Engineering International
AAS	Atomic Adsorption Spectroscopy
AEP	Annual Exceedance Probability
Ag	Silver
Ai	Abrasion Index
ALS	ALS Global
AP	Acid Potential
AP	Acid Potential
API	Algoma Power Inc.
AQTK	Drill Core Size (35.5 mm diameter)
ARD	Acid Rock Drainage
ASL	Analytical Solutions Ltd.
Au	Gold
BQ	Drill Core Size (36.4 mm diameter)
BWI	Ball Mill Work Index
CAD	Canadian dollars
CAPEX	Capital and Sustaining Capital Expenditure
CCR	Central Control Room
CIL	Carbon-In-Leach
CIL	Carbon in Leach
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CIP	Carbon-In-Pulp
CIP	Carbon in Pulp
CN	Cyanide
CO_{2e}	Carbon Dioxide Equivalent
CRF	Cemented Rock Fill
CRM	Certified Reference Materials
CSS	Close Size Setting
CV	Coefficient of Variation
DFO	Fisheries and Oceans Canada
ECA	Environmental Compliance Approval
EEM	Environmental Effects Monitoring
ENDM	Ministry of Energy, Northern Development and Min
EPCM	Engineering Procurement and Construction Management
ESA	Endangered Species Act
FAR	Fresh Air Raise
Fe	Iron

G&A	General and Administrative
G&A	General and Administrative
GHG	Green House Gases
GLDZ	Goudreau Lake Deformation Zone
GPS	Global Positioning System
ICP	Inductively Coupled Plasma
ID2	Inverse Distance Weighting Method
IRR	Internal Rate of Return
ISO	International Standards Organization
LHD	Load Haul Dump
LiDAR	Light Detection and Ranging
LOM	Life of Mine
MDL	Method Detection Limit
MDL	Method Detection Limit
MECP	Ministry of the Environment and Conservation and Parks
MENDM	Ministry of Energy, Northern Development and Mines
MGB	Michipicoten Greenstone Belt
MLF	Maskinonge Lake Fault
MNRF	Ministry of Natural Resources and Forestry
N’	Geotechnical Parameter
NaCN	Sodium Cyanide
Non-PAG	Not-Potentially Acid Generating
NP	Neutralizing Potential
NPI	Net Profit Interest
NPR	Neutralization Potential Ratios
NPV	Net Present Value
NQ	Drill Core Size (47.6 mm diameter)
NSR	Net Smelter Return
OK	Ordinary Kriging
OPEX	Operating Expenditure
OREAS	Ore Research and Exploration Pty Ltd Assay Standards
OWL	Operating Water Level
PAG	Potentially Acid Generating
PR	Provincial Road
PTTW	Permit to Take Water
PWQO	Provincial Water Quality Objectives
PWQO	Provincial Water Quality Objectives
Q’	Geotechnical Parameter
QA	Quality Assurance
QC	Quality Control
QP	Qualified Person

RAR	Return Air Raise
RMR	Rock Mass Rating
ROM	Run of Mine
RPA	Roscoe Postle Associates
RQD	Rock Quality Designation
SAB	SAG and Ball Mill
SAG	Semi-Autogenous Grinding (mills)
SAR	Species at Risk
SARA	Species at Risk Act
SD	Standard Deviation
SQL	Structured Query Language
TMF	Tailings Management Facility
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
UCF	Unconsolidated Rock Fill
UCS	Uniaxial Compressive Strength
UDS	Underground Distribution System
URSTM	Unité de Recherche et de Service en Technologie Minérale
USD	United States Dollars
VLD	Very Low Frequency
VOD	Ventilation on Demand
vs.	Versus
WI	Work Index
WMP	Waste Management Procedure
WTP	Water Treatment Plant

Units of Measure

˚	Degrees
˚C	Degrees Celsius
cfm	Cubic feet per minute
µg/m^3	Microgram per cubic metre
µm	Micrometer
µm	Micrometre (Micron)
g	gram
g/L	Grams per litre
g/t	Grams per tonne
h	Hours
ha	Hectare
hp	Horsepower

K	Thousand
kg	Kilogram
km	Kilometre
km^2	Square kilometre
kt	Thousand tonnes
kW	Kilowatt
KWh	Kilowatt hour
L	Litre
m	Metre
M	Million
m^3	Cubic metre
Ma	Millions of Years Before Present
masl	Metres above sea level
mg/L	Milligram per litre
min	Minute
mL	Millilitre
mm	Millimetre
MVA	Megavolt amperes
MW	Mega Watt
MWh	Megawatt-hours
oz	Troy ounce
oz	Ounce
Pa	Pascal
pH	Measure of a solution's acidity
ppb	Parts per billion
ppm	Parts per million
t	Tonne
t/m^3	Tonne per cubic metre
tpd	Tonne per day
V	Volt
w/w	Weight for weight
wt%	Weight percent
y	Year

29 CERTIFICATES OF QUALIFIED PERSONS

CERTIFICATE OF QUALIFIED PERSON

I, Raynald Vincent, P.Eng., M.G.P., as an author of this report entitled “NI 43-101 Technical Report for the Island Gold Mine, Dubreuilville, Ontario, Canada” prepared for Alamos Gold Inc. and dated August 31, 2020, do hereby certify that:

1. I am a Geological Engineer employed as Chief Geologist of the Island Gold Mine by Alamos Gold Inc., located at Goudreau Road, Dubreuilville, Ontario.
2. I received a bachelor in Geological Engineering from the University of Laval (Quebec, Canada) in 1983 and a Master’s in Project Management from the University of Quebec in Abitibi-Témiscamingue (Quebec, Canada) in 2002;
3. I am a registered member of the Ordre des Ingénieurs du Québec (OIQ licence no 42761) and a member of the Professional Engineers of Ontario (PEO licence no 100210071). I have worked as an Engineer for more than 30 years since my graduation. I have worked mainly in exploration and production geology in the mining industry for different companies with increasing levels of responsibilities.
4. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
5. I have worked at the Island Gold Mine for the last six years.
6. I am the author of Sections 4 to 12, 14, and 23, and co-author of Sections 1, 2, 3, 15 and 24 to 27 of the NI 43-101 report entitled “NI 43-101 Technical Report for the Island Gold Mine, Dubreuilville, Ontario, Canada " dated August 31, 2020.
7. I have no personal knowledge, as of the date of this certificate, of any material fact or change, which is not reflected in this report;
8. I have been an employee of Alamos Gold Inc. since January 2009, first as Senior Geologist and later as Chief Geologist;
9. I have prepared this Technical Report in compliance with National Instrument 43-101 and in conformity with generally accepted Canadian mining industry practices. As of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
10. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Dated this 31st day of August 2020

(Signed & Sealed) “Raynald Vincent”

(Original signed and sealed)

Raynald Vincent, P.Eng. M.G.P. (OIQ no. 42761, PEO no 100210071)

CERTIFICATE OF QUALIFIED PERSON

I, Nathan Eugene Gerard Bourgeault, M.Eng, P.Eng., PMP as an author of this report entitled “NI 43-101 Technical Report for the Island Gold Mine, Dubreuilville, Ontario, Canada” prepared for Alamos Gold Inc. and dated August 31, 2020, do hereby certify that:

11. I am a licensed Mining Engineer employed as Chief Engineer of the Island Gold Mine, located at Goudreau Road, Dubreuilville, Ontario.
12. I received a Bachelor of Engineering in Mining Engineering from Laurentian University (Ontario, Canada) in 2007 and a Master of Engineering with a specialization in Natural Resources Engineering from Laurentian University (Ontario, Canada) in 2014;
13. I am a registered member of the Professional Engineers of Ontario (PEO licence no 100149936). I have worked as an Engineer for more than 13 years since my graduation. I have worked mainly in project development and operations in the mining industry for different companies with increasing levels of responsibilities.
14. I have read the definition of “qualified person” set out in National Instrument 43-101 (“NI 43-101”) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.
15. I have worked at the Island Gold Mine for the last three years.
16. I am the author of Sections 13, 16, 17, 18, 19, 21 and 22 and co-author of Sections 1, 2, 3, 15 and 24 to 27 of the NI 43-101 report entitled “NI 43-101 Technical Report for the Island Gold Mine, Dubreuilville, Ontario, Canada " dated August 31, 2020.
17. I have no personal knowledge, as of the date of this certificate, of any material fact or change, which is not reflected in this report;
18. I have been an employee of Alamos Gold Inc. since November 2017, first as Senior Production Engineer and later as Chief Engineer;
19. I have prepared this Technical Report in compliance with National Instrument 43-101 and in conformity with generally accepted Canadian mining industry practices. As of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
20. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Dated this 31st day of August 2020

(Signed & Sealed) “Nathan Eugene Gerard Bourgeault”

(Original signed and sealed)

Nathan Eugene Gerard Bourgeault, P.Eng. (PEO no 100149936)

ALAMOS GOLD INC.

CERTIFICATE OF QUALIFIED PERSON

I, Colin Webster, P. Eng., as an author of this report entitled "NI 43-101 Technical Report for the Island Gold Mine, Dubreuilville, Ontario, Canada" prepared for Alamos Gold Inc. and dated August 31, 2020, do hereby certify that:

21. I am an Environmental Engineer employed as Vice President Sustainability & External Affairs for Alamos Gold Inc. located at 181 Bay Street, Suite 3910, Toronto, Ontario, M5J 2T3;
22. I received a Bachelor of Science in Mining Engineering from in Queen's University (Kingston, Ontario) in 1990 and a diploma in Environmental Technology from Fanshawe College (London, Ontario) in 1994;
23. I am a registered member of the Professional Engineers of Ontario (PEO licence no 90498825). I have worked as an Engineer for more than 23 years since my graduation. I have worked mainly in environmental management and sustainability within the mining and consulting industries for different companies with increasing levels of responsibilities.
24. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
25. I have worked at Alamos Gold Inc. for the last four years.
26. I am the author of Section 20 of the NI 43-101 report entitled "NI 43-101 Technical Report for the Island Gold Mine, Dubreuilville, Ontario, Canada " dated August 31, 2020.
27. I have no personal knowledge, as of the date of this certificate, of any material fact or change, which is not reflected in this report;
28. I have been an employee of Alamos Gold Inc. since January 2016 as Vice President Sustainability & External Affairs;
29. I have prepared this Technical Report in compliance with National Instrument 43-101 and in conformity with generally accepted Canadian mining industry practices. As of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
30. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public.

Dated this 31st day of August 2020

(Signed & Sealed) "Colin Webster"

(Original signed and sealed)

Colin Webster, P.Eng. (PEO no 90498825)