Technical Report for the Madsen Gold Project - Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates

for Pure Gold Mining Inc.
Red Lake Area, Ontario, Canada

Located at: 93°54'58" W Longitude, 50°57'58" N Latitude

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1. Executive Summary

The Madsen Gold Project is an advanced gold exploration project in northeastern Ontario. Pure Gold Mining Inc. ("Pure Gold") announced the positive results of a Preliminary Economic Assessment ("PEA") on the Project, conducted by Nordmin Engineering Ltd. ("Nordmin"), on September 14, 2017 and filed a technical report summarizing the details of the study on October 30, 2017. Subsequently, Pure Gold announced the results of a maiden Mineral Resource estimate for two satellite deposits on the Madsen Property on December 14, 2017. These two satellite deposits occur in close proximity to the Madsen Mineral Resources but are not included in the Potentially Mineable Resource considered in the previously disclosed PEA, and the PEA remains current. This report restates the PEA in its entirety and provides an update on exploration activities on the Project and a summary of the Mineral Resource estimate for the two satellite deposits.

The Madsen Gold Project located in the Red Lake district of Northwestern Ontario, approximately 440 km Northwest of Thunder Bay, Ontario, 260 km east-northeast of Winnipeg, Manitoba and 10 km south-southwest via provincial highway ON-618 S from the Municipality of Red Lake. The Project is adjacent to the village of Madsen and centred at approximately 93.91 degrees longitude west and 50.97 degrees latitude north. Access to the Project site is via the Mine Road off ON-168 S and access to Red Lake is via ON-105 N from the Trans-Canada Highway/ON-17 and via commercial airline flying into the Red Lake Municipal Airport.

The Madsen Gold Project, which is 100% owned by Pure Gold is centred around an historical gold producer, the Madsen Mine, which produced 2.5 million ounces at an average grade of 9.7 g/t gold (7.9 million tonnes) between 1938 and 1999 (Lichtblau et al., 2017). The Madsen Gold Project comprises a contiguous group of 258 mining leases, mining patents and unpatented mining claims covering an aggregate area of 4,769 hectares (47.7 km^2). Infrastructure includes paved highway access, a mill and tailings facility and access to power and water.

The Madsen Gold Project is focused on exploration and delineation of highly deformed orogenic gold deposits within mafic and ultramafic volcanic and intrusive rocks of the Archean Red Lake Greenstone Belt which is part of the Uchi subprovince of the Superior Province craton. This greenstone belt has been a significant gold producer with continuous production since 1927 including present-day production at the Red Lake Gold Mines operation of Goldcorp Inc. Pure Gold has been actively exploring the Madsen Gold Project since 2014, and in 2017 permitted and initiated an advanced exploration program including re-entry of the underground workings and underground exploration.

This PEA was prepared by independent consultants Darcy Baker, Ph.D., P.Geo., of Equity Exploration Consultants Ltd., Gilles Blais, P. Eng. of Nordmin Engineering Ltd., John Folinsbee, P. Eng., of Heads Ore Tails Metallurgical Consulting Inc., Marc Jutras, P. Eng., of Ginto Consulting Inc., and Roy Levesque, P. Eng. of Nordmin Engineering Ltd.

1.1 Mineral Resource Estimate

The current mineral resources of the Madsen Gold Project were estimated by Ginto Consulting Inc. The Madsen property drill hole database is comprised of 14,627 holes with 1,145,777 m of drilling. Significant drilling has been completed by Pure Gold from 2014 to 2017 both in areas drilled by previous operators and in new areas. The mineral resources were estimated with an ordinary kriging technique on capped composited gold assays. Table 1.1 summarizes the mineral resources.

Table 1.1: Mineral Resource Statement for Madsen Gold Project [1,2,3,4] - Effective December 14, 2017

Deposit	Indicated			Inferred		
	Tonnage tonnes	Au Grade g/t	Au Content ounces	Tonnage tonnes	Au Grade g/t	Au Content ounces
Madsen	5,785,000	8.86	1,648,000	587,000	9.42	178,000
Fork	194,000	6.47	40,000	255,000	5.76	47,000
Russet South	259,000	6.70	56,000	322,000	6.82	71,000

[1] *Mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent*.

[2] *Mineral resources that are not mineral reserves do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resources estimated will be converted into mineral reserves. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues*.

3 The 2014 CIM Definition Standards were followed for the classification of indicated and inferred mineral resources. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there has been insufficient exploration to define these inferred mineral resources as an indicated mineral resource. It is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated mineral resources with further exploration.

[4] *All figures in Table 1.1 have been rounded to the nearest thousand to reflect the relative accuracy of the estimates.*

1.2 Preliminary Economic Assessment

The newly estimated Russet South and Fork deposit mineral resources lie outside of the footprint of the PEA mine plan and economic evaluation.

The diluted potentially mineable underground resource considered for this study is estimated to be approximately 3,000,000 tonnes at a grade of 10.3 g/t Au and is sourced solely from the Madsen deposit. The Preliminary Economic Assessment includes both Indicated Mineral Resource (93% of the total tonnes) and Inferred Mineral Resource. Table 1.2 shows a breakdown of the potentially mineable resource.

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Table 1.2: Mineral Resource (Mine Diluted) Included in PEA Mine Plan*

Resource Classification	Tonnes	Au (g/t)	Recovered ounces
Indicated	2,391,512	11.56	826,977
Inferred	187,407	14.98	84,520
Total dilution	415,598		

**Mineral resources that are not mineral reserves do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Initial disclosure of mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent. For the purpose of the PEA, mine diluted mineral resources are reported with a variable cut-off grade dependent on individual stoping areas, a US$1,275 per troy ounce gold, and gold metallurgical recoveries of 92 percent.*

Mill recovery rates are estimated at 92%, which results in 911,497 ounces of recoverable gold based on the current estimated potentially mineable resource.

It should be noted that the Preliminary Economic Assessment is preliminary in nature and that it includes Inferred Mineral Resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as Mineral Reserves. For the PEA, the metallurgical recovery is based on early stage test work and historic production records. In addition, the cost projections range in accuracy from PEA to Feasibility level. Therefore, there is no guarantee that the economic projections contained in this Preliminary Economic Assessment would be realized.

The PEA as envisioned includes an underground mining operation relying heavily on the existing mining, milling and tailings management infrastructure at the Madsen Gold Project. Primary access will be via the existing Madsen portal, which is located approximately one kilometre from the existing mill, and provides ramp access to the top 150 vertical metres of the mine workings. The PEA mine plan includes further ramp development to access the 24 main levels of the mine and below the existing shaft. The existing Madsen shaft would be used for ventilation and a second means of egress via the manway located in the shaft.

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Table 1.3 illustrates the key economic parameters used for the Preliminary Economic Assessment and Table 1.4 demonstrates the PEA Sensitivity to the price of gold.

Table 1.3: PEA Parameters

Parameters	Units
Gold Price	US$1,275/oz.
Exchange Rate (US$ to C$)	1.25
Total Resource Tonnes Mined / Milled	2.99 million
Processing Rate	600 t/d
Diluted Head Grade	10.3 g/t
Gold Recovery Rate	92%
Mine Life	13.8 years
Total Gold Ounces Recovered	**911,497 oz.**
Average Annual Gold Production	66,109 oz.
Peak Annual Gold Production	85,411 oz.
Pre-production Capital Cost	$50.9 million
Sustaining Capital Cost (Life of Mine)	$134.7 million
Unit Operating Costs (per tonne processed)	
Mining Costs	$155/tonne
Processing Costs	$28/tonne
G&A	$43/tonne
LOM Average Cash Cost(1)	US$595/oz.
LOM Cash Cost plus Sustaining Cost	US$714/oz.
Royalties	None
Corporate Income Tax / Ontario Mining Tax	25% / 10%

(1) Cash cost includes mining cost, mine-level G&A, mill and refining cost

Table 1.4: PEA Sensitivities

Gold Price (US$/oz.)	$1,175	$1,225	$1,275	$1,325	$1,375
Pre-Tax NPV5% (C$ million)	$289	$327	$365	$403	$442
After-Tax NPV5% (C$ million)	$205	$232	$258	$285	$311
Pre-Tax IRR	44%	49%	54%	59%	64%
After-Tax IRR	38%	42%	47%	51%	56%

1.3 Capital and Operating Costs

The capital costs were prepared from first principles and using information and costs of recent projects of similar scale and magnitude. Pre-production capital costs are estimated at $44.3 million with the majority of the costs being associated with mill refurbishment as well as ramp and surface development. Additional capital cost requirements include surface installations and a new ventilation and pumping system that will utilize the existing shaft. Pre-production capital will be minimized by utilizing existing infrastructure, including a 600 tonne per day mill with carbon-in-pulp (CIP) circuit and tailings management facility. The PEA mine plan includes further ramp development to access the 24 levels of the mine and below the existing shaft. Existing workings would be rehabilitated and used as access development where possible.

Underground mining and haulage is anticipated to be accomplished by contract mining companies using their own equipment, conducted 365 days per year. Electrical grid power will provide power to the project over the life of the mine. The site is currently serviced by 44 kV power.

LOM sustaining capital costs are estimated at $127.1 million with the majority of the costs being associated with ramp development, slashing existing workings, and new access development. Table 1.5 summarizes the Capital Costs estimated for the PEA.

Table 1.5: Capital Costs (millions of dollars)

Capital Costs	Pre-Production	Sustaining	Total
Surface Infrastructure	$3.5	$1.0	$4.5
Mining Infrastructure	$14.3	$108.6	$122.9
Mobile Equipment	$1.6	-	$1.6
Ventilation	$5.8	$11.3	$17.1
Electrical	$2.4	-	$2.4
Mill and Tailings Management Refurbishment	$9.6	$2.9	$12.5
Water Management	$5.9	-	$5.9
Other	$1.3	$3.3	$4.6
Subtotal	**$44.3**	**$127.1**	**$171.4**
Contingency %	15%	5%	8%
Contingency	$6.6	$7.6	$14.2
Total Capital Costs	**$50.9**	**$134.7**	**$185.6**

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Table 1.6 summarizes the estimated operating costs for the PEA.

Table 1.6: Operating Costs

Operating Costs	$/t processed	$/oz.	US$/oz.
Mining Cost	$155	$511	$409
Processing Cost	$28	$93	$74
G&A Cost	$43	$141	$112
Total Cash Cost(1)	**$227**	**$745**	**$595**
Sustaining Capital	$45	$148	$118
Cash Cost plus Sustaining Capital	**$272**	**$892**	**$714**

(1) Cash cost includes mining cost, mine-level G&A, mill and refining cost

1.4 Mining and Processing

The PEA is based on all ramp and level waste development being performed by a mining contractor using two boom electric hydraulic drill jumbos, 2.7m^3 bucket LHDs, 20 tonne haul trucks, scissor lifts/bolters and other rubber tired diesel-powered support equipment. The total LOM waste development is summarized below in Table 1.7.

Table 1.7: Waste Development in PEA Mine Plan

Waste Development	Metres
Ramp	17,164
Slash	9,781
Ventilation Raise	1,232
Access Development	10,955
Total	**39,132**

The PEA considers refurbishing the existing mill and tailings management facility which have been on care and maintenance since 1999. Mill production of 600 tonnes per day is assumed achievable by modernizing controls and instrumentation of the reagent and grinding circuits. Mill and tailings dam refurbishment is estimated to be $12.5 million, of which $9.6 million is included as a pre-production capital cost item and the remainder is sustaining capital.

The mill consists of a single stage crushing circuit and a two-stage grinding circuit, followed by cyanide leaching. The leached gold is collected in a CIP circuit, and is subsequently stripped using mild caustic, then collected on stainless steel mesh cathodes by electrowinning. The product from electrowinning is refined into doré bars in an induction furnace.

A 92% gold recovery was assumed for the PEA, based on the historical average recovery rate of the mill when it operated intermittently from 1997 to 1999. The Company's existing permits, including the Environmental Compliance Approval, allow for operation of a 1,089 tonne per day mill and CIP circuit with discharge of treated tailings to the existing tailings facility. Some of these permits will need to be updated or amended for the new mine plan. Additional work is required to determine optimum processing rates.

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1.5 Conclusions

The Madsen Gold Project provides positive economic returns. Significant capital cost savings can be achieved from the permitted processing infrastructure that currently exists on site. Table 1.8 summarizes the estimated returns for the Madsen Gold Project.

Table 1.8: PEA Highlights

Pre-Tax $NPV_{5\%}$	\$365 million
Pre-Tax IRR	54%
Payback Period	2.7 Years
After-tax $NPV_{5\%}$	\$258 million
After-tax IRR	47%
Payback Period	2.8 years

1.6 Recommendations

The PEA supports that the Madsen Gold Project has the potential to be economically viable. The results of the PEA warrant additional exploration focused on expansion of the potentially mineable resource including conversion of inferred resources to measured and indicated, although there is no certainty that further drilling will enable resources to be converted. It is recommended that feasibility level studies be initiated including current and new drilling information. In parallel with this engineering and geoscience work, environmental baseline study and permitting should continue to be advanced.

Additional opportunities also include optimizing the mine plan to consider future potential mineral resources outside the scope of this PEA, optimizing the mill and CIP circuit processing rate including the potential to increase the mill throughput rate to 1,089 tonnes per day allowed for under the existing Environmental Compliance Approval and optimizing gold recovery.

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2. Introduction

2.1 Terms of Reference

This technical report was prepared by Nordmin for Pure Gold Mining to summarize the results of a Preliminary Economic Assessment of the Madsen Gold Project. This report was prepared in accordance with the National Instrument 43-101 guidelines set out by the Canadian Securities Administrators and is considered effective September 14, 2017.

Pure Gold is a junior mineral exploration and development company listed on the TSX-Venture Exchange (PGM) with their head office at:

Suite 1900 – 1055 West Hastings
Vancouver, BC
Canada, V6E 2E9
Phone: 604-646-8000

2.2 Sources of Information

This PEA has been prepared by independent consultants who are Qualified Persons under NI 43-101 definitions. Subject to the conditions and limitations set forth herein, the independent consultants believe that the qualifications, assumptions and the information used by them is reliable and efforts have been made to confirm this to the extent practicable. However, none of the consultants involved in this study can guarantee the accuracy of all information in this report.

This report is based, in part, on internal company technical reports, maps and reports of other independent consultants, published government reports, company memoranda, and public information as listed in Section 27 references.

A draft copy of this Report has been reviewed for factual errors by Pure Gold regarding the company and history of the property, and the geological resource estimate dated August 2, 2017 prepared by Ginto Consulting Inc. Nordmin has relied on Pure Gold's historical and current knowledge of the Madsen Gold Project and work performed thereon. Any statements and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are not false and misleading at the date of this report.

2.3 Resources

This PEA is preliminary in nature and is based on both Indicated Mineral Resource and Inferred Mineral Resource. Inferred Mineral Resources are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that the results predicted by this PEA would be realized. The resources considered for this study are a subset of the total current resource for the Madsen Gold Project. The newly estimated Russet South and Fork deposit mineral resources lie outside of the footprint of the PEA mine plan and economic evaluation.

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2.4 Site Visits

Mr. John Folinsbee, P. Eng., of Heads Ore Tails Metallurgical Consulting visited the site in early 2013. Dr. Darcy Baker, P.Geo., of Equity Exploration visited the site numerous times since 2014 and most recently on November 9, 2017. Marc Jutras P.Eng., visited the Madsen Gold Project on August 30, 2017.

2.5 Currency

All dollar values are in Canadian dollars ($CAD) unless otherwise stated. An exchange rate of $1USD = $1.25CAD was used for the financial analysis.

2.6 Glossary of Terms

Abbreviation	Meaning
°C	Degrees Celsius
$ and CAD$	Currency of Canada
AA	Atomic Absorption (assay method to measure metal content)
Ag	Silver
Au	Gold
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
Cu	Copper
CPUE	Catch-per-unit-effort
DDH or ddh	Diamond Drill Hole
DMS	Dense Media Separation
EA	Environmental Assessment
EIS	Environmental Impact Statement
el	elevation
EM	Electromagnetic
EPR	Environmental Permitting Regulations
Ga	Billion years ago
g	gram
g/t	grams per tonne
GRG	Gravity Recoverable Gold
ha	hectare
hp	horsepower
HMY	High Mass Yield
ICP	Inductively Coupled Plasma (geochemical test method)
IK	Indicator Kriging (block model type)
IP	Induced Polarization (geological survey method)
IRR	Internal rate of return
JV	Joint Venture
km	kilometre
kg	kilogram
kg/t	kilograms per tonne
kV	kilovolts
LCS	Local Coordinate System
LOI	Letter of Intent
LOM	Life of Mine

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Abbreviation	Meaning
m	metre
m^3	cubic metre
m^3/s	cubic metres per second
mm	millimetre
µm	micrometre
Ma	millions of years
Mt	millions of tonnes
N	North
NN	Nearest neighbour (block model type)
NPV	Net Present Value
NSR	Net Smelter Return
NTS	National Topographic System
NW	Northwest
oz.	Troy Ounces (1 troy oz. = 31.1034 g)
P. Eng.	Professional Engineer
P. Geo.	Professional Geoscientist
PEA	Preliminary Economic Assessment
PMA	Particle Mineral Analysis
PMR	Potential Minable Resource
ppm	parts per million
QP	Qualified Person
S	South
SE	Southeast
SG	Specific Gravity
SMU	Smallest Mining Unit
SW	Southwest
t	tonne (metric)
TMF	Tailings Management Facility
UTM	Universal Transverse Mercator
V	Volt
VLF-EM	Very Low Frequency Electromagnetic Survey
W	West
WCS	World Coordinate System

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3. Reliance on Other Experts

This technical report was prepared for Pure Gold Mining Inc. (TSX Venture: PGM) for the 100% owned Madsen Gold Project ("Madsen") in the Red Lake mining district of Ontario Canada.

Nordmin has assumed, and relied on the fact, that all the information and existing technical documents listed in the References Section 27 of this Report are accurate and complete in all material aspects. While Nordmin carefully reviewed all the available information presented, we cannot guarantee its accuracy and completeness.

In section 20, it is assumed that copies of the operating licenses and permits that were presented and reviewed are current. Nordmin did not independently verify the operating licenses and permits or legality of any underlying agreement(s) that may exist concerning the licenses or other agreement(s) between third parties.

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Table 3.1: Sections for Which Each Author Takes Responsibility*

Section	Title	Qualified Person	Company
01	Summary	Roy Levesque, P.Eng	Nordmin Engineering
02	Introduction	Roy Levesque, P.Eng	Nordmin Engineering
03	Reliance on Other Experts	Roy Levesque, P.Eng	Nordmin Engineering
04	Property Description and Location	Darcy Baker, P.Geo	Equity Exploration
05	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Roy Levesque, P.Eng	Nordmin Engineering
06	History	Darcy Baker, P.Geo	Equity Exploration
07	Geological Settings and Mineralization	Darcy Baker, P.Geo	Equity Exploration
08	Deposit Types	Darcy Baker, P.Geo	Equity Exploration
09	Exploration	Darcy Baker, P.Geo	Equity Exploration
10	Drilling	Darcy Baker, P.Geo	Equity Exploration
11	Sample Preparation, Analyses and Security	Darcy Baker, P.Geo	Equity Exploration
12	Data Verification	Darcy Baker, P.Geo	Equity Exploration
13	Mineral Processing and Metallurgical Testing	John Folinsbee	Head Ore Tails
14	Mineral Resource Estimate	Marc Jutras	Ginto
15	Mineral Reserve Estimate	N/A	
16	Mining Methods	Roy Levesque	Nordmin Engineering
17	Recovery Methods	John Folinsbee	Head Ore Tails
18	Project Infrastructure	Gilles Blais, P.Eng, PMP	Nordmin Engineering
19	Market Studies and Contracts	Roy Levesque, P.Eng	Nordmin Engineering
20	Environmental Studies, Permitting and Social or Community Impact	Roy Levesque, P.Eng	Nordmin Engineering
21	Capital and Operating Costs	Roy Levesque, P.Eng	Nordmin Engineering
22	Economic Analysis	Roy Levesque, P.Eng	Nordmin Engineering
23	Adjacent Properties	Darcy Baker, P.Geo	Equity Exploration
24	Other Relevant Data and Information	Roy Levesque, P.Eng	Nordmin Engineering
25	Interpretation and Conclusion	Roy Levesque, P.Eng	Nordmin Engineering
26	Recommendation	Roy Levesque, P.Eng	Nordmin Engineering
27	References	Roy Levesque, P.Eng	Nordmin Engineering

**Sections 1, 25 and 27 are compiled by the author (Nordmin) but the other report contributors listed within the table have contributed to these sections.*

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4. Property Description and Location

4.1 Mineral Tenure

The Madsen Gold Project comprises a contiguous group of 259 mining leases, mining patent claims and unpatented mining claims covering an aggregate area of 4,769 hectares (47.7 km^2) in northwestern Ontario (Figure 4-1). The Property is centred at 50.97˚ North latitude and 93.91˚ West longitude (UTM Projection NAD83, Zone 15 North coordinates 5646000N, 435000E) within the Baird, Heyson and Dome Townships of the Red Lake Mining District. Claim data is summarized in Table 4.1 and shown in Figure 4-2.

Figure 4-1: Madsen Gold Project location map. *Provided by Pure Gold, September 10, 2017.*

Pure Gold owns 100% of all mining leases, patents and unpatented claims comprising the Madsen Gold Project. Other than the royalties described in Table 4.2, the authors are unaware of any other royalties, back-in rights, payments or other agreements and encumbrances to which the property is subject. None of the royalties described apply to tenure covering the current mineral resource statement.

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Unpatented mining claims confer title to hard-rock mineral tenure only, and claims must be converted to leases before mining can take place. Their boundaries are defined by the physical location of claim posts on the ground and were surveyed in 2017. Annual assessment work valued at $400 per claim unit (generally each claim unit measures 16 ha) must be carried out to maintain unpatented mining claims in good standing. Significant work credits exist on these claims or adjacent patent claims. Work credits can be transferred from adjoining claims.

Patented mining claims ("patents") confer fee-simple rights to hard-rock mineral tenure and allow extraction and sale of minerals. Most of the Pure Gold patents also include the surface rights above the mineral tenure; some easements for municipal services have been granted and a few claims have other surface owners. Typically, boundaries of mining patents are defined by legal surveys done prior to patenting. Patents do not require assessment work but are subject to an annual Mining Land Tax of approximately $4/ha.

Unpatented mining claims can be converted to mining leases which grant the right to extract and sell minerals for a renewable period of 21 years. Surface rights can be granted with the mining lease if they were previously held by the Crown; if not, an agreement with the surface rights owner must be completed as part of the leasing process. Boundaries of mining leases are defined by legal surveys done at the time of lease conversion. Leases do not require assessment work but are subject to an annual rent of $3/ha.

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Table 4.1: Tenure data

Claim No.	No. of Claims	Area (ha)	Type		Claim No.	No. of Claims	Area (ha)	Type
	Madsen Mine					Aiken		
11502 – 11509	8	158	Patented		19367 – 19368	2	32	Patented
11509A	1	17	Patented		19719 – 19720	2	35	Patented
12521 – 12529	9	158	Patented		21316 – 21318	3	55	Patented
12527A	1	19	Patented		21316A	1	25	Patented
12601 – 12605	5	99	Patented		19684 – 19688	5	94	Patented
12638 – 12641	4	97	Patented		19278 – 19281	4	90	Patented
12658 – 12663	6	115	Patented		20169 – 20171	3	64	Patented
12664 – 12669	6	108	Patented		18728 – 18729	2	58	Patented
12673 – 12684	12	229	Patented		18778	1	23	Patented
12836 – 12838	3	81	Patented		20585 – 20588	4	86	Patented
12921 – 12922	2	17	Patented		20585A – 20587A	3	63	Patented
13024	1	20	Patented		21378	1	24	Patented
36016 – 36019	4	66	Patented		19788	1	7	Patented
38091 – 38094	4	58	Patented		21273 – 21278	6	51	Patented
Grouping Total	66	1,242			21280 – 21281	2	25	Patented
	Starratt-Olsen				Grouping Total	40	732	
12963 – 12965	3	55	Patented			Ava		
12704 – 12706	3	51	Patented		19247 – 19254	8	127	Patented
12642 – 12648	7	129	Patented		19306 – 19313	8	104	Patented
12730	1	24	Patented		19428 – 19430	3	61	Patented
12642A – 12644	3	56	Patented		Grouping Total	19	292	
12953 – 12955	3	89	Patented			Killoran		
12858 – 12866	9	112	Patented		47990 – 47996	7	108	Leased
12875 – 12883	9	154	Patented		50992 – 50993	2	27	Leased
12881A – 12882A	2	30	Patented		51018 – 51021	4	68	Leased
Grouping Total	40	700			Grouping Total	13	203	
	Russet					Hager		
19235 – 19238	4	80	Patented		1184229	1	26	Unpatented
19181 – 19182	2	46	Patented		1184231	1	21	Unpatented
12820 – 12824	5	70	Patented		1184902	1	19	Unpatented
12726 – 12728	3	63	Patented		51287 – 51290	4	52	Leased
Grouping Total	14	259			Grouping Total	7	118	
	Mills					My-Ritt		
19223 – 19226	4	52	Patented		456	1	16	Patented
12758 – 12760	3	49	Patented		407 – 408	2	40	Patented
12764 – 12766	3	37	Patented		457 – 461	5	82	Patented
16672 – 16673	2	39	Patented		Grouping Total	8	137	
Grouping Total	12	177				Nova Co		
	Newman-Heyson				1445 – 1451	7	121	Patented
13060 – 13062	3	54	Patented		1452	1	21	Patented
13068 – 13069	2	40	Patented		Grouping Total	8	142	
13241 – 13244	4	87	Patented		Derlak			
13254 – 13255	2	41	Patented		12746 – 12756	11	219	Patented
13082 – 13084	3	64	Patented		Grouping Total	11	219	
13475 – 13477	3	57	Patented		Pending Claim*			
13659 – 13660	2	36	Patented		4282890	1	168	Unpatented
Grouping Total	19	380						

**Claim 4282890 was staked and filed in early August, 2017 but has not yet been processed by MNDM Lands Section.*

Table 4.2: Summary of royalty agreements affecting Madsen tenure

Claim No.	No. Claims	Royalty Holder	Royalty
18728, 18729, 19367, 19368, 19687, 19688, 19720, 20169 - 20171, 20585 - 20588, 20585A–20588A, 21273, 21274, 21275 - 21278, 21280, 21281, 21316 - 21318, 21316A, 21378, 12726–12728, 12820–12824, 19181, 19182, 19235–19237, 19328	44	Franco-Nevada Corporation	1% NSR to a maximum of C$1 million
18728, 18729, 19367, 19368, 19687, 19688, 19720, 20169–20171, 20585–20588, 20585A–20588A, 21273, 21274, 21275–21278, 21280, 21281, 21316–21318, 21316A, 21378, 12726–12728, 12820–12824, 19181, 19182, 19235–19237, 19328	44	Canhorn Mining Corporation*	1% NSR to a maximum of C$1 million
13060 to 13062, 13069, 13241 to 13244 , 13255 , 13554 , 13659 , 13660, 13068, 13082 to 13084, 13254 , 13475 to 13477 , 407 , 408, 456, 457, 458 to 461O, 1444 to 1452, 1476	38	Sandstorm Gold Ltd.	0.5% NSR
13060 to 13062, 13069 , 13241 to 13244 , 13255 , 13554 , 13659 , 13660 , 13068 , 13082 to 13084, 13254 , 13475 to 13477	20	Franco-Nevada Corporation	1.5% on first 1M oz-equiv; 2% on production beyond first 1M oz-equiv
407 , 408 , 456 –, 457 , 458 to 461	8	My-Ritt Red Lake Gold Mines Ltd	3% NSR
K 1445 to 1452	8	Camp McMann Red Lake Gold Mine Ltd.	3% NSR
12746 – 12756	11	Fechi Inc.	3% NSR, 1% purchasable for C$1M

4.2 Surface and Other Rights

Table 4.3 shows surface rights ownership for Madsen Gold Project claims, patents and leases. Pure Gold owns surface rights as indicated in the table. Where Pure Gold does not hold surface rights they are predominantly held by the Crown, as administered by the Province of Ontario. Timber rights are reserved to the Crown and water rights are held for the public use. A First Nations owned timber company has obtained a timber harvest licence covering the northwestern portion of the property and has been granted access by Pure Gold through an agreement. A single trapping tenure is held over the entire property and Pure Gold maintains good relations with the tenure holder. A local outfitter has Bear Management Area licence over the Property which requires consent of the landowner for access. Several registered easements for highway and utility lines cross the property. The authors are aware of no other conferred rights on the Property.

Table 4.3: Summary of Surface Rights

Claim No.	No. Claims	Disposition Type
1445-1452, 407-408, 456-461, 11502-11509, 12521-12529, 12601-12605, 12638-12648, 12658-12669, 12673-12684, 12704-12706, 12726-12728, 12730, 12746-12756, 12758-12760, 12764-12766, 12820-12824, 12836-12838, 12858-12866, 12875-12883, 12921-12922, 12953-12955, 12963-12965, 13024, 13060-13061, 13068-13069, 13082-13084, 13241-13244, 13254-13255, 13475-13477, 13554, 13659, 13660, 16672-16673, 18728-18729, 18778, 19181-19182, 19223-19226, 19235-19238, 19247-19254, 19278-19281, 19306-19313, 19367-19368, 19428-19430, 19684-19688, 19719-19720, 19788, 20169-20171, 20585-20588, 21273-21278, 21280-21281, 21316-21318, 21378, 11509A, 12527A, 12642A-12644A, 12881A-12882A, 20585A-20587A, 21316A, 2890	229	Patent, surface and mining rights
50992, 50993, 51018, 51019, 51020, 51021, 51287, 51288, 51289, 51290	10	Lease, surface and mining rights
4229, 4231, 4902	3	Crown retained surface rights
13062, 38093	2	Licence of Occupation, surface and mining rights
47990, 47991, 47992, 47993, 47994, 47995, 47996	7	Lease, mining rights only
36016, 36017, 36018, 36019, 38091, 38092, 38094	7	Patent, mining rights only
4282890	1	Claim Pending, Crown retained surface rights

The property is located in the October 1873 Treaty #3 area. On acquiring the Madsen Property Pure Gold initiated engagement with the Grand Council of Treaty #3, who identified five First Nation communities to Pure Gold as needing to be informed and engaged with respect to Pure Gold activities and plans. Pure Gold has to date shared its plans and regular updates of its activities with these five nations: Wabauskang First Nation; Lac Seul First Nation; Wabaseemoong First Nation; Grassy Narrows First Nation; Naotkamegwanning First Nation; and also the Métis Nation of Ontario. The Ontario Ministry of Northern Development and Mines (MNDM) has indicated to Pure Gold that only Wabauskang First Nation and Lac Seul First Nation need to be engaged and consulted at this stage, and further, that the MNDM will fulfill the duty to consult. At this time, the primary role of Pure Gold with First Nations is to ensure that appropriate information sharing occurs. The MNDM will consider additional development and advise, if and when a more formal consultation role should be undertaken by Pure Gold. Figure 4-3 shows the locations of Treaty No.3 First Nations relative to the Madsen Property.

Pure Gold considers that it has good relations with local First Nations and is making efforts to enhance and strengthen those relations. Pure Gold has developed a Consultation Plan and is seeking to align this with First Nations requirements. Pure Gold has an extensive record of all consultation with First Nations since taking ownership of the project. Pure Gold and the Wabauskang First Nation and Lac Seul First Nation are working towards developing an Exploration Agreement to formally define a cooperative and mutually beneficial relationship. Pure Gold posts all employment opportunities at Wabauskang First Nation and Lac Seul First Nation and also encourages its prime contractors to do so. Several employees of Pure Gold and its contractors identify as local First Nations members. Pure Gold maintains regular communication with the Red Lake Municipality council and administration and regularly sponsors community events. The company held a community information forum in late 2016 with approximately 60 local residents attending to hear about project activities and plans.

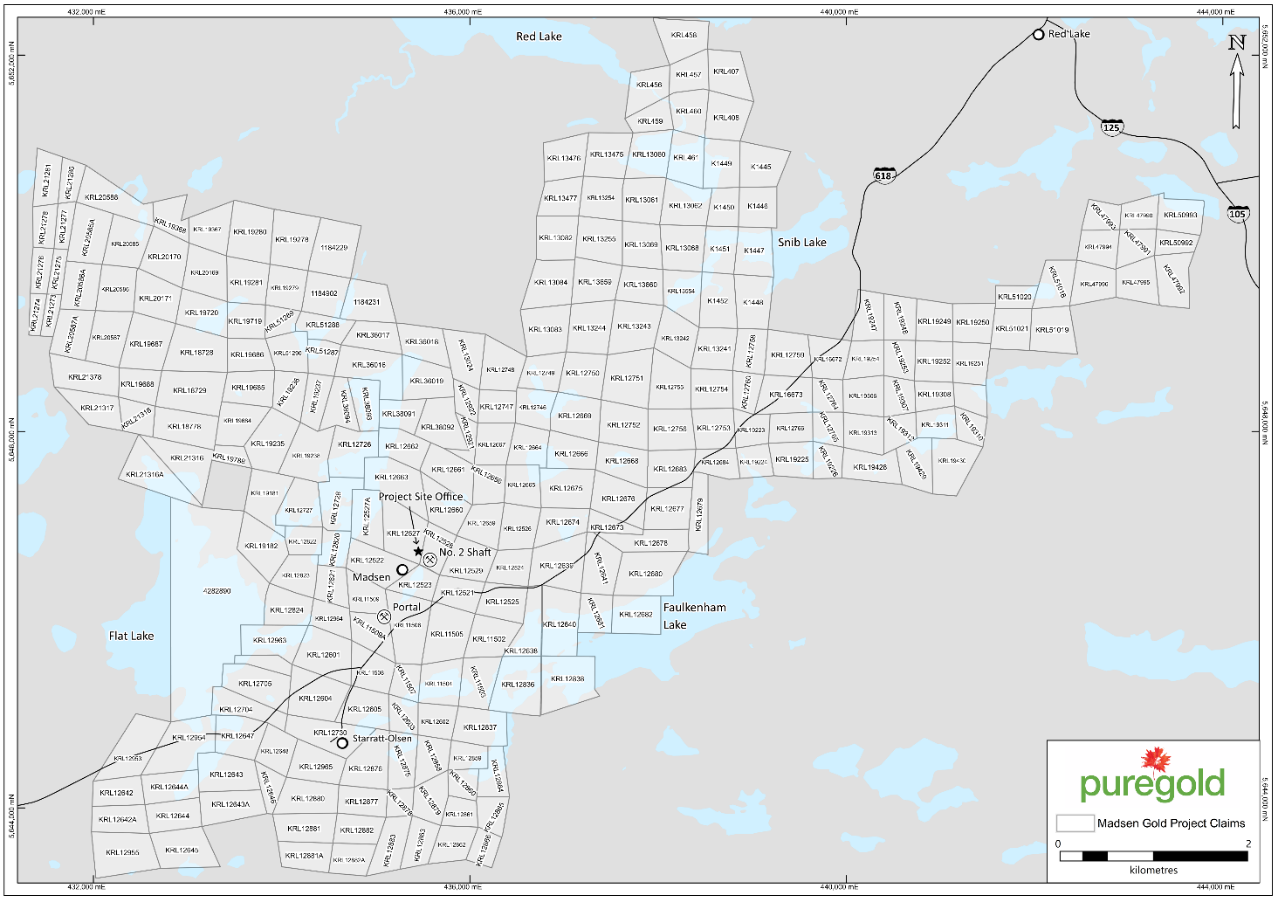

Figure 4-2: Madsen Gold Project tenure map. *Provided by Pure Gold, September 10, 2017.*

Figure 4-3: Treaty No. 3 First Nations. *Provided by Pure Gold, September 10, 2017.*

4.3 Environmental Liabilities

Pure Gold inherited a mining site with a history of almost a century of exploration, mining and minerals processing as well as an unfunded closure program submitted by the previous operator. The closure plan was updated and additional required funding was submitted by Pure Gold. Pure Gold has also undertaken, at its own expense, a site cleanup that has seen significant amounts of waste removed from the site, off-site tire and metal recycling, derelict building removal, PCB storage site decommissioning and rehabilitation, road upgrading and re-vegetation of critical areas. Tailings from historical operations are present at Madsen and Starratt. Reopening of the mine will require an update of the closure plan and additional funding of that plan. The clean-up actions and reopening of the mine will facilitate eventual mine closure by allowing Pure Gold to fund further progressive reclamation of the Project site (Vendrig, 2017).

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4.4 Permitting

Information on Permitting contained in this section is derived from Vendrig (2017).

Pure Gold has worked to maintain the permits that existed for the Madsen Mine under Claude. As the future project design has evolved and continues to change including operational enhancements and as regulations have changed over time, some permits will require updating should the project transition into operations. The following permits and authorisations are currently in good standing:

- Permit-To-Take-Water (0202-AHJL45): This permit was updated in 2017 and is in good standing allowing Pure Gold to pump approximately 6.5 ML of water per day from the mine workings.
- Advanced Exploration Closure Plan: In 2016, Pure Gold requested that the Madsen Portal Advanced Exploration area to be taken out of Temporary Suspension and put into Advanced Exploration. The closure plan for these proposed activities was accepted by the regulators along with additional funding for the Advanced Exploration program closure.
- Species at Risk (SAR) Exemption and Benefit Program Under Clause 17(2)c of SAR for Endangered Bats: Pure Gold discovered protected bats in the decline leading from the Madsen portal during the reopening of the portal in 2017. A new permit allowing Pure Gold to exclude the bats with the requirement to provide alternate outdoor bat house habitat and research on the bats was granted in June of 2017. The permit is in good standing until 2026.
- Registered Hazardous Waste Generation Site: Pure Gold maintains its registration as a hazardous waste site. This is renewed annually and is in good standing for 2017.
- MTO: Pure Gold holds several permits for drill road access from Highway 618 and a building and land use permit that allows exploration drilling in the Highway Permit Control area.

The following existing permits will require updating due to process changes or regulatory changes:

- Environmental Compliance Approval (ECA) Industrial Sewage Works Permit: Pure Gold is currently undertaking baseline studies focussed on optimizing water resource usage, recovery and recycling and has presented an updated operation general arrangement in the Project Definition.
- ECA for Air and Noise: Due to expected new equipment and operational changes to minimize power, energy and water usage, a new air and noise ECA will be required.

- Mine Closure Plan, MNDM: Claude submitted an unfunded Mine Closure Plan to the MNDM on May 24, 1995 with an amended yet still unfunded closure plan submitted to the MNDM in July 2011. Pure Gold submitted an enhanced closure plan along with a performance bond of $2,517,025 to fully satisfy regulatory agencies, in February 2014. Current funding is considered to be adequate for closure of the current mine in Temporary Suspension status as considerable site cleanup has been undertaken by Pure Gold outside of the closure plan funding. Given the new Project Definition and the considerable effort that has been made to clean up the site at Pure Gold's own cost, the closure plan will require updating should the mine be returned to operational status.
- Permit to Mine, MNDM: A Notice of Project Status was received and acknowledged by the MNDM on April 24, 2007; it allows for dewatering to 2900 feet (883.92 m). This would require updating if dewatering were to occur below this level.

Other Permits that may be required include:

- ECA for Sewage: For approval to construct and operate a domestic sewage treatment system, or Health Unit approval for smaller systems.
- Work Permit: Any construction/relocation of a transmission line, work on Crown land or for work in water.
- Plans and Specifications Approval: For construction of dams or berms, including those associated with tailings facilities and/or new ponds and ditches.
- Forest Resource License: Annual license for clearing of merchantable Crown timber.
- Aggregate Permit: Aggregate Resources Act For extraction of aggregate for dam construction.
- Leave to Construct: For approval to construct a transmission line.
- Notice of Construction: Notice is required before any contractor or construction activities take place.
- SARA Approvals: For migratory birds and their breeding areas.

4.5 Other Factors and Risks

The authors are not aware of any other significant factors and risks that may affect access, title or the right or ability to perform work on the property.

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5. Accessibility, Climate, Local Resources, Infrastructure and Physiography

The Madsen Gold Project is located adjacent the community of Madsen, within the Red Lake Municipality of northwestern Ontario, approximately 565 km by road (430 km direct) northwest of Thunder Bay and approximately 475 km by road (260 km direct) east-northeast of Winnipeg, Manitoba. Red Lake can be reached via Highway 105 from the Trans-Canada Highway 17. Red Lake is also serviced with daily flights from Thunder Bay and Winnipeg by Bearskin Airlines.

The Madsen Gold Project is accessible from Red Lake via Highway 618, a paved secondary road maintained year-round by the Ministry of Transportation of Ontario. The Madsen Mine site is 10 km southwest of Red Lake. A series of intermittently maintained logging roads and winter trails branching from Highway 618 provide further access to other portions of the property.

5.1 Local Resources and Infrastructure

The Red Lake Municipality, with a population of approximately 5,000, comprises six communities: Red Lake, Balmertown, Cochenour, Madsen, McKenzie Island, and Starratt-Olsen. Mining and mineral exploration is the primary industry in the area, with production mainly from Goldcorp's 3100 tonne/day Red Lake gold mine (Goldcorp, 2016). Other industries include logging and tourism. The Municipality of Red Lake offers a full range of services and supplies for mineral exploration and mining, including both skilled and unskilled labour, bulk fuels, freight, heavy equipment, groceries, hardware and mining supplies. Many of the Madsen Gold Project staff live in the surrounding area and out of town employees stay in local accommodations in Red Lake.

The Madsen Mine site is serviced by a 44kV Ontario Hydro transmission line. Water is supplied via a municipal treatment facility from nearby Russet Lake. The project site is connected to municipal wastewater service.

5.2 Physiography and Climate

The topography within the Madsen Gold Project is gentle to moderate with elevations ranging from 360 to about 430 m. Topography is dominated by glacially scoured southwest-trending ridges, typically covered with jack pine and mature poplar trees. Swamps, marshes, small streams, and small to moderate-size lakes are widespread. Rock exposure varies, but rarely exceeds 15% at ground surface and averages between 5–10%. Glacial overburden depth is generally shallow, rarely exceeding 20 m, and primarily consists of ablation till, minor basal till, minor outwash sand and gravel, and silty-clay glaciolacustrine sediments.

Vegetation consists of thick second growth boreal forest composed of black spruce, jack pine, poplar, and birch. Figure 5-1 shows a winter view looking southeast over Russet South (foreground with drilling rig) towards the No. 2 Madsen shaft and mill complex (upper right).

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Figure 5-1: Typical landscape surrounding the Madsen Gold Project.

The climate in the Red Lake area is described as warm-summer humid continental (climate type Dfb according to the Köppen climate classification system). Mean daily temperatures range from -18˚C in January to +18˚C in July. Annual precipitation averages 70 cm, mainly occurring as summer showers, which includes a total of about two metres of snow. Snow usually starts falling during late October, and starts melting during March but is not normally fully melted until late April. Late-season snow in May does occur.

Fieldwork and drilling are possible year-round on the property although certain wetter areas are more easily accessible in the winter when frozen.

6. History

Gold was originally reported in the Red Lake area in 1897 by R.J. Gilbert. Intensive exploration of the district followed discovery in 1925 of the gold showings which eventually formed part of the Howey Mine (Lebourdaix, 1957).

Since 1927, a total of 28 mines have operated in the Red Lake Mining District, producing 29 million ounces of gold at an average recovered grade of 15.6 g/t Au. Approximately 89% of this gold was produced from three mines (Campbell Mine, Dickenson/Red Lake Mine and Madsen Mine) with the Madsen Mine accounting for 9% of the district's production (Lichtblau et al., 2017).

Highlights of the exploration and mining history of the Madsen Gold Project within the Red Lake area are tabulated in Table 6.1.

The Madsen Gold Project can be divided into five claim groups with separate histories of mining and exploration prior to amalgamation with the Madsen Mine property over the past forty years: Madsen, Starratt (acquired in 1980), Russet (timing unknown, but acquired between 1989 and 1997), Newman-Madsen (2014) and Derlak (2017). The following sections describe the exploration and mining work carried out during each main stage of property amalgamation:

- from 1925, when gold mineralization was first discovered at Red Lake, until 1980 when the Madsen and Starratt mine properties were combined;
- from 1980 until 1998 when Claude acquired the Madsen, Starratt and Russet properties; and
- from 1998 until 2014 when Laurentian (subsequently renamed Pure Gold) purchased the project and amalgamated the Newman-Madsen claims (2014) and in 2017 the Derlak property.

Exploration conducted by Pure Gold after acquisition of the Madsen Gold Project in 2014 is described in Section 9.0.

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Table 6.1: Exploration and mining history highlights of the Madsen Gold Project

Year	Activity
1925	Gold discovered at Red Lake.
1926	First claims staked in Madsen area
1935	Madsen Red Lake Gold Mines incorporated, No. 1 shaft sunk to 175 m.
1936	Discovery of Austin Deposit.
1937	Madsen No. 2 shaft sunk to access Austin Deposit. Ultimately reaches to 1275 m with 27 levels.
1938	Madsen mill facility initiates 36 year continuous production.
1948	Starratt-Olsen mine opens with production for 8 years.
1956	Production halted at Starratt-Olsen mine. Total production of 823,554 tonnes at a recovered grade of 6.19 g/t (163,990 oz Au).
1969	Discovery of Zone 8 located between levels 22 and 27 of the Madsen Mine.
1974	Production halted at Madsen Mine. Total production of 7,593,906 tonnes at a recovered grade of 9.91 g/t (2,416,609 oz Au).
1974	Madsen operation sold to Bulora Corporation.
1976	Bulora Corporation files for bankruptcy.
1980	E.R. Rowland acquires Madsen and Starratt properties.
1990	Red Lake Buffalo Resources acquires Madsen and Starratt properties from Rowland estate, changes name to Madsen Gold Corp. in 1991.
Prior to 1998	Madsen Gold Corp. acquires Aiken and Russet claims and amalgamates with the Madsen and Starratt properties (collectively referred to hereinafter as the Madsen Gold Project).
1998	Claude purchases Madsen Gold Corp. and commences dewatering Madsen workings and mining from the Madsen shaft.
1998–2000	Claude drills 230 holes (~21,000 m) on the Madsen Gold Project.
1999	Claude mines and mills from the Madsen shaft until October 1999. Total production for Claude of 278,773 tonnes at a recovered grade of 3.99 g/t (35,779 oz) Au.
2001	Placer Dome options the Madsen Gold Project and stops dewatering.
2001–2004	Placer Dome drills 115 holes (60,725 m) on the Madsen Gold Project, most on targets outside the Madsen and Starratt mine areas. Discovers Fork and Treasure Box zones.
2002	Wolfden acquires the Newman-Madsen Property and explores it in joint venture with Kinross (2002-03; 17 holes; 4,193 m) and Sabina (2004-2011; 48 holes; 18,684 m).
2006	Placer Dome exits Madsen Gold Project, returning it 100% to Claude.
2007–2013	Claude drills 346 holes (198,913 m) on the Madsen Gold Project, including >200 holes (>80,000 m) on targets outside the Madsen Mine itself. Dewaters from level 6 (2007) to level 16 (2010) and below, pumping halted in 2013.
2012	Sabina purchases 100% interest in Newman-Madsen Property and issues 0.5% NSR to Premier Gold Mines Limited.
2012	Sabina drills 13 holes (4,332 m) on Newman-Madsen Property.
2014	Laurentian Goldfields Ltd. purchases the Madsen Gold Project from Claude.
2014	Laurentian, renamed Pure Gold, purchases the Newman-Madsen Property from Sabina and amalgamates it into the Madsen Gold Project. SRK restates 2009 resource
2014–2017	Pure Gold drills 550 core holes (174,711 m) on the Madsen Gold Project, with drilling continuing to the present.
2016	Nordmin completes positive Preliminary Economic Assessment (PEA) for Pure Gold on a limited portion of the known resource
2017	Pure Gold opens Madsen Portal and initiates ramp reconditioning
2017	Pure Gold initiates permitting study and environmental baseline work
2017	Pure Gold purchases the Derlak property from Orefinders Resources Inc. and merges it into the Madsen Gold Project.
2017	Pure Gold stakes claim on Flat Lake area to cover Balmer Assemblage rocks recently mapped
2017	Pure Gold completes new resource estimate and positive PEA
2017	Pure Gold completes maiden resource estimates for Russet South and Fork deposits

6.1 1925–1980

6.1.1 Madsen

The first claims staked in the Madsen area date back to 1927, with no work from this period recorded. Marius Madsen staked part of the property in 1934 and Madsen Red Lake Gold Mines was incorporated in 1935 (Leduc and Sutherland, 1936). Early prospecting uncovered several gold showings in the area. Initially, the work focused on an auriferous quartz vein hosted by felsic volcanic rock on claim 11505 near High Lake. The No. 1 shaft was sunk to a depth of 175 m on this zone, and four levels were developed. In 1936, Austin McVeigh located a gold-bearing zone (later determined to be part of the McVeigh Deposit) on the northern edge of what is now the Process Water Pond. Drilling on this and an adjacent zone in late 1936 delineated the important Austin Deposit. The underground development of the No. 2 Madsen shaft (Figure 6.1) commenced in 1937 with the sinking of a three-compartment shaft to a depth of 163 m. The shaft eventually reached a depth of 1,273 m with 24 shaft-accessible levels and three additional ramp-accessible levels totalling 27 underground levels (~67 linear km) of development. The original Madsen mill began operating in August 1938 (Brown and Crayston, 1939) and operated continuously until 1974.

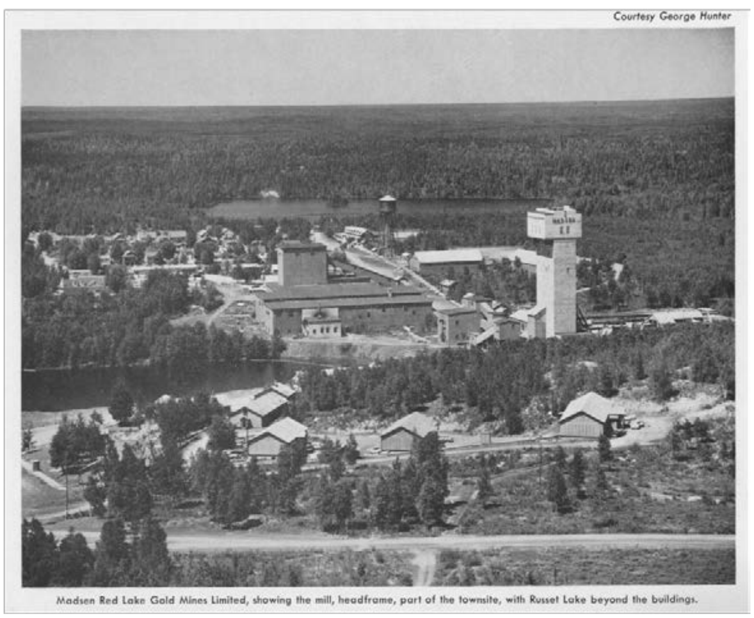

Figure 6-1: Madsen Mine Site in the 1960s.

Total recorded production from 1938–1999 at the Madsen Mine is 7,872,679 tonnes at an average recovered grade of 9.69 g/t Au. This production accounted for 2,452,388 ounces of gold (Lichtblau et al., 2017). Annual production for the period 1938–1976 is summarized in Table 6.2 (excludes data from certain periods).

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Table 6.2: Gold production for Madsen Mine from 1938–1976

Year	Gold Production (ounces)	Tonnage Milled (tons)	Year	Gold Production[1] (ounces)	Tonnage Milled (tons)
1938	n/a	n/a	1958	123,489	302,200
1939	13,909	65,460	1959	118,805	301,999
1940	25,716	140,674	1960	119,084	306,377
1941	30,088	141,109	1961	106,096	301,031
1942	30,971	145,534	1962	100,878	311,705
1943	39,195	146,346	1963	107,131	306,247
1944	33,733	144,179	1964	n/a	n/a
1945	36,825	127,870	1964	94,869	305,823
1946	25,438	98,472	1965	87,632	94,869
1947	34,977	143,371	1967	70,033	277,566
1948	32,421	143,391	1968	56,196	265,268
1949	35,579	150,779	1969	60,579	238,473
1950	65,444	282,050	1970	40,569	184,530
1951	61,687	302,227	1971	44,497	146,162
1952	67,337	304,251	1972	37,696	138,250
1953	82,596	285,018	1973	29,163	126,070
1954	82,333	286,246	1974	2,102	11,112
1955	104,874	295,713	1975	n/a	n/a
1956	100,995	294,913	1976	2,196	12,840
1957	103,181	305,300			

[1]Production figures extracted from available Madsen Mine annual reports, 1938-1976. n/a = data not available. Table from Cole et al. (2016).

The operation was sold to Bulora Corporation in 1974 and was acquired by E.R. Rowland in 1980.

6.1.2 Starratt

The Starratt-Olsen Mine, located approximately 2.2 km southwest of Madsen Mine, operated from 1948 through 1956 and produced approximately 163,990 ounces of gold from 823,554 metric tonnes at an average recovered grade of 6.19 g/t Au (Lichtblau et al., 2017).

The original staking and prospecting in the Starratt area dates back to 1926 and 1927, soon after gold was discovered in Red Lake (Kilgour and de Wet, 1948). Only minor work was completed at the time, and the claims were allowed to lapse. Claims were staked by David Olsen and R.W. Starratt in 1934 and optioned by Val d'Or Mineral Holdings (Val d'Or) in 1935 (Ferguson, 1965). The early exploration focused on three showings termed the Olsen, De Villiers, and Starratt. Trenching and core drilling were performed on the De Villiers and Starratt showings during 1936 and 1937. In 1938, New Faulkenham Mines optioned the property and sank a three-compartment shaft to a depth of 53 m but did not complete any further work (Holbrooke, 1958). In 1939, Val d'Or continued exploration underground on the 53 m level and outlined four mineralized shoots.

The property remained idle from 1940 to 1944, after which exploration resumed. A drilling campaign in 1945 was sufficient to outline an ore reserve, and Starratt-Olsen Gold Mines Limited was incorporated (Crayston and McDonough, 1945). Sinking of the Starratt shaft to a depth of 450 m and level drifting were completed between 1945 and 1947. Mining operations were carried out at the Starratt shaft between 1948 and 1956 (Figure 6.2). In 1957, the company name was changed to Starratt Nickel Mines Limited.

Figure 6-2: Starratt-Olsen Mine in 1949.

The New Faulkenham Mines property is located east-southeast of the Starratt claim group and consists of 18 patented claims that were originally staked by the Faulkenham Lake Gold Syndicate in 1935. Some surface exploration was carried out between 1935 and 1938, mostly on Claim 12881. During this time, a three-compartment shaft was sunk to a depth of 105 m and three levels were established (Holbrooke, 1958). No historical production data are available for the Faulkenham shaft. Exploration commenced again in 1958 with the completion of 11 surface holes. The property was acquired by Starratt Nickel Mines Limited in 1963. In 1965, Starratt Nickel itself was acquired by Dickenson Mines Limited.

Further core drilling was conducted by Dickenson Mines in 1963 and 1964 mainly at De Villiers but with three holes to the west of the Olsen showing (Madsen, 1965). E.R. Rowland acquired the property in 1980 and amalgamated it with the Madsen Property.

6.1.3 Russet

The Russet Red Lake Syndicate was formed in 1936 and acquired eight patented mining claims in the southern part of the Russet Lake area and completed limited prospecting work. Russet Red Lake Gold Mines was incorporated in 1943 and acquired the Syndicate's claims and six additional patent claims. Exploration by Russet Red Lake Gold Mines commenced in 1944 with trenching and 24 short holes on Claims 19181 and 19235 just west of Russet Lake (Crayston and McDonough, 1945). This work focused on a seemingly complexly folded zone of iron formations hosted by mafic volcanic rock that crops out on Claim 19235. Work then shifted about 350 m to the east to explore another zone of gold mineralization hosted by altered mafic volcanic rock near the western contact of the Russet Lake Ultramafic. In 1946 and 1947, a total of 105 shallow holes tested both the Main zone and the No. 3 Zone near Russet Lake (Panagapko, 1999), after which the property remained idle until it was amalgamated with the Aiken ground to the west in 1965.

Aiken Red Lake Gold Mines Limited was incorporated in 1945 and acquired 36 patented mining claims previously held by several smaller prospecting syndicates. Work in 1945 consisted of prospecting, trenching, and core drilling on the No. 1 and No. 2 veins located on Claims 18728 and 20585, respectively (Ferguson, 1965). No further work was conducted on the property until it was merged with the Russet South property to the east in 1965.

International Mine Services carried out a three-hole drilling program in the No.3 zone area in 1966 (Kuryliw, 1968a). A further 21 holes were completed on the Russet mineralized zones in 1968, based on a geological and structural re-interpretation (Kuryliw, 1968b).

Five holes in 1969 tested the stratigraphy south of the No.3 zone (Panagapko, 1998). During the winter of 1974, a 22-hole program was completed in the No.3 zone area (Tindale, 1974).

Following up on an electromagnetic anomaly identified from an airborne magnetics and electromagnetics survey carried out by Madsen Gold Mines in 1971, bulldozer-trenching, line-cutting, geological mapping, magnetometer survey, electromagnetic EM-17 horizontal loop survey and chip sampling were conducted in the fall of 1974 (Kuryliw, 1975; Tindale, 1975a, b).

One hole was drilled in the northern part of the property in 1977 to test an EM conductor (Tindale, 1977).

6.1.4 Newman-Madsen

Coin Lake Gold Mines Ltd. ("Coin Lake") acquired the property historically referred to as My-Ritt from Red Lake Bay Mines Ltd. in 1936. Coin Lake completed an intensive program of stripping and trenching from 1936 to 1939 (Chastko, 1972). During this time, a magnetometer survey was completed and at least 22 holes were drilled.

Between 1943 and 1946, Cockeram Red Lake Gold Mines completed a total of 35 diamond drill holes (5,674 m), testing for gold mineralization along strike from the Madsen Mine (Durocher et al., 1987). Results from these drilling programs are not available. Additional drilling in this area was done in 1943 by Central Patricia Gold Mines Ltd., who drilled 14 core holes (Durocher et al., 1987).

An area south of Coin Lake was held as part of a land package owned by Rajah Red Lake Gold Mines Ltd in the mid-1950s. In 1957, the company's charter was cancelled and ownership of the Heyson Township claims was transferred to H.A. Newman. The only recorded work on the Heyson Township claims consists of geological and magnetometer surveys completed in 1959 (Howe, 1960). Mespi Mines Ltd. also completed an aeromagnetic survey over the area in 1959.

Assessment file records are scarce for the time period between 1959 and 1971 but it is known that My-Ritt Gold Mines Ltd. held the property at some point during this time period.

In 1971, Cochenour-Willans Gold Mines Ltd. obtained the property from My-Ritt Gold Mines Ltd. and completed VLF-EM, IP and soil geochemical surveys, followed by three core holes totalling 528 m (Chastko, 1972). However, the exact location of these holes is unknown and results are unavailable.

6.1.5 Derlak

The following information on Derlak is taken from Durocher et al. (1987). The earliest records on the Derlak property indicate that stripping, trenching, magnetometer surveying and diamond drilling were completed by Derlak Red Lake Gold Mines Limited in 1936–1937. Nine holes (~518 m) tested approximately 500 m of strike length along a porphyry dyke. Mineralized shear zones associated with the dyke contact had a maximum width of 12 m and low gold values.

In 1944, Derlak Red Lake Gold Mines Limited drilled another eight diamond drill holes testing below the same zones without success.

Madsen Red Lake Gold Mines Limited optioned Derlak and drilled 13 holes in 1967 with a maximum assay of 2.3 g/t Au.

6.1.6 Fork

Prior to the discovery of the Fork Deposit and subsequent definition drilling conducted by Placer Dome and Claude between 2002 and 2009, only minor surface and underground exploration work was completed in the vicinity of the deposit. Between 1936 and 1944 a series of short drill holes tested the southwestern extension of the Madsen Mine Trend towards the Starratt mine property between 1953 and 1966 (Panagapko 1998). Several drill holes from these programs encountered altered rock and quartz veins as well as localized brittle and ductile deformation zones within the Fork Deposit area. In the late 1950s underground drilling from the 16-Level of Madsen Mine intersected what is now interpreted to be the down dip projection of the Fork Deposit. Drill-hole logs report alteration and mineralized intercepts returning 8.23 g/t Au over 0.85 m and 21.26 g/t Au over 1.53 m. Several follow up fans of drill holes were completed into the altered zone, but no further work was reported until the early 2000s.

6.2 1980–1998

6.2.1 Madsen/Starratt

E. R. Rowland controlled the combined Madsen-Starratt property from 1980 to 1988 when Red Lake Buffalo Resources acquired the ground from his estate. Under an option agreement, Noranda Exploration carried out mapping and core drilling between 1980 and 1982 (Noranda Exploration Company Limited, 1982). On the Starratt claims, Noranda's 11 holes focused on the down-dip extension of the De Villiers vein. Three of these holes hit significant gold mineralization including an intersection grading 16.46 g/t Au over 1.55 m.

Red Lake Buffalo Resources was reorganized into Madsen Gold Corp. ("Madsen Gold") in 1991. Madsen Gold drilled 29 holes (2,480 m) at Starratt in 1998 (Panagapko, 1998).

6.2.2 Russet

In 1985, Aiken-Russet Red Lake Mines Ltd. was amalgamated with several other companies to form Canhorn Mining Corporation. The following year, an airborne electromagnetic survey covering the entire Aiken-Russet property was carried out by Aerodat Ltd and outlined several conductors. Additional work in 1986 included line cutting, ground magnetometer and VLF surveys and limited field examinations before the property was optioned to United Reef Petroleum Ltd. (Butella and Erdic, 1986). United Reef Petroleum carried out an exploration program on the Russet property in 1987 and 1988 (Siriunas, 1989), which included airborne and ground geophysical surveys and a 78-hole drilling program. The majority of the drilling focused on the Russet Main and No.3 zones, but drilling was also directed to various other targets on the property.

The Russet property was acquired by Red Lake Buffalo Resources or Madsen Gold prior to 1998 and combined with the Madsen and Starratt properties.

6.2.3 Newman-Madsen

Between 1981 and 1982 Noranda Inc. completed four holes of unknown length in the central part of the Newman-Madsen claims. The location, orientation and results of the drilling are unavailable. No further exploration on the property was reported until 2002, when the property was acquired by Wolfden Resources Corporation (“Wolfden”).

6.2.4 Derlak

Selco Inc. optioned the Derlak property and completed geological mapping, magnetometer, VLF-EM, HLEM surveys and six diamond drill holes in 1980–81 (Pryslak and Reed, 1981). No significant gold mineralization was located.

The property was reportedly optioned by Seine Explorco Ltd. in 1981 and by Redaurum Red Lake Mines Ltd. in 1985 but the reports have not been located.

Placer Dome optioned the property in 1997 and undertook IP, magnetometer, geological mapping and rock sampling surveys (Blackburn et al., 1999). Twelve rock samples (probably selective grab samples) exceeded 10 g/t Au on the western part of the property, including a quartz vein that returned 370 g/t Au. Placer Dome drilled four holes on the property in 1998, intersecting weak quartz-carbonate veining in shear zones without significant gold values.

6.3 1998–2014

6.3.1 Madsen/Starratt/Russet

After the acquisition of the Madsen Mine and surrounding property in April 1998, Claude began mining portions of the McVeigh and Austin deposits with access from the Madsen (McVeigh) portal and ramp.

In 1998, Claude extracted 85,417 tonnes, of which 81,740 tonnes were milled for a total production of 8,929 ounces of gold at an average recovered grade of 3.43 g/t (0.10 oz/ton) Au (Blackburn et al., 1999). Mill recovery was estimated to be 86.75%, with a head grade of 3.91 g/t (0.114 oz/ton) Au. Mining occurred within the Austin Deposit between levels 2 and 5 of the mine and in the McVeigh Deposit between surface and 2 Level.

Information available for the final seven months ending October 1999 indicate a mill throughput of 99,726 tonnes at a diluted gold grade of 4.39 g/t (0.128 oz/ton) Au for a total of 13,260 ounces of gold. Reconciliation revealed a significant grade variance, ascribed to excessive mining dilution (Olson et al., 1999).

After 15 months, the Madsen Mine and mill complex was put on care and maintenance status in October of 1999. Total recorded production for the Madsen Mine property, inclusive of that produced by Claude, during the periods 1938 to 1974 and 1998 to 1999, is 7,872,679 metric tonnes at an average recovered grade of 9.69 g/t (0.283 oz/ton) Au for a production of 2,452,388 ounces of gold (Lichtblau et al., 2017).

Following cessation of mining in 1999, Claude compiled all historic geophysical, geological, geochemical, and drilling data on the Madsen Gold Project (Panagapko, 1998) and surveyed 11.7 line-km of gradient array IP over the Austin and McVeigh deposits. The IP survey successfully outlined a chargeability anomaly related to sulphide mineralization associated with the auriferous tuff intervals and was also helpful in delineating silica alteration in basalt.

Between 1998 and 2000, Claude evaluated several near surface targets including the McVeigh West, De Villiers, and No. 1 shaft zones (Panagapko, 1999). This involved mapping, stripping, trenching, limited test-mining and drilling of 133 holes. Table 6.3 summarizes the extent and distribution of drilling on the Madsen Gold Project, as far as known, between Claude's purchase of the property in 1998 and its sale to Pure Gold in 2014.

Table 6.3: Distribution of 1998–2013 drilling on the Madsen Gold Project

Operator		Zone						Total
		Madsen	Starratt	Fork	Russet South	Treasure Box	Other	
Claude (1998-2000)	holes	≥85	≥33	-	-	-	≥15	133
	metres	>6,417	na	-	-	-	≥1,296	7,713
Placer Dome (2001-2004)	holes	>12	9	16	6	49	>6	98
	metres	15,244	4,830	6,160	3,653	24,356	>4,315	58,558
Claude (2007-2012)	holes	≥108	35	105	5	51	≥10	314
	metres	≥93,883	19,344	45,179	3,121	13,573	≥7,439	182,539
Total (1998-2013)	holes	≥205	≥77	121	11	100	≥42	545
	metres	≥115,598	>24,174	51,339	6,774	37,929	≥13,051	248,810

At the McVeigh West area, approximately 750 m west of the Madsen shaft, 80 surface holes explored several new zones of gold mineralization extending to at least 90 m below surface. Exploration drilling in the 2-11N and 2-13N raise areas of the McVeigh zone confirmed the presence of gold-bearing lenses above the known workings on the second level.

The surface expression of the No. 1 Shaft quartz vein system was stripped, mapped and channel sampled, delineating four shoots on surface. Three benches were mined for approximately 7,920 tonnes of vein and wallrock. An additional waste stockpile of 5,440 tonnes was generated with a reported average grade of 4.83 g/t gold. Fifteen holes were drilled on the No. 1 Shaft vein shoots; several decimetre-scale zones of gold mineralization were intersected but most holes encountered either minor or no veining at all.

The De Villiers area on the Starratt property, about 2.5 km southwest of the Madsen shaft, was stripped, mapped, and sampled, exposing a discontinuous zone of quartz veins and stringers. Seventeen holes were drilled on the De Villiers vein, with 16 intersecting veins and/or silicification. The best intercept was 9.9 g/t Au over 2.8 m. Two benches were mined for a total of 2,667 tonnes.

In 2001, Claude granted Placer Dome an option to earn 55% of the Madsen project. Placer Dome failed to produce the required bankable feasibility study in time and Goldcorp returned the property to Claude in September 2006 following their acquisition of the Placer Dome Red Lake assets.

Most of Placer Dome's efforts (information taken from Crick, 2003; Dobrotin, 2002, 2003, 2004a, b; Dobrotin and Landry, 2001; Dobrotin and McKenzie, 2003) were directed at drilling the Madsen Mine at depth and other broad property-scale targets (Table 6.3). Surface mapping and geochemistry and a 45 km^2 airborne magnetic/gravity survey were also completed.

From 2001 to 2005, Placer Dome drilled 115 holes (60,725 m) to test the footwall stratigraphy of the main Madsen auriferous zones within a mafic-ultramafic sequence up-dip of various targets on the property, including: 8 Zone, Starratt, Treasure Box, Russet South, and Fork, among others. Several zones of anomalous gold mineralization were encountered and several of these areas remain as high priority targets. Mobile metal ion and conventional soil sampling to the north, west, and around Russet Lake in 2001 outlined five relatively small and low magnitude anomalies. Re-logging of historical drill holes and compilation of historical geochemical, geophysical and drill data led to drilling of eight holes (5,028 m) in 2002 on the northern shore of Russet Lake, in an area now referred to as the Treasure Box zone. Of these eight holes, three intersected visible gold, and all eight intersected gold grades ranging from 1 to 48 g/t Au. A further 41 holes (19,328 m) were drilled at Treasure Box in 2003 and 2004, with some of the better composites including 9.6 m at 4.58 g/t Au, 4.9 m at 10.6 g/t Au, and 4.2 m at 17.9 g/t Au.

Five holes (2,664 m) were drilled on the western shore of Russet Lake in 2002. Four of the holes intersected gold values ranging from 1 to 14.5 g/t Au with a best intercept of 10.6 g/t Au over 1.22 m. A further 3 holes (2,356 m) were drilled in this area in 2003, outlining a broad corridor of ductile deformation with gold values from 1 to 8.83 g/t Au over 0.3 to 1.2 m widths.

Nine holes were drilled in the Starratt area in 2003, intersecting numerous quartz-chlorite-epidote altered vein structures, some with visible gold but widths were generally narrow and the continuity was irregular. A new discovery, tested by only two holes, returned 5.97 g/t Au over 1.2 m within altered rock.

After Claude re-acquired the Madsen Gold Project in 2006, they focused mainly on drilling, historical data compilation, and dewatering and rehabilitation of the Madsen Mine. Mine dewatering commenced in 2007 and was discontinued in late 2013. Claude drilled 346 holes (198,913 m) on the Madsen Gold Project between 2007 and 2012 (Table 6.3).

Claude drilled 108 holes in the Madsen Mine area, both from surface and underground. Their main targets were the down-dip extension of 8 Zone, the McVeigh target near the southwestern extent of known mineralization, near-surface mineralization northeast of the Austin Deposit in an area known as Apple, and its down-plunge extension.

Claude drilled 51 holes in the Treasure Box area in 2007 (Lichtblau et al., 2008), testing the system to depths in excess of 350 m. Anomalous gold values were present throughout, with several narrow high grade zones associated with quartz-tourmaline veining over a strike length of 165 m. The best intersections included 6.05 m grading 12.94 g/t Au and 1.22 m grading 38.47 g/t Au.

During the first half of 2008, Claude drilled 18 holes testing the mafic-ultramafic trend in the footwall of the Starratt-Olsen mine workings (Lichtblau et al., 2009). Hole ST-08-03 intersected high grade vein systems associated with the footwall contact of the ultramafic unit. This work was followed up by an additional 13 closely-spaced holes later in 2008, defining two narrow zones of gold mineralization. Claude drilled another four holes in 2010, intersecting 1.0 to 8.6 g/t Au over narrow widths of 1.5 to 3.5 m.

6.3.2 Newman-Madsen

The Newman-Heyson property was explored under a joint venture between Wolfden and Kinross Gold Corporation ("Kinross") in 2002 and 2003. In 2002, the Wolfden/Kinross joint venture completed line-cutting, ground magnetics, soil geochemical surveys and six holes (1,786 m) testing targets in the Dome stock (Klatt, 2003a). Assay results included rare high-grade intersections including hole KRL-02-05 which intersected 9.25 g/t gold over 3.55 m. In 2003, the joint venture drilled 11 holes (2,407 m) on widely spaced targets, but no gold mineralization was encountered (Klatt, 2003b).

In 2004, Wolfden created the Newman-Madsen project by amalgamation of the My-Ritt, Nova Co, and Newman-Heyson properties. Exploration on Newman-Madsen was completed under a joint venture between Wolfden and Sabina Resources Ltd. ("Sabina Resources"), whereby Sabina Resources earned a 50% interest in the property. In 2004, the joint venture completed a drilling program comprising 31 holes (9,531 m) with Wolfden as operator (Toole, 2005). Drilling intersected gold mineralization along a regional structure. In this area, mineralization is spatially associated with an arsenic soil geochemical anomaly related to the Dome stock granodiorite. This mineralized zone was subsequently termed the Evade zone (Toole, 2005).

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In 2006 the joint venture drilled four holes (2,964 m) to test targets along or near the Balmer-Confederation unconformity. All holes intersected anomalous gold values; an intercept of 22.57 g/t Au over 2.0 m was encountered in hole DDH NM06-02 (Long, 2007).

In 2010, the joint venture, under the operatorship of Sabina Gold & Silver Corp. ("Sabina") completed four holes (3,183 m) to test the far northeast extension of the Madsen Mine trend stratigraphy at levels significantly deeper than previously explored. Drilling was successful in intersecting the targeted stratigraphy and delineating an area of hydrothermal alteration with significant gold, including a high-grade intercept of 43.51 g/t Au over 0.65 m in hole NM-10-02.

In 2011, the joint venture drilled nine holes (3,006 m) to test targets interpreted to comprise folded mafic and ultramafic rock sequences of the Balmer Assemblage where they are coincident with favourable structures, geochemical signatures, and resistivity anomalies. These targets were selected to test Red Lake Mine High-Grade zone style opportunities and returned a series of anomalous and significant gold values.

In January 2012, Sabina acquired 100% interest in the Newman-Madsen Property for a cash payment of C$500,000 and issuance of a 0.5% net smelter return royalty to Premier Gold Mines Limited. Following this transaction, Sabina drilled 13 holes (4,332 m) testing extensions of the Buffalo mine trend, the Dome Stock contact, and the Balmer Assemblage (Sabina Gold and Silver Corp., 2012).

In March 2013, Sabina contracted a 37.4 line-km IP survey using a Volterra-3DIP instrument array in an attempt to delineate the extent of the Buffalo and Madsen trends, and to outline the contact between the Dome stock and adjacent Balmer Assemblage volcanic rock.

In October 2013, Sabina mobilized a four-person mapping crew to the Newman-Madsen project to complete surface observations of stratigraphy and structure. In June 2014 Sabina sold the Newman-Madsen Property to Pure Gold, who amalgamated it into the Madsen Gold Project. Table 6.4 summarizes historical drilling on the former Newman-Madsen Project.

Table 6.4: Summary of drilling on former Newman-Madsen Project

Operator	Year	No. of Holes	Total Length (m)
Coin Lake Gold Mines Ltd	1930s	~221	unknown
Cockeram Red Lake Gold Mines	1943–1946	45	5,674
Cochenour-Willans Gold Mines Ltd.	1971	3	528
Noranda Inc.	1981–1982	33	unknown
Wolfden Resources Ltd./Kinross Gold Corporation	2002–2003	17	4,193
Wolfden Resources Ltd. / Sabina Resources Ltd	2004–2006	35	12,495
Premier Gold Mines Ltd / Sabina Gold & Silver Corp.	2010–2011	13	6,189
Sabina Gold & Silver Corp.	2012	13	4,332
Totals		~380	~29,200

6.3.3 Derlak

Reddick and Lavigne (2012) reported no further exploration on the Derlak property after 1998. A Titan 3D IP survey and drilling of 3 holes totalling 1556 m were completed by Orefinders along with limited fieldwork prior to selling the property to Pure Gold in 2017.

6.3.4 Fork

The Fork Deposit was discovered by Placer Dome during exploration programs in 2002–2004. In 2003, two holes (for 1,671 m) were drilled on the northeastern part of the target 500 m along trend from the southwest extent of the McVeigh Deposit. The original targeting criteria was an intersection between an interpreted flexure in the Russet Lake ultramafic rocks and a ductile structure interpreted from results of field mapping, airborne magnetic survey data and a metamorphic petrology study. Both drill holes intersected a wide zone of strongly altered and deformed mafic and ultramafic rocks with several gold intercepts highlighted by 4.0 g/t Au over 1.2 m (Dobrotin 2003).

In 2004, Placer Dome drilled an additional 14 holes (for 4,489 m) at Fork adding additional mineralized intercepts, with significant intervals grading up to 6.1 g/t Au over 2.8 m and 47.0 g/t Au over 1.3 m. During this drilling program Placer Dome reported that the Fork target was composed of several southeast plunging chute-like structures. Two of these structures (AD and BC zones) hosted deformed gold-bearing blue grey quartz veins proximal to deformation zones within the Russet Lake Ultramafic. The mineralization style was considered analogous to that of the 8 Zone Deposit, though the exploration program was unsuccessful in delineating a connection between the Fork and 8 Zone. The 2004 summary report recommended systematic drilling up dip and down dip of the AD and BC zones; which were regarded as highly prospective targets to discover another significant 8- Zone - type deposit (Dobrotin 2004).

In 2007, Claude Resources completed 17 exploration drill holes at Fork Deposit and followed up by extensive infill drilling in 2008–2009 (105 holes for 45,179 m) (Lichtblau et al., 2009). Drilling in 2008 focused on infilling to 30–40 m spacing and indicated mineralization was spatially related to two subparallel southeast-dipping shear zones that host narrow, discontinuous gold-bearing vein systems over a strike length of 400 m (Lichtblau et al., 2009). Significant intercepts included 13.91 g/t Au over 8.39 m and 15.77 g/t Au over 7.62 m. In 2009, additional drilling attempted to demonstrate continuity along the interpreted mineralized structures and define the limits of the known mineralization (Cole et al., 2010). No resource estimation was reported.

6.4 Previous Mineral Resource and Mineral Reserve Estimates

The Madsen mineral resources have been estimated by previous operators in 1999 and 2009. The details of each estimate are summarized in this section to serve as a comparison of the parameters used for estimation and classification in the past to help understand the changes evident in the current mineral resources presented in Section 14 of this report.

The reader is cautioned that the historical mineral resource and mineral reserve estimates discussed in this section were prepared before the development of NI 43-101. A qualified person has not done sufficient work to classify the historical estimate as current mineral resource or mineral reserve. Hence, the reader is cautioned that the figures should not be relied upon. The historical mineral resource and mineral reserve estimates are superseded by the Mineral Resource Statement reported in Section 14 of this document.

6.4.1 Pre-NI 43-101 Mineral Resource and Mineral Reserve Estimates

Annual estimates of mineral resource and mineral reserves inventories for the Madsen Mine were undertaken internally by mine staff using various sampling data. Typically, sampling from exposed development and stoping was used to estimate proven reserves, whereas closely spaced core drilling data were used for estimating probable reserves. Indicated and Inferred resources were extrapolated from widely spaced holes only. Independent audits were undertaken by ACA Howe in 1998 and 1999. Aspects of the last audit performed in 1999 (Patrick, 1999) are described in this section.

Mineral reserves for the Austin and McVeigh zones above level 6 were estimated by Madsen Mine staff using a polygonal methodology and the following parameters:

i. Assays were capped at 1 ounce of gold per ton (34.2857 g/t gold);
ii. Minimum geological width of 4 feet (1.22 m);
iii. Minimum mining width of 6 feet (1.83 m);
iv. A 15% dilution factor at 0.34 g/t gold for shrinkage mining, and a 20% dilution factor at 0.34 g/t gold for longhole stoping mining methods;
v. The tonnage factor of 2.85 tonnes per cubic metre;
vi. Area of influence around a drill intersection is defined as a rectangular block with horizontal and vertical sides tangential to a 7.62 m (25 feet) radius around the drill pierce point on a vertical longitudinal projection;
vii. Reported at a cut-off grade of 4.85 g/t gold derived from a gold price of US$325/oz. and a mill gold recovery of 95%.

Based on the above criteria, historical mineral resources and reserves were classified into the following categories:

i. **Inferred Resources** included blocks above the cut-off grade estimated from drill intersections with pierce points that were further apart than 22.86 m (75 feet). Confidence level 10–30%;
ii. **Indicated Resources** were blocks above the cut-off grade defined by three or more drill intersections with pierce points less than 22.86 m apart (75 feet). Confidence level 30–60%;
iii. **Probable Reserves** were restricted to 7.62 m (25 feet) above and below a drill intersection when grouped together in sets of four or less. Confidence level 75%;
iv. **Proven Reserves** lay adjacent to sampled mine openings, usually supported by drill intersections. The spatial characteristics, size, and mineral content of ore blocks were well established and ore blocks were at or above the mine cut-off grade. Proven reserves were extended to a maximum of 7.62 m (25 feet) beyond a

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sampled development if core or other sampling information supported the extension. Confidence level 85–90%.

An additional 76,245 tonnes at a grade of 11.71 g/t gold in proven pillar reserves above level 6 were not considered mineable at the time by the mine staff. ACA Howe included this material in the proven reserve category as they considered this material to represent a future reserve.

Although Madsen Mine staff did not process any data below level 6, ACA Howe considered it prudent to define all the material previously identified by previous operators as undiluted reserves below level 6 as Indicated resources. In addition, ACA Howe also identified additional Inferred resources for the Austin and McVeigh mineralized zones below level 6. A table summarizing the historical Madsen reserve and resource inventory as reported by ACA Howe is provided in Table 6.5. The reader is cautioned that the historical mineral resource and mineral reserve estimate was prepared before the development of National Instrument 43-101 guidelines, and that the figures reported in this table should not be relied upon. This historical mineral resource and mineral reserve estimate is superseded by the Mineral Resource Statement reported in Section 14 of this report.

Table 6.5: 1999 resource and reserve inventory for the Madsen Mine (Patrick, 1999)

Classification* / Zone	Quantity (tonnes)	Grade (g/t Au)	Contained Metal (ounces Au)	Quantity (tonnes)	Grade (g/t Au)	Contained Metal (ounces Au)
	Above Level 6			Below Level 6		
Reserves						
Proven						
Austin	72,153	10.97	25,451			
McVeigh	49.867	11.66	18,689			
No 1 Shaft	5,418	5.83	1,015			
Total	127,438	11.02	45,156			
Probable						
Austin	57,373	11.31	20,870			
McVeigh	130,407	6.86	28,750			
No 1 Shaft						
Total	187,780	8.22	49,620			
Resources						
Indicated						
Austin	63,286	8.57	17,440	565,331	12.38	225,086
McVeigh	36,108	8.91	10,349			
No 1 Shaft				801	7.89	203
Total	99,394	8.70	27,789	566,132	12.38	225,289
Inferred						
Austin	21,135	7.54	5,126	136,065	7.54	32,997
McVeigh	23,585	7.54	5,719	181,420	7.54	43,996
No 1 Shaft						
Total	44,720	7.54	10,845	317,485	7.54	76,993

**The reader is cautioned that the historical mineral resource and mineral reserve estimates were prepared before the development of National Instrument 43-101. A qualified person has not done sufficient work to classify the historical estimate as current mineral resources or reserves. Hence, the figures reported in this table should not be relied upon. The historical mineral resource and mineral reserve estimates are superseded by the Mineral Resource Statement reported in this report.*
The resource and reserve inventory reported in this table has been converted to metric system. Reported at a cut-off grade of 4.85 g/t gold considering a gold price of US$325 per troy ounce gold and metallurgical recoveries of 95%. Estimates include pillar reserves. This table is reproduced from Cole et al. (2016) without verifying figures.

6.4.2 Previous NI 43-101 Compliant Mineral Resource and Mineral Reserve Estimates

In 2008, Claude commissioned SRK Consulting (Canada) Inc. ("SRK") to prepare a resource estimate to NI 43-101 standards for four separate auriferous zones (Austin, South Austin, McVeigh, and 8 Zone) of the Madsen Mine. This resource estimate for the Austin, South Austin and McVeigh deposits is based on 13,617 drill holes (808,344 m) and 550,687 gold assays, current to September 27, 2009. For Zone 8, the resource estimate is based on a mixture of exploration holes, stope definition holes and stope chip samples, with the database current to July 7, 2009.

SRK divided the auriferous zones into 16 domains for geostatistical analysis, variography and grade estimation. Assays were composited to 2 m length in the Austin, South Austin and McVeigh deposits and to 1 m length in Zone 8. In different domains, high-grade composites were capped at 12–150 g/t Au, depending upon the grade distribution in each domain. Resource blocks in all zones measured 5 m x 5 m x 5 m; their grades were estimated by ordinary kriging.

In the Austin, South Austin and McVeigh deposits, Indicated Resources were deemed to consist of resource blocks with a minimum of 2 composites within variogram range; those blocks with one composite within twice the variogram range were deemed to be Inferred Resources. For 8 Zone, an Indicated classification was assigned to blocks located at elevations within 25 m below the lowest stope (elevation of 190 m), whereas an Inferred classification was assigned to all blocks below that elevation.

A cut-off grade of 5.0 g/t Au was used for the resource estimate, based on a gold price of US$1,000 per ounce and an assumed metallurgical recovery of 94%.

A table summarizing the Madsen reserve and resource inventory as reported by Cole et al. (2010) is provided in Table 6.6. This mineral resource estimate is superseded by the Mineral Resource Statement reported in Section 14 of this report. It has been included here for information only, and should not be relied upon.

Table 6.6: 2009 Madsen Gold Project mineral resource estimate (Cole et al., 2010)

Class*	Deposit	Quantity ('000 tonnes)	Au Grade (g/t)	Contained Metal ('000 oz Au)
Indicated	Austin	1,677	7.92	427
	South Austin	850	9.32	254
	McVeigh	374	9.59	115
	Zone 8	335	12.21	132
	Total	**3,236**	**8.93**	**928**
Inferred	Austin	108	6.30	22
	South Austin	259	8.45	70
	McVeigh	104	6.11	20
	Zone 8	317	18.14	185
	Total	**788**	**11.74**	**297**

**Mineral resources that are not mineral reserves do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Reported at a cut-off grade of 5.0 g/t gold based on US$1,000 per troy ounce gold and gold metallurgical recoveries of 94%. The mineral resource estimate in this table is superseded by the Mineral Resource Statement reported in Section 14 of this report and should not be relied upon.*

7. Geological Setting and Mineralization

7.1 Regional Geology

The Madsen Gold Project is located within the Archean craton of the Superior Province of the Canadian Shield. It occupies part of a regional geologic domain characterized by volcanic-plutonic rocks termed the Uchi Subprovince which is bound to the north by the Berens River Subprovince (pluton dominated) and to the south by the English River Subprovince (metasediment dominated). These three subprovinces amalgamated through tectonic processes at ca. 2700 Ma during the Kenoran orogeny (Stott et al., 1989).

7.1.1 Uchi Subprovince

The Uchi Subprovince is approximately 570 km long by 50 km wide and comprises a series of plutonic rocks discontinuously surrounded by arcuate belts of supracrustal rocks, predominately volcanic and subordinate metasedimentary rocks. Continuously trending packages of supracrustal rocks are referred to as greenstone belts due to their typically green colour owing to widespread greenschist-grade metamorphism. Globally, Archean greenstone belts are responsible for about 18% of historical gold production (Roberts, 1988) and the Uchi Subprovince is a significant contributor. Most Uchi greenstone belts have some recorded historical gold production but all pale by comparison to the well-endowed Red Lake Greenstone Belt which boasts 28.9 million ounces of gold production to the end of 2016 (Lichtblau et al., 2017).

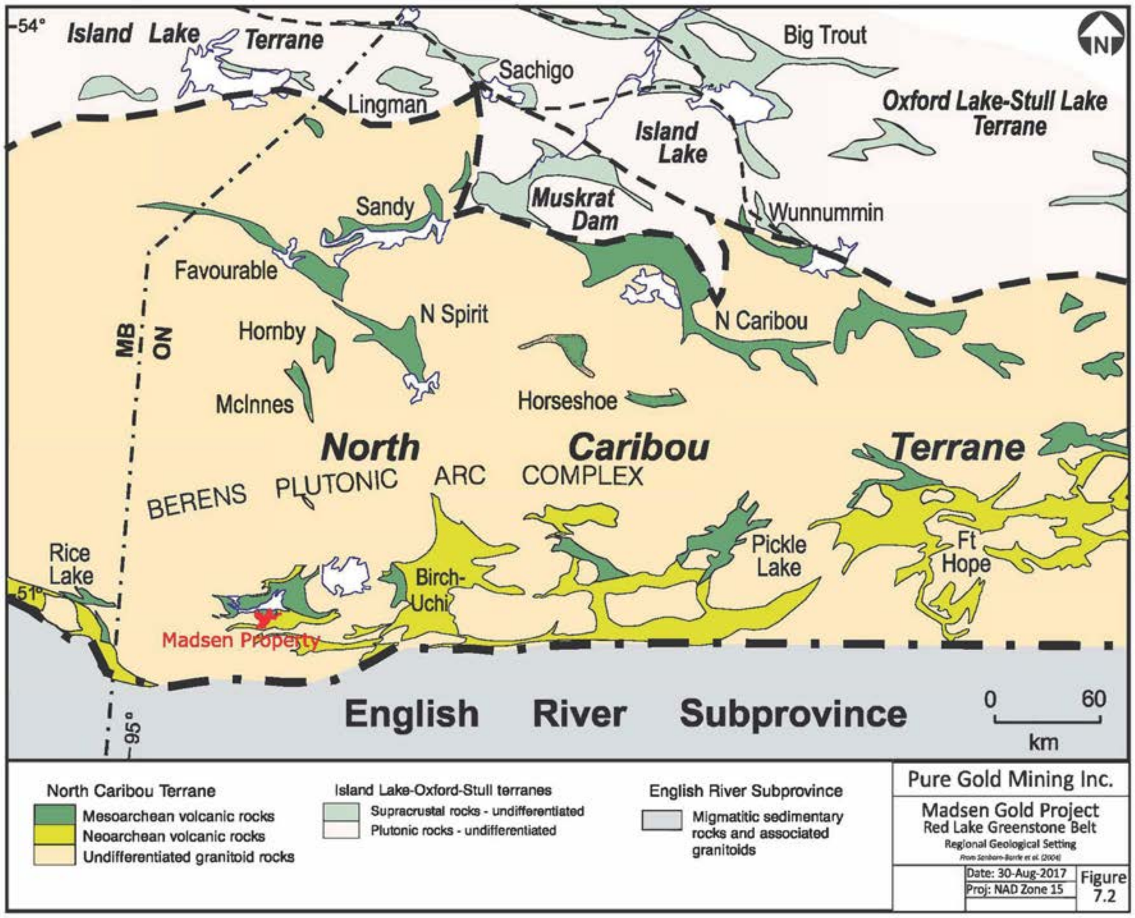

Figure 7-1: Geology of the Uchi Subprovince showing location of the Madsen Property *in the Red Lake Greenstone Belt. From Sanborn-Barrie et al. (2004b) and drafted by Equity, August 30, 2017.*

7.1.2 Red Lake Greenstone Belt

The Red Lake Greenstone Belt is approximately 50 km by 40 km in dimension and comprises a series of ca. 2.99–2.70 Ga supracrustal rocks intervening between three main grainitoid batholiths ranging from 7 to 20 km across (Figure 7-2). The supracrustal rocks have been stratgraphically divided into eight assemblages and the following descriptions of these are taken from Sanborn-Barrie et al. (2004b).

7.1.2.1 Balmer Assemblage

The oldest volcanic rocks in the Red Lake greenstone belt comprise predominately tholeiitic mafic and komatiitic ultramafic rocks of theca. 2.99–2.96 Ga Balmer Assemblage. Significantly, all the belt's major gold deposits are hosted in Balmer rocks. The assemblage consists of lower, middle, and upper massive to pillowed tholeiitic sequences separated by distinctive felsic and ultramafic volcanic rocks. Metasedimentary rocks also occur within the assemblage, mainly as thinly bedded magnetite-chert iron formation.

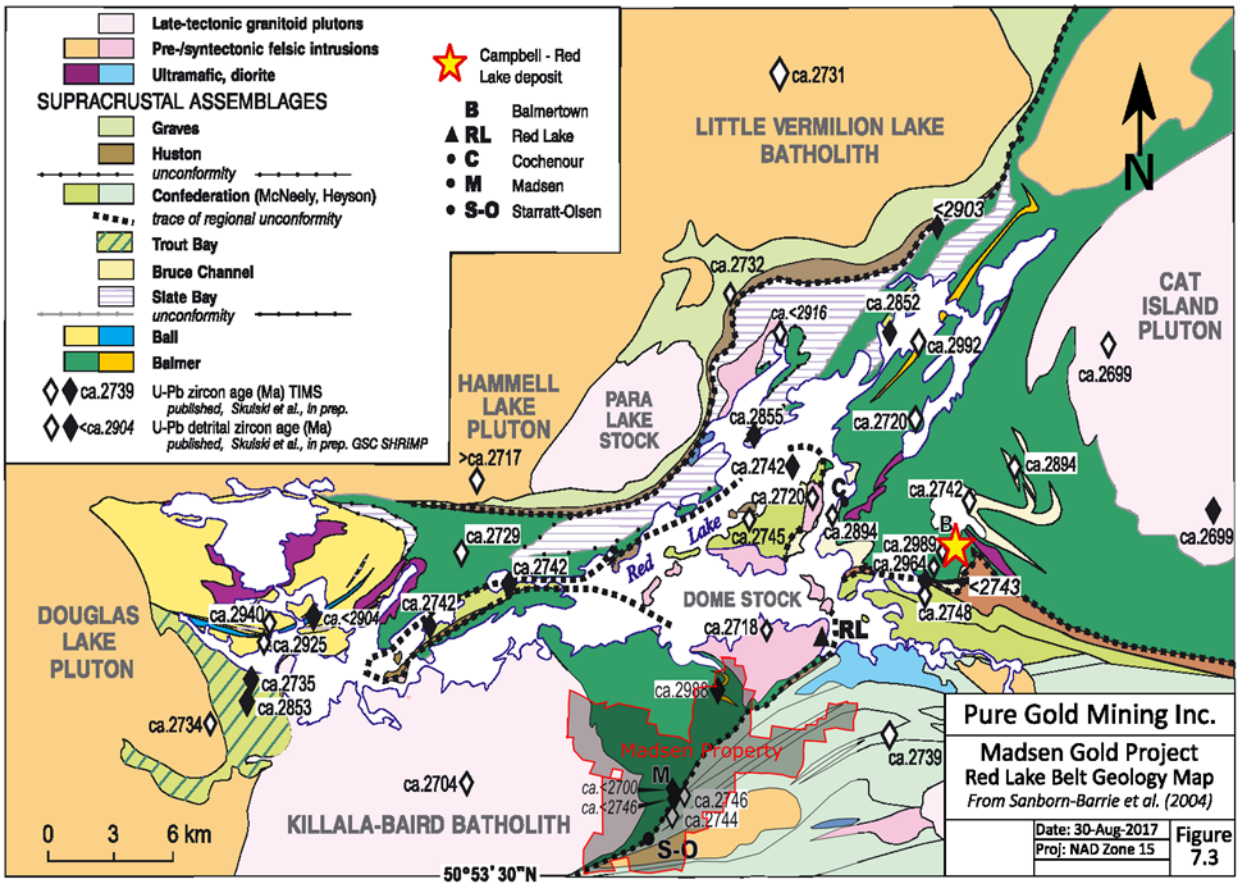

Figure 7-2: Simplified Geology of the Red Lake Greenstone Belt. *Madsen Property is shown in red with grey shading. From Sanborn-Barrie et al. (2004b) and drafted by Equity, August 30, 2017.*

7.1.2.2 Ball Assemblage

Underlying the northwestern portion of the Red Lake Greenstone Belt is the ca. 2.94-2.92 Ga Ball Assemblage, comprising a thick sequence of metamorphosed intermediate to felsic calc-alkaline flows and pyroclastic rocks.

7.1.2.3 Slate Bay Assemblage

The Slate Bay Assemblage extends the length of the belt and lies disconformably on Balmer and Ball assemblage volcanic rocks. It comprises clastic rocks of three main lithological facies varying from conglomerates, quartzose arenites, wackes, and mudstones. Detrital zircon data indicate that the Slate Bay clastic material is mostly derived from Ball Assemblage rocks with minor input from Balmer Assemblage rocks. Based on the youngest zircon ages, the maximum age of deposition for the Slate Bay Assemblage is ca. 2916 Ma whereas overlying ca. 2850 Ma volcanic rocks (Trout Bay Assemblage) provide a minimum age for deposition (Corfu et al., 1998; Sanborn-Barrie et al., 2004b).

7.1.2.4 Bruce Channel Assemblage

A thin (<500 m) sequence of calc-alkaline dacitic to rhyodacitic pyroclastic rocks, clastic sedimentary rocks and banded iron formation is dated at ca. 2.89 Ga and assigned to the Bruce Channel Assemblage. Enriched LREE trace element profiles relative to the Balmer assemblage are interpreted to indicate crustal growth at a juvenile continental margin.

7.1.2.5 Trout Bay Assemblage

The Trout Bay Assemblage was previously correlated with Balmer rocks but represents a distinct sequence in the northwestern part of the belt. It comprises tholeiitic basalt, clastic rock and iron formation. An interbedded, intermediate tuff returned a ca. 2.85 Ga age for this assemblage.

7.1.2.6 Confederation Assemblage

Following a hiatus in volcanic activity for approximately 100 million years, the Confederation assemblage records a time of widespread calc-alkaline volcanism from ca. 2,748–2,739 Ma. A ca. 2,741 Ma (Lichtblau et al., 2012) quartz-feldspar-porphyritic lapilli tuff forms a distinctive basal Confederation assemblage unit within the Madsen Mine area.

Overlying the McNeely sequence in the Confederation assemblage is the Heyson sequence of tholeiitic basalts and felsic volcanic rocks. Isotopic and geochemical data suggest the McNeely rocks were formed during a shallow marine to subaerial arc on the existing continental margin with later intra-arc extension and eruption forming the Heyson sequence. In the Madsen area, the strata of the Confederation and Balmer assemblages depict an angular unconformity with opposing facing directions. The Balmer Assemblage was, thus, at least tilted and possibly overturned prior to the deposition of the Confederation Assemblage (Sanborn-Barrie et al., 2001).

7.1.2.7 Huston Assemblage

Following the Confederation Assemblage, the Huston Assemblage (approximately between 2,742 and 2,733 Ma) records a time of clastic sedimentary deposition varying from immature conglomerates to wackes. The Huston Assemblage has been compared to the Timiskaming conglomerates commonly associated with gold mineralization in the Timmins camp of the Abitibi greenstone belt (Dubé et al., 2003).

7.1.2.8 Graves Assemblage

The ca. 2.73 Ga Graves Assemblage comprises andesitic to dacitic pyroclastic tuff on the north shore of Red Lake. It is interpreted to represent the volcanic deposits of a shallow water to subaerial arc complex. It overlies and is locally transitional with the Huston Assemblage.

7.1.2.9 Intrusive Rocks

Intrusive rocks found in the Red Lake Greenstone Belt generally coincide with the various stages of volcanism described in the assemblage sections above. In the simplest interpretation, these intrusive rocks are the subvolcanic feeders to the extrusive volcanism that occurred at the earth's

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surface. These rocks include mafic to ultramafic intrusions during Balmer and Ball time periods, gabbroic sills related to Trout Bay volcanism, felsic dykes and diorite intrusions during the Confederation Assemblage, as well as, intermediate to felsic plutons, batholiths, and stocks of Graves Assemblage age.

Post-volcanism plutonic activity is also evident from granitoid rocks such as the McKenzie Island stock, Dome Stock, and Abino granodiorite (2,720 and 2,718 Ma), which were host to past producing gold mines. The last magmatic event recorded in the belt is from about 2.7 Ga and includes a series of potassium-feldspar megacrystic granodiorite batholiths, plutons and dykes, including the post-tectonic Killala-Baird batholith. The contact between Killala-Baird granodiorite and the Balmer Assemblage volcanics is well exposed on the Madsen property at Flat Lake.

7.1.2.10 Deformation History

The structural and deformation history of the Red Lake Greenstone Belt is summarized here from the published regional mapping of Sanborn-Barrie (Sanborn-Barrie et al., 2004a; Sanborn-Barrie et al., 2001; Sanborn-Barrie et al., 2000; Sanborn-Barrie et al., 2004b). Note that more detailed, recent work at the Madsen Gold Project has developed a modified structural history and this is discussed in the next section.

The earliest deformation event (denoted as D_0) involved non-penetrative deformation which resulted in tilting of Balmer Assemblage rocks prior to Confederation-aged volcanism. Evidence for this is cited as opposed younging directions on either side of the Balmer/ Confederation unconformity near Madsen and within central Red Lake.

The main stage of penetrative deformation (i.e. that which has imposed a strong tectonic fabric to the rocks) occurred post Confederation time (<2.74 Ga). This D_1 event resulted in formation of northerly-trending F_1 folds including a NNW-trending fold that trends through the centre of the Madsen Property concordant with the Killala-Baird batholith contact. Sanborn-Barrie suggests that D_1 deformation was completed prior to deposition of ca. 2.73 Ga Graves Assemblage volcanic rocks since these do not seem to be affected by F_1 folds.

Superimposed on these early (D_1) structures are E to NE-trending D_2 structures in the western and central Red Lake Greenstone Belt. These same structures trend SE in the eastern part of the belt. This change in orientation is gradual – consistent with coeval timing rather than an overprinting relationship. Significantly, Sanborn-Barrie views the penetrative deformation events as widespread and affecting the entire belt rather than strongly partitioned into crustal-scale shear zones as proposed by an earlier round of researchers (e.g. Andrews et al., 1986). The timing of D_2 strain is constrained by the ca. 2.72 Ga Dome Stock which exhibits a weak S_2 fabric but country rock xenoliths within the pluton exhibit a penetrative S_2. Sanborn-Barrie suggests that this means the deformation largely predated Dome Stock but continued after stock emplacement which brackets the timing at about 2.72 Ga and this deformation is therefore linked to the Uchian orogeny. Since the post 2.70 Ga English River Assemblage conglomerate is deformed by a penetrative S_2 fabric, this suggests that D_2 was a protracted event.

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In summary, Sanborn-Barrie's deformation history of the Red Lake Greenstone Belt involves tilting of Balmer stratigraphy (D_0) followed by penetrative foliation development during belt-scale folding (D_1) post-Confederation time and lastly, widespread overprinting of D_1 structures by an S_2 foliation.

7.2 Property Geology

The Madsen Property is underlain by Balmer, Confederation and possibly Huston Assemblage supracrustal rocks (Figure 7-3). These rocks are cut by a series of plutonic rocks (post-tectonic Killala-Baird batholith to the west and syntectonic Dome Stock to the east) and associated smaller sills and dykes. Although detrital zircon geochronological data suggests that epiclastic rocks near the Madsen Mine belong to the Huston or English River Assemblages (Lichtblau and Storey, 2015; Lichtblau et al., 2012; Sanborn-Barrie et al., 2004b), the sequence of these units based on drilling data suggests that the Huston Assemblage underlies the Confederation Assemblage. This is difficult to reconcile with regional relations so these units are herein grouped with the Confederation Assemblage until more geochronological data is available.

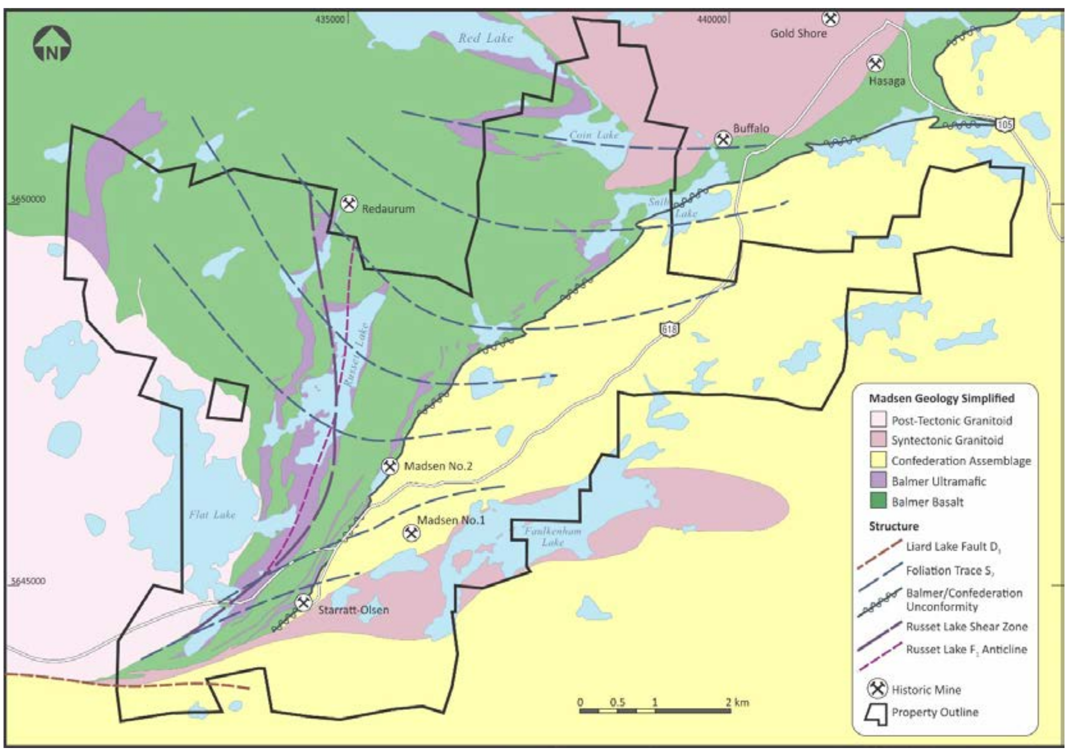

Figure 7-3: Simplified geology map of the Madsen Property - *area showing traces of the main structural features. An F1 axial trace trends along the core of the Russet Lake ultramafic volcanic unit (purple unit underlying Russet Lake). Minor displacement along the Russet Lake Shear Zone likely occurred during D1 and is linked with the gold event at 8 Zone which occurs at depth along this structure. A regional overprinting S2 foliation cuts obliquely across Balmer and Confederation Assemblage rocks and overprints gold mineralization at Madsen and Starratt. Drawn by D. Baker, September 10, 2017.*

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7.2.1 Structural Geology

Given the significant role that deformation-related structures (e.g. shear zones and fault zones) play in transporting and focusing gold-bearing fluids in orogenic gold systems, determining the structural architecture and deformation history of the Madsen Gold Project has been a focus of surface exploration work since the property was acquired by Pure Gold (Baker, 2014a, b; Baker and Swanton, 2016; Cooley and Leatherman, 2014a, b, 2015). Additionally, oriented core drilling data along with three-dimensional interpretation of major lithological contacts has constrained the relations between the Madsen host stratigraphy, gold-bearing structures and deformation features.

Based on surface mapping and core analysis, most supracrustal rocks exhibit a tectonic foliation which is the most common structural element present across the property. The intensity of this foliation varies widely from a decimetre-scale-spaced planar fabric to an intense, sub-millimetre-spaced schistosity with local shear-related fabrics. Mafic rock units such as massive and pillowed Balmer basalt (BSLT), typically do not exhibit strong tectonic foliations. By contrast, felsic units of the Confederation Assemblage (e.g. FVOL) readily developed foliations owing to a bulk chemistry that encourages phyllosilicate (e.g. sericite) growth during stress-related recrystallization and metamorphism. As such, use of a qualitative determination of “intensity” of strain must be used with caution because this is a rock composition dependant feature. The focus of Madsen surface work has been on recording structures from outcrop to outcrop with the understanding that a given foliation in Confederation Assemblage felsic volcanic rock will manifest itself much differently in adjacent Balmer basalt across the regional unconformity.

The deformation history of the Madsen Gold Project is best summarized with three deformation events: D_1, D_2 and D_3. Identification and interpretation of these structures is not everywhere unambiguous, but these sets of structures show the best continuity across surface outcrop and drill hole data.

D_1 deformation is confined to Balmer-aged rocks and equates to the D_0 event of Sanborn-Barrie et al. (2004b). Outcrop-scale evidence for this event is largely absent because, as described above, the unaltered mafic and ultramafic rocks of the Balmer Assemblage do not readily develop penetrative foliations. The strongest evidence, however, is the property-scale map pattern showing repetition of Balmer stratigraphic units on the east and west sides of the Russet Lake ultramafic body. Taken alone, this pattern could be explained by structural duplication but opposing, consistent and numerous pillow tops way-up indicators in both ultramafic and mafic rocks (Atkinson, 1993) suggest that the Russet Lake ultramafic is the core of an isoclinal antiform with an overturned western limb. Although no widespread penetrative foliation developed during this folding event, strain was seemingly partitioned into axial planar shear zones such as the Russet Lake shear zone, an interpreted ductile shear zone that is concordant with the F_1 fold axis which trends along the core of the Russet Lake ultramafic body. Importantly, this structure seems to exert controls on gold mineralization (8 Zone) and by extension, other gold mineralization on the property including the Austin, South Austin, A3, McVeigh and Starratt are possibly linked to this generation of structure. The current interpretation is that these individual, planar deposits all formed within early (D_1?) planar structures.

S_1 deformation fabrics are difficult to identify and only locally are S_1/S_2 overprinting relationships observed. Within these structures, the rock has been strongly overprinted by D_2 deformation and metamorphism such that most D_1 structures are obliterated. As such, characterizing these structures is difficult because of later strain and metamorphism so it is unclear if these structures behaved in a ductile (i.e. shear zones), brittle (i.e. fault or breccia zones) or a combination of both strain types. What is clear, however, is that these structures and associated gold mineralization pre-date the penetrative regional D_2 foliation.

The strongest evidence for these being early structures is the planar geometry and scale as well as their low angle oblique relationship to lithological contacts and the Balmer / Confederation unconformity. This is based on systematic geological interpretation and contradicts early descriptions that suggest the Madsen deposit is stratabound and occurs at the unconformity (Dubé et al., 2000). In detail, the Madsen deposits trend away from the unconformity and locally (e.g. the Austin deposit) end at the unconformity surface. Significantly for exploration, this opens up a voluminous sequence of prospective host rocks away from the unconformity. Stated another way, with this interpretation, gold prospectively does not decrease away from the unconformity and indeed the high-grade 8 Zone is an example of significant gold mineralization well down section from the unconformity.

No evidence exists that Confederation assemblage rocks were affected by F_1 folds such as the Russet Lake anticline or other F_1 folds in the eastern part of the Red Lake Greenstone Belt (Sanborn-Barrie et al., 2004b). As such, the current interpretation is that D_1 predates 2,744 Ma.

The second generation of structural fabric development at Madsen includes a conspicuous, penetrative, regional foliation (S_2) which is generally consistent with the D_2 structural trends of Sanborn-Barrie et al. (2004b). As described above, this foliation has been described as parallel to the Balmer / Confederation unconformity and to represent a major transcurrent, regional shear zone (e.g. Hugon and Schwerdtner, 1988). By contrast, recent detailed data shows that this fabric consistently cuts across the unconformity with no displacement of lithological contacts. Minor (10s of metres scale) S-shaped folds are defined by lithological contacts and also by historical outlines of Madsen orebodies on numerous original underground level plans (Horwood, 1940). The S_2 foliation is axial-planar to these small folds linking the S-folds to D_2.

The latest deformation to affect the Madsen Gold Project is localized brittle faulting. Such faults are rare across the property, particularly in the Madsen Mine area but are common at Starratt where they are characterized by metre-scale intervals of fault breccia and fault gouge recovered in recent drill core. These are most likely steeply-dipping, approximately east-west trending and related to faulting along the southern contact of the Killala-Baird Batholith (e.g. the Liard Lake fault of Sanborn-Barrie et al., 2004b). These faults clearly post-date gold deposition as they locally displace gold mineralized lenses at Starratt but offsets seem to be less than a few metres.

Generally, the deformation history outlined for the Madsen Gold Project above is consistent with that for the Red Lake Greenstone Belt (Sanborn-Barrie et al., 2004b). Sanborn-Barrie interprets a tilting-only event to explain the angular relation between Balmer and Confederation Assemblage rocks but the pre-Confederation deformation event appears to be much more significant and involved broad folding (F_1 folds of Sanborn-Barrie et al., 2004b) of Balmer rocks across the belt.

Early, planar structureshost gold mineralization at Madsen and Starratt and may coincide with F_1 folding since they are at least locally axial-planar to F_1 structures. Significantly, Confederation rocks are not affected by these folds so the interpretation herein is that D_1 predates 2,744 Ma. Therefore only minor differences between the deformation history of Sanborn-Barrie et al. (2004b) and the working deformation history for the Madsen Gold Project are required. These include the intensity of Balmer-only deformation and the lack of requiring a cryptic, tilting-only D_0 deformation as this tilting is accomplished via F_1 folding.

The following sections briefly describe the recognized supracrustal, metasomatic (altered), vein and intrusive rock units that are present across the Madsen Gold Project and form the basis of geological mapping and drill core logging database.

7.2.2 Balmer Assemblage Rocks

The oldest rocks underlying the Madsen Gold Project below to the ca. 2.99-2.96 Ga Balmer Assemblage comprising predominantly mafic volcanic and intrusive rocks with minor ultramafic volcanic and intrusive rocks, and metasedimentary rocks including narrow iron formations which serve as useful stratigraphic markers. Each of the logged and mapped Balmer lithologies are described below.

7.2.2.1 Peridotite

Peridotite (PRDT) sills and flows with komatiitic geochemistry are common within the Balmer Assemblage. These ultramafic bodies are often altered to serpentine-magnetite or talc (Figure 7-4a), but where their original textures are preserved both primary intrusive and extrusive features have been observed. On this basis and on Al_2O_3-TiO_2 ratios which chemically classify an Al-depleted komatiite derived from a depleted mantle source and an Al-undepleted komatiite as distinct units with different source magmas. Spatial relationships of these two chemical units combined with field relationships and primary textures have allowed discrimination into two main units: (1) an intrusive or largely intrusive unit and (2) an extrusive unit named the Russet lake Ultramafic (Figure 7-4b, and Figure 7-4c). PRDT is not itself prospective for gold mineralization at Madsen, it is not known whether this is related to its chemical or physical nature but it is rarely significantly hydrothermally altered. However, this unit has an important close spatial relationship with all known gold zones.

7.2.2.2 Pyroxenite

Medium to coarse grained Pyroxenite (PXNT) (Figure 7-4d) occurs within composite sills with PRDT (Section 7.2.2.1) within the Balmer Assemblage. The close association of PXNT and PRDT in these sills suggests that PXNT is a product of olivine fractionation during the emplacement of the sills (Mackie, 2016). Due to its lack of hydrothermal alteration, PXNT is not itself prospective for gold mineralization at Madsen except as part of a composite sill with PRDT as described above.

7.2.2.3 Iron Formation

Iron formation (IRFM) occurs exclusively within the Balmer Assemblage in the Madsen area, forming 0.1–1 m thick beds within rare clastic sedimentary packages or more commonly between individual basalt flows. Three types are recognized at Madsen: chert magnetite iron formation (Figure 7-4: Photos of type ultramafic and iron formation units in half-sawn drill core.e), garnet-rich silicate iron formation (Figure 7-4: Photos of type ultramafic and iron formation units in half-sawn drill core.f, g), and chert sulphide iron formation (Figure 7-4: Photos of type ultramafic and iron formation units in half-sawn drill core.h). Silicate iron formations seem generally less prospective than sulphide iron formations which ubiquitously host low-grade (<1 g/t Au) gold mineralization, with much higher grades (>10 g/t Au) possible where intersected by mineralized structures.

7.2.2.4 Metasedimentary Rock

Bedded, clastic metasedimentary rocks (MTSD) (Figure 7-6: Photos of type Balmer Assemblage units in half-sawn drill corea, b) occur as isolated, thin (1–10 m) units hosted within the volcanic package. They typically contain garnet, staurolite, andalusite, and amphibole porphyroblasts indicating an aluminous parent rock.

7.2.2.5 Basalt

Dark green-brown, fine grained, unaltered basalt (BSLT) (Figure 7-6: Photos of type Balmer Assemblage units in half-sawn drill corec) is the most common lithology in the Balmer Assemblage. Basaltic flows are typically massive but are locally pillowed, with rare flow top breccias and hyaloclastic textures preserved. Unaltered basalt has low prospectively for gold mineralization but altered Balmer basalt is the main host to gold mineralization on the Madsen Property, particularly when proximal to PRDT units.

7.2.2.6 Gabbro

Dark grey, massive, equigranular, medium to coarse grained gabbro (GBRO) (Figure 7-6: Photos of type Balmer Assemblage units in half-sawn drill cored) cuts basalt rocks and shows relatively high ratios of Mg, Ni and Cr relative to younger Confederation gabbro (O'Connor-Parsons, 2015). Gabbro is not prospective for gold mineralization at Madsen.

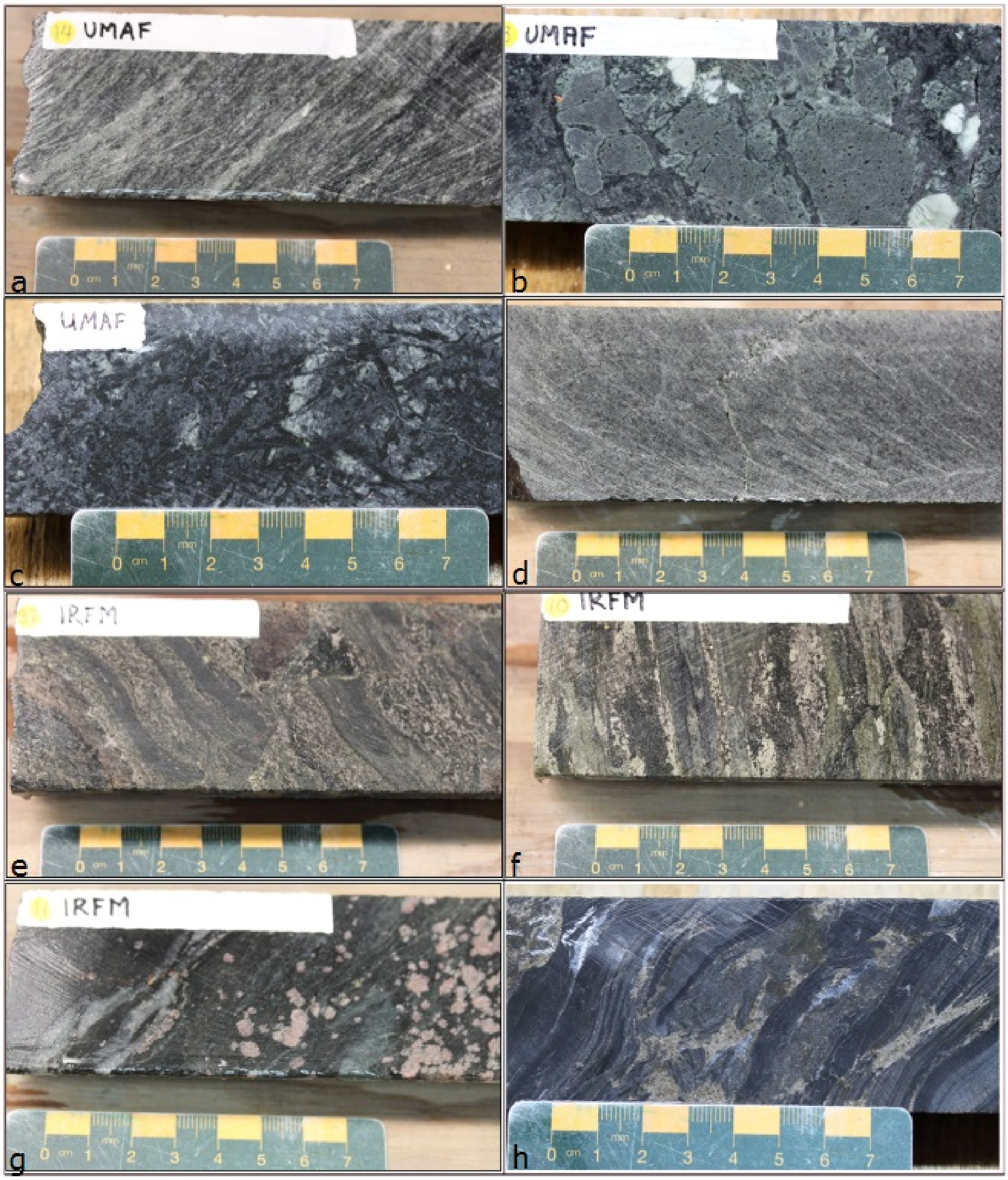

Figure 7-4: Photos of type ultramafic and iron formation units in half-sawn drill core. *(a) Serpentinized PRDT, typical of the margins of PRDT bodies, (b) fragmental PRDT from the Russet Lake Ultramafic, (c) pyroxene-phyric PRDT, (d) Coarse, crystalline, equigranular PXNT, (e) IRFM with chert bands separated by garnet-amphibole layers, (f) amphibole-garnet rich silicate IRFM, (g) garnet rich silicate IRFM, (h) finely-laminated sulphide-rich IRFM.*

7.2.3 Confederation Assemblage Rocks

7.2.3.1 Felsic Volcanic

Felsic volcaniclastic rocks (FVOL) form the majority of the lower Confederation Assemblage comprising ash, lapilli tuff and juvenile epiclastic rocks sourced from tuffaceous material (Figure 7-5: Photos of type Confederation Assemblage units in half-sawn drill corea) that commonly directly overlies the quartz crystal-lithic rhyolite tuff (QPXL, section 7.2.3.3). FVOL is not prospective for gold mineralization at Madsen, except where cut by late quartz veins that host remobilized gold.

7.2.3.2 Intermediate Volcanic

Dark coloured, lustrous, intermediate volcanic rocks overlie the felsic volcaniclastic rocks (FVOL) of the Confederation Assemblage in the Madsen area. This unit comprises massive and locally pillowed or variolitic flows (Figure 7-5: Photos of type Confederation Assemblage units in half-sawn drill coreb). This unit is not prospective for gold mineralization at Madsen, except where cut by late quartz veins that host rare, remobilized gold.

7.2.3.3 Quartz Crystal and Lithic Rhyolite Tuff

A distinctive, quartz crystal-rich lithic-crystal tuff (QPXL) forms the majority of the lowest Confederation Assemblage in the Madsen area. The unit includes 5-15% quartz phenocrysts and rare flattened lithic fragments in a silica rich, sericitic, tuffaceous matrix (Figure 7-5: Photos of type Confederation Assemblage units in half-sawn drill corec). QPXL is locally interbedded with lenses of clastic metasedimentary rock and is not prospective for gold mineralization at Madsen, except where it hosts remobilized gold from the underlying Balmer units. QPXL is dated at ca. 2,741 Ma (Lichtblau et al., 2012) near Madsen Mine.

7.2.3.4 Conglomerate

A pebble-cobble conglomerate (CONG) makes up the lowest part of the Confederation Assemblage where it locally underlies the lithic-quartz crystal tuff. However, a similar unit is also found locally elsewhere in the stratigraphic sequence and in the Balmer Assemblage. This unit would be interpreted as Huston Assemblage by Sanborne-Barrie et al. (2004b). Flattened but identifiable clasts may be of mafic or felsic origin (Figure 7-5: Photos of type Confederation Assemblage units in half-sawn drill cored). The brown matrix locally contains porphyroblasts of staurolite, andalusite, garnet, and amphibole. This unit is not prospective for gold mineralization at Madsen, except where hosts remobilized gold from the underlying Balmer units.

7.2.3.5 Metasedimentary Rock

Bedded, clastic metasedimentary rocks (MTSD) (Figure 7-6: Photos of type Balmer Assemblage units in half-sawn drill corea, b) are present in both the Balmer and Confederation assemblages as thin (1-10 m) units within volcaniclastic packages. They commonly host garnet, staurolite, andalusite, and amphibole porphyroblasts indicating an aluminous parent rock. In the Confederation Assemblage, these units have low gold prospectivity.

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7.2.3.6 Basalt

Dark green-brown, fine-grained, unaltered basalt (BSLT) (Figure 7-6: Photos of type Balmer Assemblage units in half-sawn drill corec) is the most common lithology in the Balmer Assemblage but is less abundant in the Confederation Assemblage. Basaltic flows are typically massive but variations include pillowed, flow top breccia and hyaloclastic textures. Confederation basalt has low prospectively for gold mineralization and is typically massive.

7.2.3.7 Gabbro

Dark grey, massive, equigranular, medium to coarse grained gabbro (GBRO) (Figure 7-6: Photos of type Balmer Assemblage units in half-sawn drill cored) are Fe-rich relative to older Balmer gabbro. None of the gabbros identified are prospective for gold mineralization at Madsen.

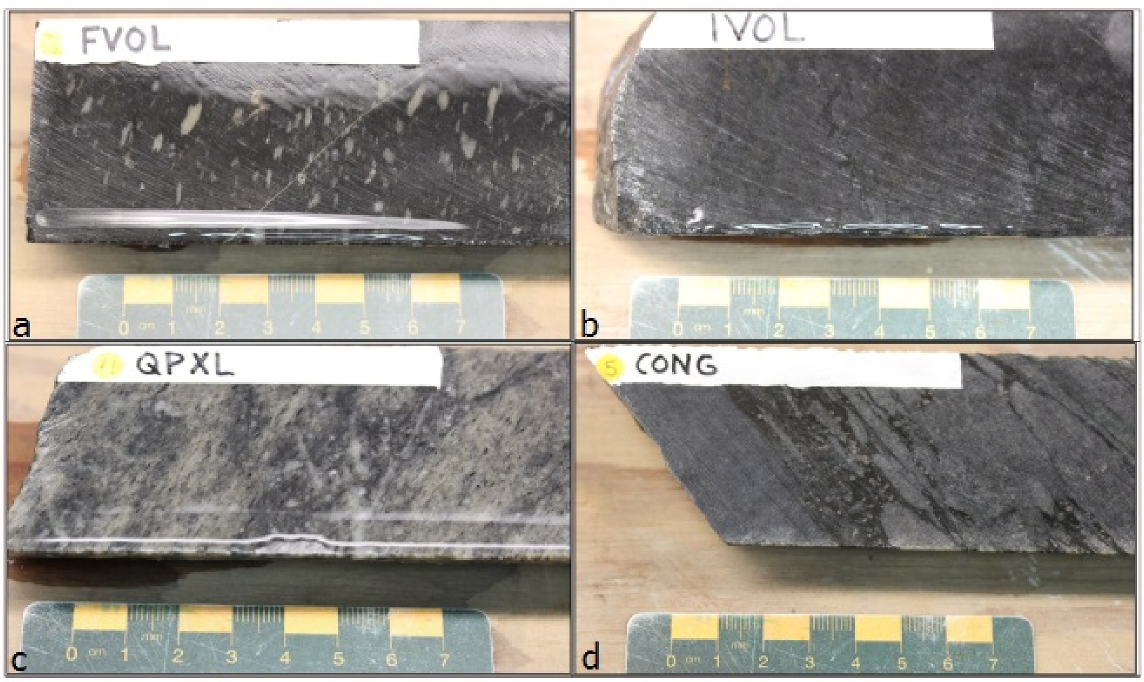

Figure 7-5: Photos of type Confederation Assemblage units in half-sawn drill core *(a) Felsic volcaniclastic rock (FVOL), (b) intermediate variolitic volcanic flow (IVOL), (c) lithic-quartz crystal rhyolite tuff (QPXL), (d) pebble-cobble bearing conglomerate (CONG) – light coloured domains represent flattened clasts.*

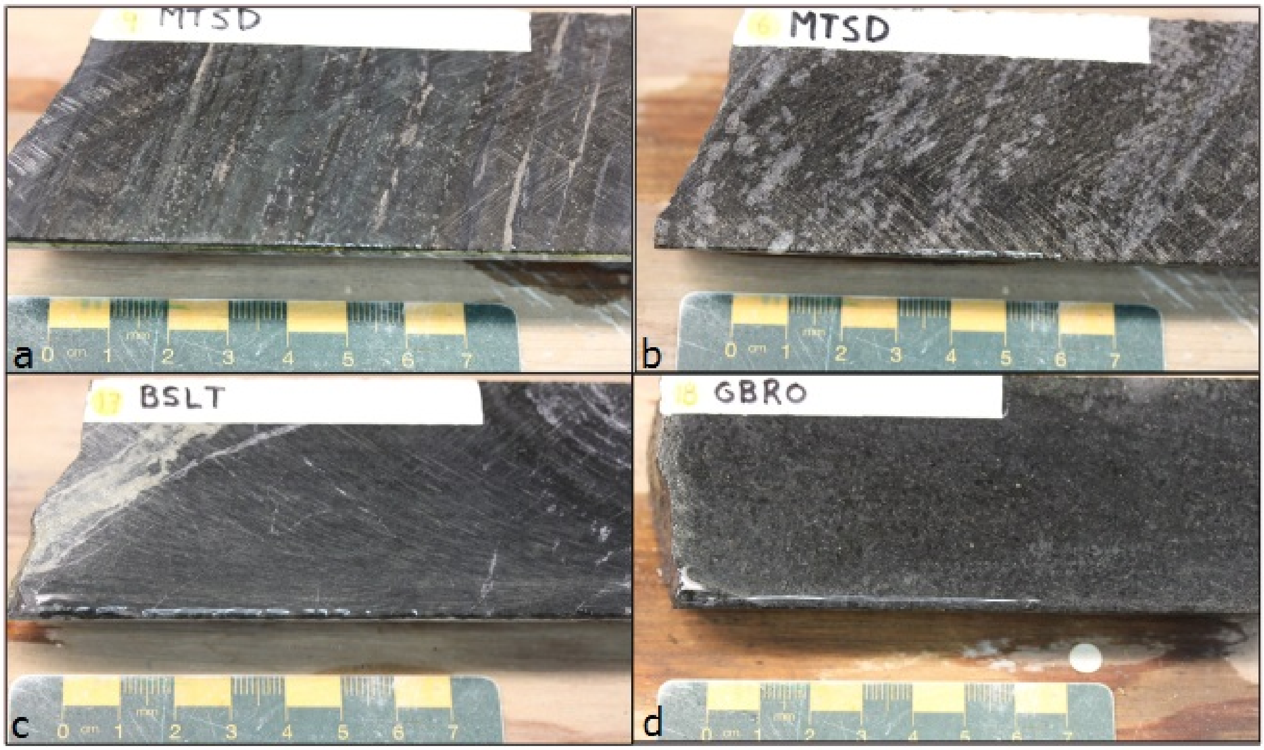

Figure 7-6: Photos of type Balmer Assemblage units in half-sawn drill core. *(a) Typical MTSD showing primary laminations, (b) aluminosilicate-rich MTSD, (c) calcite-veined dark green, fine grained BSLT, (d) typical medium to coarse grained GBRO.*

7.2.4 Vein Types

7.2.4.1 Quartz-Carbonate Veins

Carbonate-quartz veins (VQCB) (Figure 7-7: Photos of type vein examples in half-sawn drill corea) commonly fill tension gashes and extensional zones in BSLT and GBRO. They do not carry gold and are not associated with gold-bearing structures.

7.2.4.2 Early Carbonate-Magnetite Veins

White-grey to violet grey, massive to dismembered, fine-grained, early carbonate-magnetite veins (VECB) (Figure 7-7: Photos of type vein examples in half-sawn drill coreb), occur only within Balmer Assemblage rocks and were emplaced early in the deformation history. These veins are overprinted (metamorphosed) by later amphibole-bearing veins or nearly completely replaced by VNDI. This vein type has a close spatial association with gold mineralization, and although they seemingly predate the gold mineralizing event in detail, broadly they seem part of the same hydrothermal system. The consistent and locally intense metamorphic overprint of these veins resembles a skarn assemblage as suggested by Dubé et al. (2000) but these mineral phases grew from metamorphism of a pre-existing carbonate alteration event.

7.2.4.3 Diopside Replacement Veins

Light green, massive, coarse crystalline diopside-quartz-amphibole-calcite veins (VNDI) (Figure 7-7: Photos of type vein examples in half-sawn drill corec) represent the partial to total replacement of early magnetite-carbonate veins (VECB). These veins are highly prospective for gold mineralization, especially along vein margins where VNDI is in contact with altered country rock, quartz veins, or quartz porphyry.

7.2.4.4 Quartz Veins

Fine grained, white to translucent, mono-mineralic quartz veins (VNQZ) (Figure 7-7: Photos of type vein examples in half-sawn drill cored) cut both Balmer and Confederation rocks. These veins do not have a clear association with any gold-bearing structures although a few contain remobilized gold.

7.2.4.5 Blue-Grey Quartz Veins

Blue-grey to white, massive, recrystallized quartz veins (VBGQ) (Figure 7-7: Photos of type vein examples in half-sawn drill coree) are commonly associated with gold mineralization at both the Russet South and 8 Zone Deposits and have only been identified within Balmer rocks. This vein set is folded and/or boudinaged and clearly pre-dates D_2 deformation, consistent with a D_1 timing for gold mineralization. These veins are highly prospective for gold mineralization. Gold is present as unevenly distributed, discrete gold grains within the vein mass. Narrow zones of biotite and amphibole are commonly present on the immediate selvages of these veins. This vein set may relate to more pervasive silicification within the main Madsen deposits.

7.2.4.6 Quartz-Tourmaline Veins

Black and white, crystalline, quartz-tourmaline veins (VQTM) (Figure 7-7: Photos of type vein examples in half-sawn drill coref) fill tensional fractures in unaltered basalt and gabbro. At the Treasure Box showing and other deposits off of the Madsen property these veins host bonanza-grade gold. These veins are common across the Red Lake Greenstone Belt particularly proximal to the Dome Stock suggesting a temporal and genetic relationship. They occur late in the temporal sequence and seem to be more brittle in nature. At Madsen, they are rare and cut across the main, penetrative S_2 foliation.

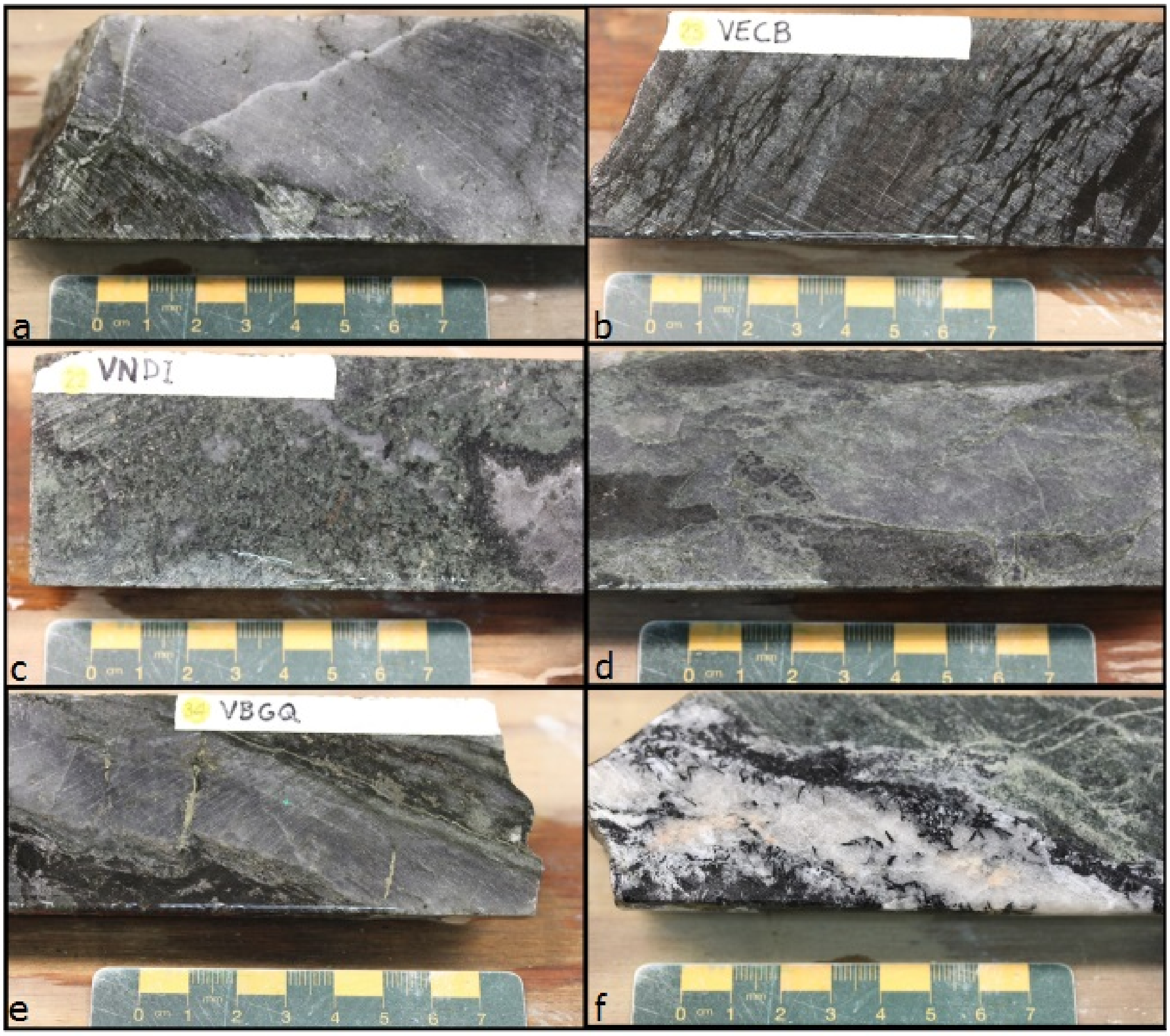

Figure 7-7: Photos of type vein examples in half-sawn drill core. *(a) Typical VQCB cutting chloritic basalt, (b) VECB with a dark, biotite-rich selvage, (c) typical coarse crystalline VNDI, (d) VNQZ cutting chloritic basalt, (e) recrystalized and boudinaged VBGQ from the Russet South Deposit, assays of this vein returned 29.5 g/t Au, (f) late-stage Treasure-Box style VQTM with coarse acicular tourmaline crystals.*

7.2.5 Metasomatized rocks

Balmer Assemblage rocks vary from unfoliated, pristine volcanic rocks with well-preserved fine-scale primary volcanic features (e.g. pillow structures), to mafic and ultramafic rock that has been pervasively altered, deformed and metamorphosed to the point that essentially no primary features are discernible (Figure 7-8: Typical example of Madsen-style strongly altered and auriferous rock in drill core). Such rocks are associated with gold mineralization across the property at all known gold-bearing zone except Treasure Box (which is characterized by late quartz-tourmaline veins without significant wall-rock alteration). Two important points need to be made about these metasomatized volcanic rocks.

Firstly, it was recognized that metasomatized, or hydrothermally altered, Balmer rock locally forms coherent, planar units (coincident with suspected early, gold-associated structures as described above) and that it was advantageous for drill targeting to delineate these intervals with codes that highlight this alteration. Strictly, these intervals are probably mostly basalt but that original protolith has been modified to the point that it is inappropriate to log or map this rock as basalt. So, three codes were developed that are defined by secondary mineral assemblages as described in the following sections.

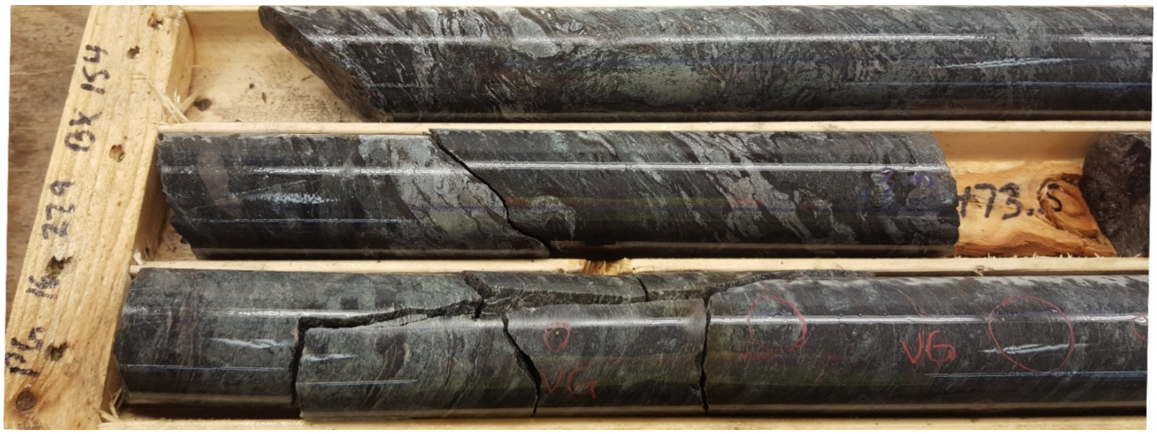

Figure 7-8: Typical example of Madsen-style strongly altered and auriferous rock in drill core.

Initially this rock was probably a pillowed basalt of the Balmer Assemblage but has been carbonate veined and altered during the early gold event and subsequently metamorphosed to strong biotite-amphibole-diopside during regional D2 deformation. Drill hole PG16-229 from the A3 Deposit at about 474 m depth. Gold-bearing interval in the bottom row returned 41.3 g/t Au from 471.1–475.7 m down hole.

Secondly, the distinction between metasomatic mineral phases (those derived from interaction with hydrothermal fluid) and metamorphic mineral phases (those derived from metamorphism generally in an isochemical system) is indiscernible at Madsen. Regional metamorphism (synchronous with D_2 deformation) has overprinted the Madsen gold systems to the degree that the host rocks to the gold-bearing zones are characterized by a seemingly complex mineral assemblage that has grown during regional metamorphism and, arguably, should not be described as alteration. But, because the rock surrounding the Madsen gold systems was altered before metamorphism, an assemblage of abundant metamorphic biotite, garnet and diopside resulted such that these minerals are useful as proxies for hydrothermally altered Balmer rock. So, these sensu stricto metamorphic minerals are herein treated as alteration indicators and this has proven an effective approach to delineating a halo surrounding gold mineralization. The three metasomatic rock assemblages identified are described in the following sections.

7.2.5.1 Strongly Altered and Foliated Zone

Strongly altered foliated zone (SAFZ) refers to coherent domains of rock that are altered and foliated to a degree that the protolith is unrecognizable. These domains of strong alteration and foliation represent structural corridors that were exploited by gold bearing fluids and delineate areas known to host gold mineralization (Figure 7-9: Photos of type metasomatized rocks in half-sawn drill corea, b, c). Zones of strong silicification within the SAFZ are especially prospective for gold mineralization.

In the Madsen deposit area, a well developed SAFZ is generally defined by the presence of 1-2 cm thick bands (ribbons) of cream-brown colored biotite-potassium feldspar (microcline) separating larger bands and pods of diopside, green amphibole and (locally) quartz and carbonate. The sulphide content of SAFZ is highly variable but ranges up to 20% pyrite-pyrrhotite-chalcopyrite-arsenopyrite. There is limited to no correlation between sulphide content and gold values. The unit typically contains abundant VECB and VNDI veins which are commonly transposed into the main fabric of the foliation.

7.2.5.2 Pervasively Altered Basalt

Pervasively altered basalt (BSLA) refers to coherent domains of weakly to moderately foliated, banded or mottled, pervasively biotite-amphibole altered rocks (Figure 7-9: Photos of type metasomatized rocks in half-sawn drill cored), interpreted to have a mafic volcanic protolith in most cases. Primary textures are locally preserved, though in many instances they are obscured by alteration and foliation.

These domains of weak to moderate alteration and foliation represent the margins of structural corridors that were exploited by gold bearing fluids and halo areas known to host gold mineralization. Where this unit is proximal to an ultramafic sill or SAFZ unit, it has low to moderate potential to host gold mineralization.

7.2.5.3 Biotite-Amphibole Altered Peridotite

Biotite-amphibole altered peridotite (PRBA) refers to domains of moderately to strongly altered and foliated rocks proximal to the 8 Zone within the Russet Lake Ultramafic, interpreted to have a peridotite protolith. In contrast with the surrounding peridotite, PRBA has a well-developed foliation due to the alignment of metasomatic biotite porphyroblasts. These domains of alteration and foliation represent structural corridors that were exploited by gold bearing fluids and delineate areas proximal to gold mineralization.

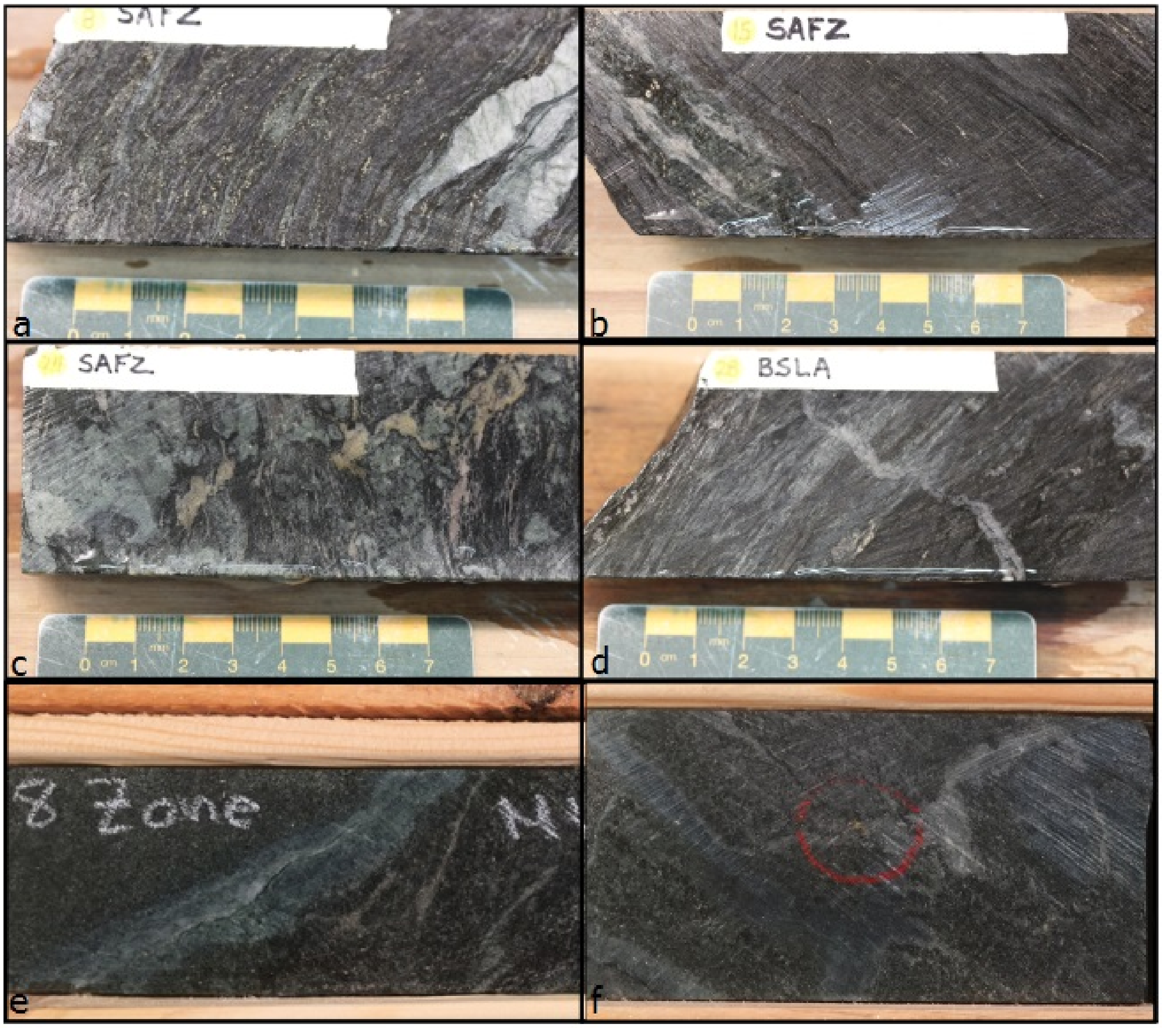

Figure 7-9: Photos of type metasomatized rocks in half-sawn drill core. *(a) SAFZ from the Austin Deposit grading 7.5 g/t Au. Displays well foliated pervasive bands of biotite-amphibole and weak diopside with 3% fine-medium subhedral pyrite, cross-cut by VECB veinlets with amphibole altered margins, (b) SAFZ from the South Austin Deposit grading 10 g/t Au. Displays well foliated pervasive biotite alteration, patchy amphibole alteration, 1% fine-grained disseminated pyrite, and weak potassium feldspar alteration, (c) SAFZ from the McVeigh Deposit. Displays ribboned biotite-potassium feldspar-amphibole alteration, coarse grained diopside replacement, and moderate silicification, (d) BSLA showing biotite and amphibole alteration with cross-cutting carbonate veins, (e) well-developed PRBA with an amphibole halo surrounding a gold-bearing quartz vein, (f) gold-bearing silica vein within a zone of biotite rich PRBA.*

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7.2.6 Plutonic Rocks

7.2.6.1 Monzonite

Monzonite (MNZT) refers to a medium to dark grey, unfoliated, medium grained, equigranular plutonic rock (Figure 7-10: Type photos of dykes and sills. Intrusive rocks from the Madsen Propertya), assigned to the Faulkenham Lake Stock. It is typically epidote and hematite altered. The Faulkenham Lake Stock post-dates mineralization and is not prospective for significant gold.

7.2.6.2 Granodiorite

Granodiorite (GRDI) refers to a white to light grey, unfoliated, medium to coarse grained, equigranular plutonic rock of the Killala-Baird Batholith (Figure 7-10: Type photos of dykes and sills. Intrusive rocks from the Madsen Propertyb). The Killala-Baird Batholith is unaltered and post-dates mineralization (2704 +/-1.5 Ma), and therefore is not prospective for gold.

7.2.7 Dykes and Sills

7.2.7.1 Intermediate Intrusive

Intermediate intrusive (IINT) refers to a group of intermediate, medium to light grey, undeformed, fine to medium grained dykes that cross-cut both the Balmer and the Confederation group and cut gold mineralization at Madsen and Starratt. These dykes have sharp, chilled margins and strike concordant to this property-wide foliation suggesting they exploited the S_2 structural grain. IINT have been dated at ca. 2698 Ma from underground at Madsen and ca. 2696 Ma from the Creek Target and provide a minimum age for Madsen gold mineralization (Dubé et al., 2004). Their similar composition and age suggests that they may be related to the Killala-Baird Batholith.

7.2.7.2 Mafic Intrusive

Mafic intrusive (MINT) refers to a group of dark grey, post-tectonic (unfoliated), fine to medium grained dykes that cross-cut both the Balmer and the Confederation Assemblage rocks. These dykes have sharp, typically chilled, margins with their host lithologies. These dykes post-date mineralization and are not prospective for gold.

7.2.7.3 Quartz Feldspar and Feldspar Porphyry

Quartz-feldspar porphyry (QFPY) and feldspar porphyry (FSPY) refer to a set of intermediate, grey-pink, unfoliated, quartz and/or feldspar-phyric dykes (Figure 7-10: Type photos of dykes and sills. Intrusive rocks from the Madsen Propertyc and e) that cut the Balmer Assemblage. QFPY dykes have not been found cutting the Confederation Assemblage, however, they are interpreted to post-date the Confederation Assemblage due to their lack of foliation. These dykes post-date mineralization, are not prospective for gold and are rare within Madsen Mine.

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7.2.7.4 Hornblende Feldspar Porphyry

Hornblende-feldspar porphyry (HFPY) refers to a set of intermediate, dark grey-pink, unfoliated, hornblende-feldspar-phyric dykes (Figure 7-10: Type photos of dykes and sills. Intrusive rocks from the Madsen Propertye) that cut the Balmer Assemblage in the Russet South area but are unknown in the Madsen Mine. HFPY dykes have not been found cutting the Confederation Assemblage; however, they are interpreted to post-date the Confederation Assemblage due to their lack of foliation. It is possible that these dykes are a local phase of the FSPY. These dykes post-date mineralization and are not prospective for gold.

7.2.7.5 Quartz Porphyry

Quartz Porphyry (QZPY) refers to a group of felsic, light to medium grey, foliated, quartz-phyric or fine-grained (aphyric) dykes (Figure 7-10: Type photos of dykes and sills. Intrusive rocks from the Madsen Propertyf) that cut the Balmer Assemblage. Porphyritic examples contain sparse, rounded, quartz phenocrysts and foliation-parallel biotite aggregates. These dykes are pervasively sericite altered and chemically are sodium-depleted (Mackie, 2016). Proximal to mineralized zones, early carbonate veins (VECB) cut QZPY dykes and amphibole-quartz-diopside replaces QZPY. Collectively, this is strong evidence that QZPY dykes predate the Madsen gold event and QZPY dykes typically show a close spatial association with gold mineralization. QZPY dykes are typically concordant to the planar Madsen deposits (this relation is particularly strong at Austin) so these dykes likely exploited the same early structures that controlled gold-associated hydrothermal systems.

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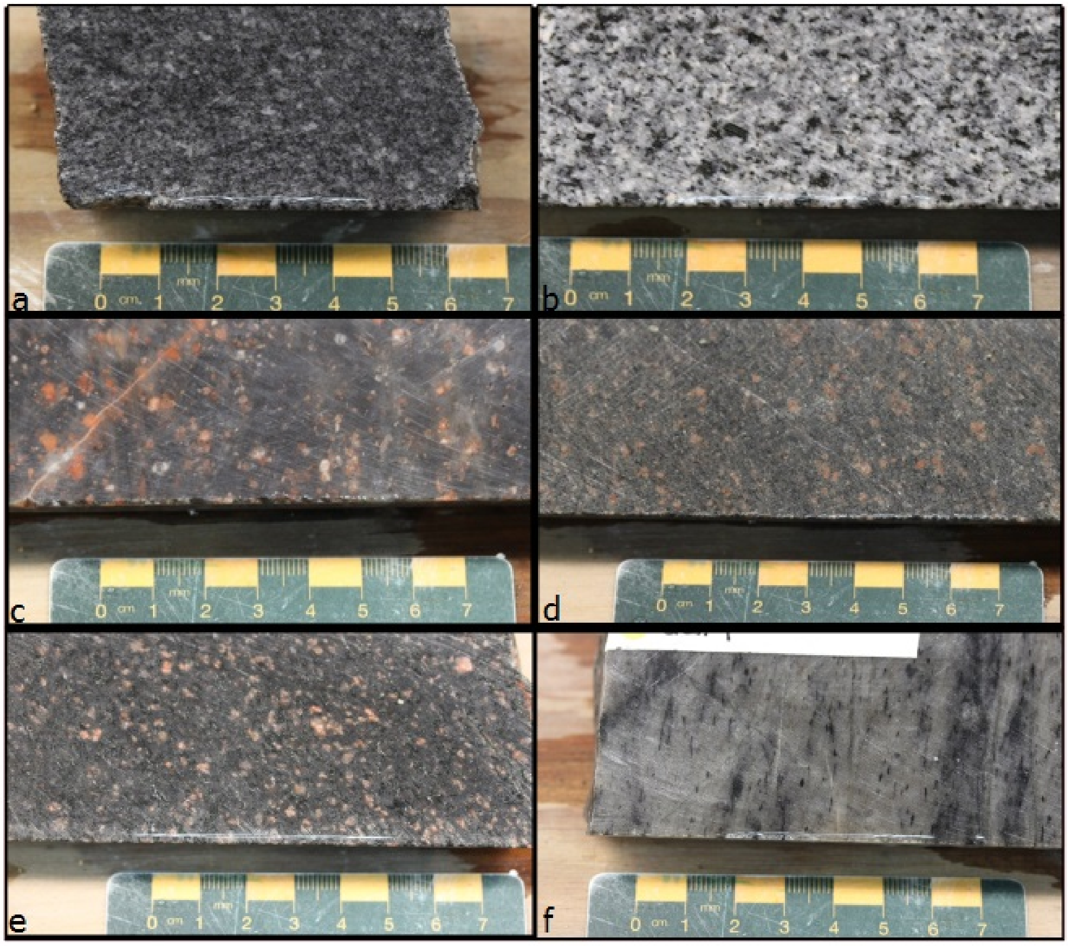

Figure 7-10: Type photos of dykes and sills. Intrusive rocks from the Madsen Property. *(a) monzonite from the Faulkenham Lake Stock (MNZT), (b) granodiorite from the Killala-Baird Batholith (GRDI), (c) silica-hematite altered quartz-feldspar porphyry (QFPY), (d) potassium feldspar porphyry dyke (FSPY), (e) potassium feldspar-hornblende porphyry (HFPY), (f) strongly foliated biotite and quartz-phyric porphyry (QZPY).*

7.3 Property Mineralization

The following sections summarize the geology, geometry and style of the significant mineralized zones and associated targets encountered on the Madsen Property (Figure 7-11: Madsen Gold Project simplified geology showing historical mines and exploration targets.).

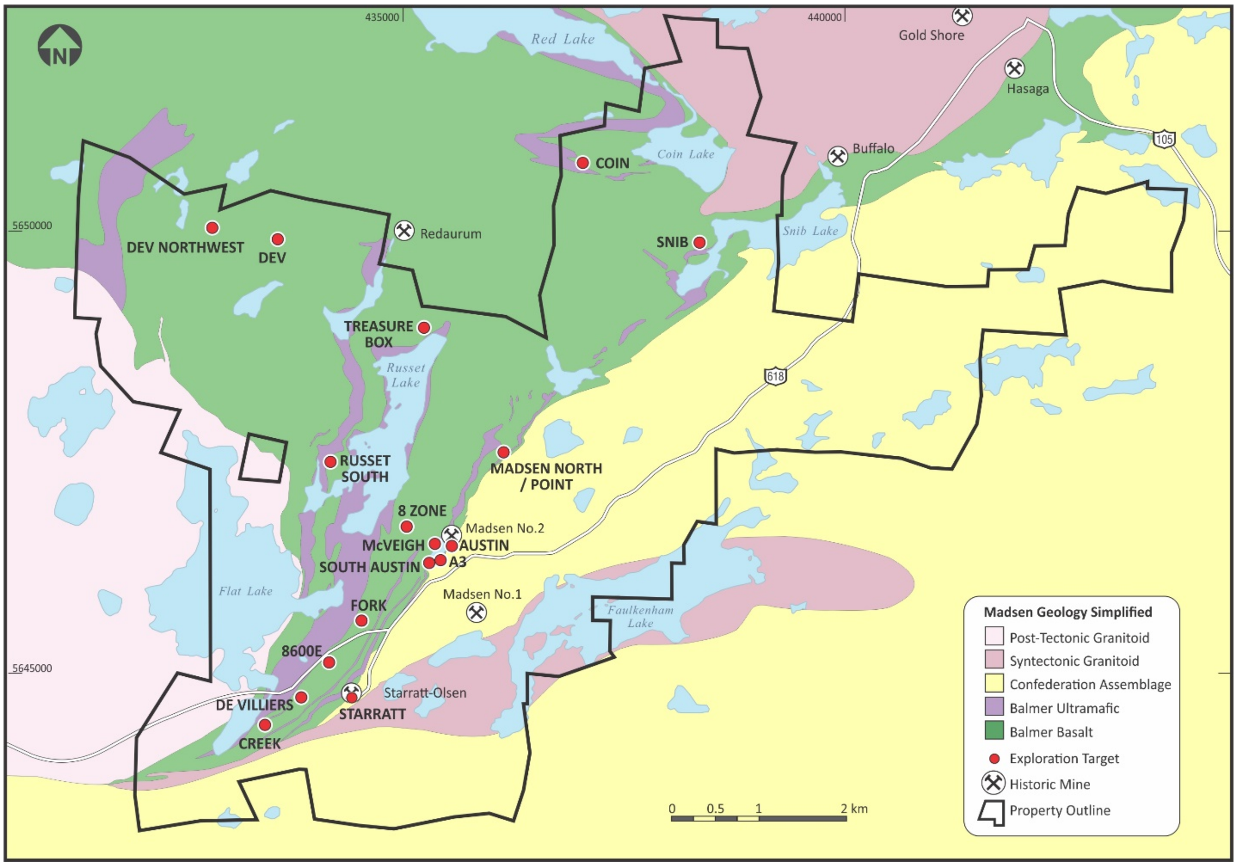

Figure 7-11: Madsen Gold Project simplified geology showing historical mines and exploration targets. *Property outline shown by solid black line. September 9, 2017. Image provided by Pure Gold.*

7.3.1 Madsen – Austin, South Austin, A3 and McVeigh Deposits

Gold mineralization at Madsen comprises the Austin, South Austin, A3 and McVeigh Deposits and is controlled principally by the intersection of a series of cryptic, early structures and lithological contacts between basalt and ultramafic rocks of the Balmer Assemblage (Figure 7-12 and Figure 7-13). A secondary plunge control is defined by the intersection of these structures with Confederation Assemblage rocks. These controls are both evident in Figure 7-12: the -40^{o} plunge control is defined by Balmer ultramafic sills (purple) whereas the steeper plunge control is defined by intersection with Confederation rocks (yellow). The Austin Deposit has approximate plunge length of 2,300 m, strike width of 500 m and thickness of 10–25 m. Similarly, the South Austin Deposit has a plunge length of 2,000 m, strike width of 300 m and a similar thickness. The A3 deposit is approximately 800 m in plunge extent, 100 m strike width and approximately 10 m thickness. The McVeigh Deposit extends for a plunge length of 1,300 m, strike width of 200–300 m and a thickness similar to both Austin and South Austin.

These structures are oriented at low angles to both the Balmer Assemblage stratigraphy (as defined by narrow metasedimentary units) as well as to the dominant, overprinting regional foliation (S_2). The geometry of the historical ore bodies (and the waste zones between them) is the result of intersection between the early (D_1?) mineralizing structures and prospective stratigraphy. Primary lithological control on gold distribution is proximity to one of the several ultramafic bodies which cross-cut the mafic volcano-sedimentary sequence within the upper several hundred meters of the Balmer Assemblage. Note that the ultramafic rocks are interpreted as sills and a proxy for stratigraphy. Most gold mineralization is located within approximately 100 m of one of these contacts, in rock characterized by strong to intense biotite, garnet and diopside alteration. As such, the Austin and South Austin Deposits occur on the same mineralizing structure, with a poorly mineralized zone of ultramafic rock separating them.

Gold mineralization at Madsen is best identified visually by fine (sub-millimetre) grains of free gold that occurs associated with various mineral phases. Generally, all high-grade intervals contain visible gold but there are numerous examples of high-grade assays returned from samples in which no visible gold was initially identified on the core surface but has been later explained by gold identified within the interior of the core samples. Sulphides (primarily pyrite and pyrrhotite with minor arsenopyrite and chalcopyrite) are relatively common throughout the deposit, though they do not appear to have any direct positive correlation with gold grade. It is believed that present sulphide abundance reflects primary sulphide abundance or alteration in the host rock, and does not serve as a marker for gold mineralization suggesting it was not introduced by the mineralizing fluids. Apart from the presence of free gold, pervasive silicification (locally accompanied by discrete quartz veining) is the best indicator that a given interval is within a high-grade lens within the mineralized structure.

As discussed below (Section 8.0) controls on mineralization at Madsen are consistent with a typical orogenic gold system. Many deposit-scale features such as control by lithological/structural contacts and association with felsic dykes are typical and not unusual in these systems. Smaller-scale features may indicate that Madsen is an unusual or end-member type of orogenic gold system. For example, Dubé et al. (2000) conclude that Madsen is a disseminated, stratabound deposit that shares similarities with mafic-hosted gold-skarns and also with higher-temperature Australian deposits. Recent work and new data collected by Pure Gold, however, indicates that, apart from its early timing of emplacement prior to the dominant regional deformation and metamorphism, Madsen shares many characteristics with typical orogenic gold deposits.

While mineralization throughout much of the Austin Deposit does locally exhibit a correlation with metasedimentary units at the top of Balmer Assemblage (likely part of the reason much of the ore host rock was referred to as “Tuff” during mine operations) concentration of gold mineralization in this unit is now thought of as being a consequence of the receptivity of this unit to gold deposition (perhaps owing to primary sulphidation) upon intersection with the mineralizing structure, as opposed to the host unit acting as a unique primary control of gold deposition.

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Consistent with Pure Gold's work, it was previously demonstrated through detailed field mapping that the Austin and McVeigh Tuff, as historically mapped, include strongly foliated pillow basalts (Zhang, 1996). For example, the slightly deformed pillow basalts immediately west of the Process Water Pond, in which the pillows are readily recognizable, are included in the tuffaceous unit in the mine level mapping. Furthermore, it has been found that the pillowed basalts southwest of the Process Water Pond are progressively deformed and transposed into well-foliated rocks with amphibole banding over short strike distance. These observations and others suggest that much of what was historically described as Tuff is volcanic flow-derived rather than true Tuff of volcano-sedimentary origin.

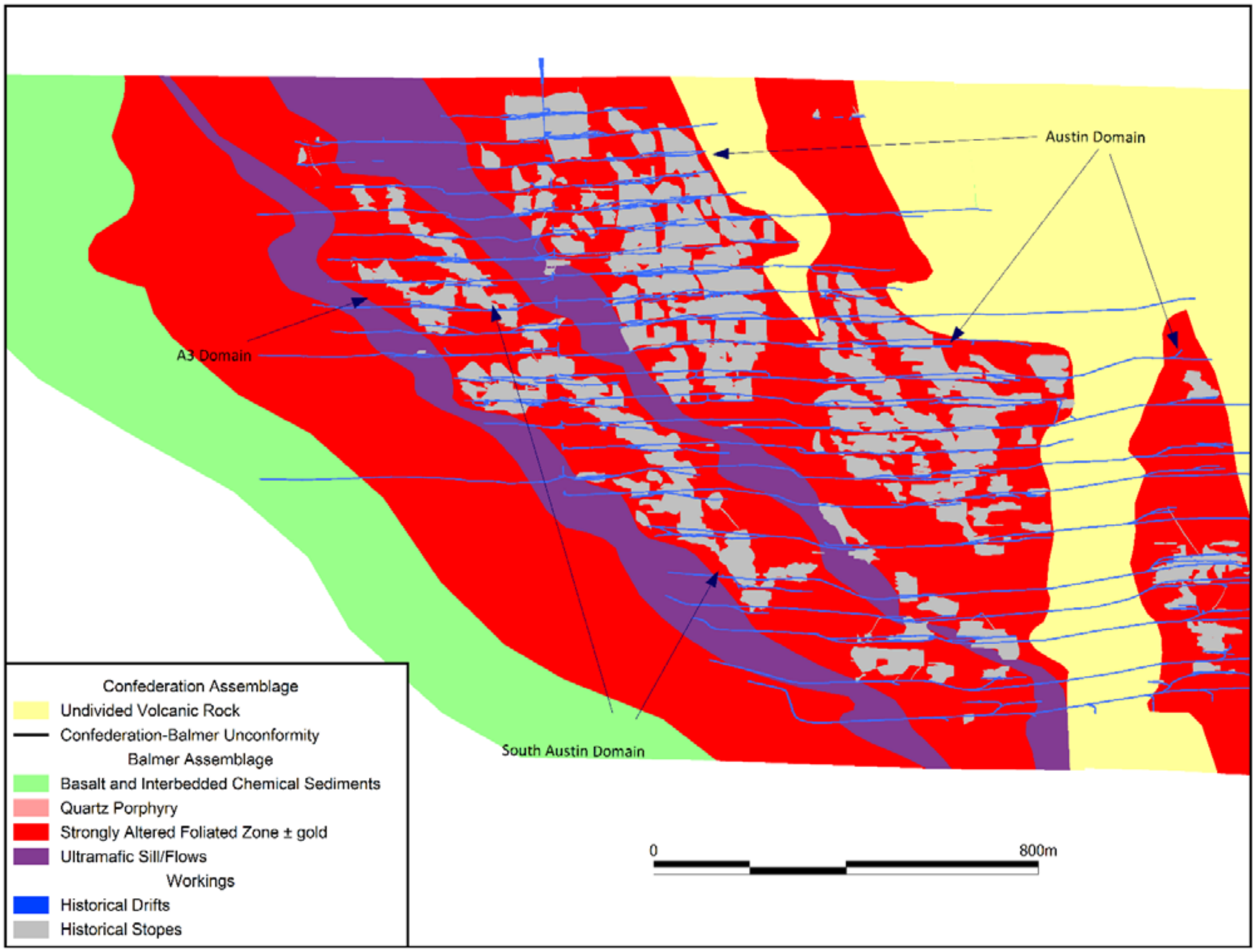

Figure 7-12: Inclined long section through the Austin and South Austin Deposits of the Madsen Mine with projected geology. *Mined stopes (grey) demonstrate gold-bearing zones which clearly show a strong northwest plunge at about 40º. The projected geology shows the strong alteration halos (red) surrounding gold-bearing zones (here represented by mined stopes) and, significantly, that these zones are interrupted by ultramafic sills (purple). Long section geology contacts were determined from detailed geological interpretation on 30 level plans from surface to below the deepest developed part of Madsen Mine. Note that the McVeigh Deposit lies in the footwall to this long section and is not shown. Drawn by D. Baker, September 10, 2017.*

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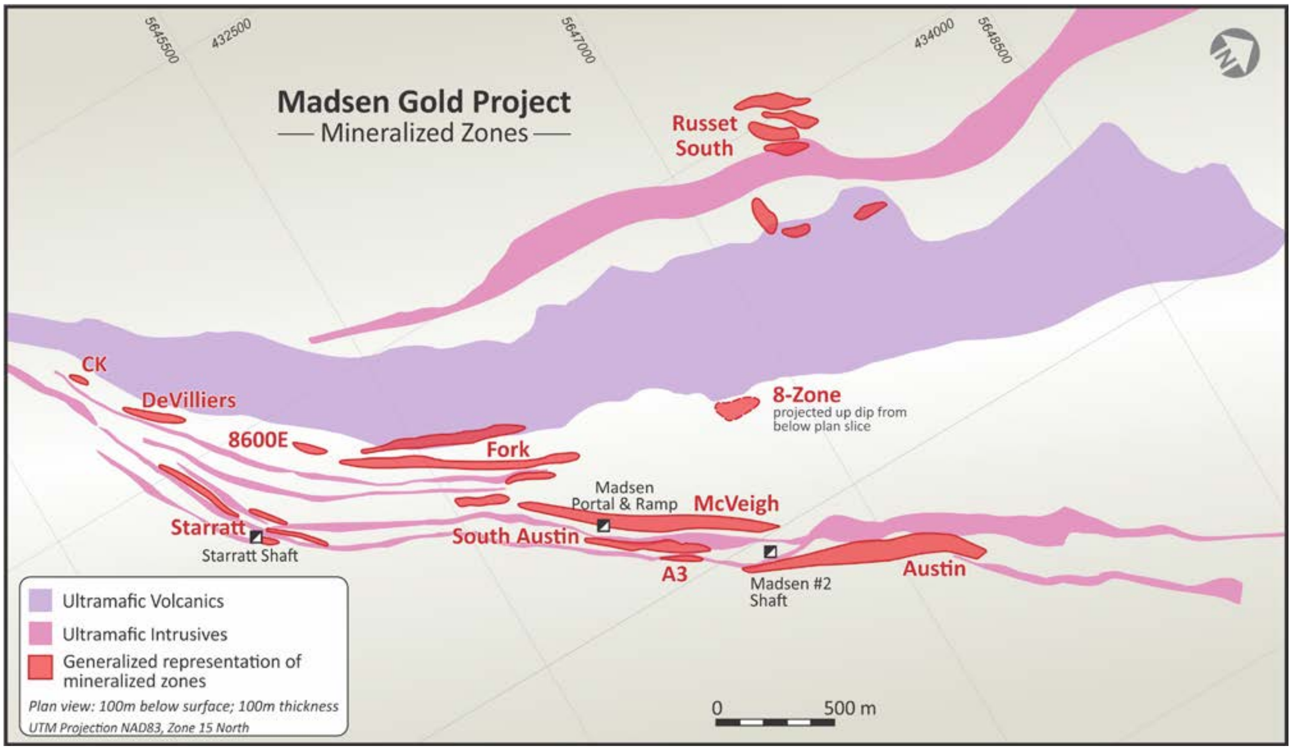

Figure 7-13: Plan map of Madsen Gold Project mineralized zones projected at 100 m below surface.*Note that 8 Zone occurs in the deepest parts of Madsen Mine just west of the ultramafic volcanic (Russet Lake ultramafic) contact so it does not project through this level. Source: P. Smerchanski, January 19, 2018.*

7.3.2 8 Zone

The geology and mineralization style at the 8 Zone is somewhat distinct from that of other known deposits within the Madsen Mine area. Gold mineralization at the 8 Zone occurs within strongly altered and veined peridotite of the Russet Lake Ultramafic (see section 7.3.5.3 for description of the PRBA unit). By contrast, most gold at the mine is hosted within mafic hosts rocks proximal to barren ultramafic units. The 8 Zone has a planar geometry, strikes generally north-south and dips to the east at approximately 45° which is significantly shallower than the other deposits. As it is presently modelled, the 8 Zone mineralization has approximate dimensions of 700 by 130 x 30 m thickness.

Within this mineralized plane, gold occurs in highly deformed, centimetre- to metre-scale blue-grey recrystallized quartz veins (VBGQ) located within a corridor of amphibole-biotite alteration which is generally on the order of tens of meters wide. The more intense zones of alteration are marked by near-total replacement by 1 – 10 cm intervals with biotite, an abundance of blue-green Ca-Mg rich amphibole, and a well-developed foliation defined by alignment of secondary biotite.

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Significant re-logging of historical surface and underground holes drilled by past operators at 8 Zone has been ongoing through 2017 and has influenced the geologic model and understanding which continues to evolve. The deposit lies adjacent to the Russet Lake Shear Zone. This early structure dissects the length of the Russet Lake ultramafic volcanic unit which represents the lowermost Balmer Assemblage rocks on the Madsen Property.

7.3.3 Russet South

Gold at the Russet South Deposit is hosted within folded and/or boudinaged blue-grey quartz veins that appear to be the same as those characteristic of the 8 Zone. At Russet South, the veins mostly occur within weakly deformed 10 m-scale wide, planar zones proximal to the northern contact of Russet Lake ultramafic volcanic rocks and on both the hangingwall and footwall of a smaller ultramafic sill parallel to this contact (Figure 7-13). The veins are most commonly hosted within relatively weakly biotite-amphibole altered basalt, though some occur within ultramafic rock and underlying iron formations. Despite the complicated arrangement of individual veins, due to their transposed nature, zones of high vein density, deformation, alteration and gold mineralization can be defined over hundreds of meters of strike length, trending generally broadly sub-parallel or at low angle to stratigraphy which is itself broadly folded about south-plunging D_2 folds in the Russet area. When projected to surface, these zones of high vein density extend over a footprint of approximately 650 m by 650 m, and have been defined to a vertical depth of 200 m.

7.3.4 Starratt

Mineralization at the Starratt Target is very similar in nature to that found at the Madsen Mine. Gold occurs in similarly strongly altered and deformed basalt with the typical biotite-amphibole-diopside assemblage with local silicification and potassium feldspar alteration. The structural setting is also equivalent to Madsen whereby mineralized zones occur in planar bodies that cut across the same ultramafic sills that occur at Madsen at low oblique angles. As at Madsen, plunge control of mineralization at Starratt is controlled by the intersection of ultramafic units and these interpreted early structures but at Starratt the plunge is steeper owing to the generally steepening of the stratigraphy as the Balmer rocks become constricted between the Killala-Baird Batholith and the Faulkenham Lake stock to the southwest.

Historically, Starratt and Madsen were operated by different companies and original records from Starratt are fragmented such that the historical drill hole database for Starratt is sparse. No original drill logs are available and the existing drill database has been built largely from fragmented original section and plan maps showing selected data only. Nonetheless, available historical information, surface mapping and geophysical interpretation aided drill-targeting as step-outs from mined out areas in 2016. Gold intercepts (such as 34.0 g/t Au over 2.3 m true thickness in PG16-198) indicate that Starratt is open at depth. The mineralized lenses at Starratt extend for approximately 1200 m strike length, vertical depth of 550 m, with a thickness of 10 – 15 metres.

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Interestingly, since the Starratt and Madsen mines were originally separated by a tenure boundary, the area between these historical mines seems particularly under-explored especially given that the area is underlain by Balmer basalts intruded by ultramafic sills. Though drill density is not adequate to confirm the alteration and host stratigraphy appear continuous between the two mines and Starratt is interpreted to be part of the same mineral system at Madsen.

7.3.5 Fork

The Fork Deposit is located 300 m northeast of the 8600E Target where a D_1 structure which hosts the 8600E, De Villiers and CK targets splays into two segments. The two mineralized structures converge toward the southwestern extent of the deposit and diverge toward the northeast resembling a two-pronged fork in level plan interpretations. Host rocks of the eastern structure are comprised of mafic volcanic flows, interflow iron formation and ultramafic sills. The broad Russet Lake ultramafic unit with minor amounts of mafic material is host to the western part of the structure. Both structures are cut by late, discordant felsic, intermediate and mafic dikes as at Madsen. The mineralized body is curvilinear, dips steeply (65°-70°) to the southeast and is weakly folded by steeply southeast plunging F_2 folds. Gold is predominantly associated with deformed quartz veins hosted within an envelope of highly strained and hydrothermally altered rock oblique to the host volcanic stratigraphy. Less commonly, gold is found in replacement-style disseminations within altered basalts along and proximal to contacts with interflow iron formations or ultramafic sills transected by the eastern splay of the D_1 gold-bearing structure. Gold-bearing veins and associated alteration related to the west structure within the ultramafic rocks are considered analogous to mineralization at the 8 Zone Deposit. Geochemically, altered rocks at the Fork Deposit are sodium-depleted and potassium-enriched. The Fork Deposit has been drill tested over a 600 m strike length, to a vertical extent of 375 m depth. The mineralized zones are typically 1 to 5 m thick.

7.3.6 CK

The CK Target (formerly Creek) is located near the south end of the Starratt-Olsen mine, along strike of the De Villiers and 8600E targets, northwest of the trend along which the main Starratt deposit lies. Surface exposure and limited historical drilling indicates the zone has a similar geometry and character to the other zones along the same trend. Extents of the zone as it is currently defined suggests a strike length of approximately 50 m and thickness of 5–10 m. Limited historical data suggests that the zone may extend down to approximately 400 m vertical depth, though this has been poorly tested by modern work.

7.3.7 De Villiers

The De Villiers Target is located near the Starratt-Olsen mine about 2.4 km southwest of the Madsen Mine. De Villiers is characterized by gold-bearing quartz veins hosted by Balmer Assemblage basalts. The target was mechanically stripped, bulk sampled and drill-tested (29 holes for 2,480 m) in 1998 (Panagapko, 1999). Results indicate a north-dipping quartz vein system that is at least 60 m by 90 m in strike length with 1-5 thickness. The zone has been intersected by very limited drilling to 150 m vertical.

7.3.8 Dev Northwest

The Dev Northwest target area has seen limited work to date. Follow-up of a 700 m by 100 m gold in soil anomaly at the end of the 2015 field season identified quartz veining and silicification in iron carbonate and banded amphibole-biotite altered basalt. Anomalous gold values were returned from limited outcrop grab sampling. In 2017 further mapping, trenching and channel sampling work was completed. Strongly altered BSLA and SAFZ zones and prominent sheeted arrays of intersecting quartz veins were identified. Altered zones range from 1 – 10 m wide and trend NW-SE.It is recommended to test the intersection of these altered zones and the ultramafic sill to the northwest.

7.3.9 Dev

At the Dev Target, a large, D_2 fold defined by magnetic anomalies is cut by several axial planar shear zones. Banded iron formation defines at least three stratigraphic marker units which may fold back on themselves to define an F1 fold hinge (Cooley and Leatherman, 2015). MMI soil surveys have defined a significant multi-element, gold associated anomaly stretching over 1500 m by 200 m (Baker and Swanton, 2016). A program of mechanized outcrop stripping during the 2016 field season (Jones, 2016) designed to follow up on these anomalies identified several zones of altered and mineralized sedimentary rocks cut by significant quartz veining, from which isolated grab samples which carry significant gold values (up to 59.3 g/t Au in grab sample). These samples are not considered representative of the outcrops but are considered indicative of prospective veining. The 2016 work demonstrated that gold mineralization is present along chemical and competency contrasts in the Dev area, making it an attractive exploration target with similar characteristics to Russet South. Further mapping and rock sampling as well as re-logging of historical drill core from Placer Dome was completed at Dev in 2017. Russet-style quartz veining observed at surface and in drill core is highly encouraging; further work is required to better define the extent of mineralization in this area.

7.3.10 Coin

Immediately south of Coin Lake, a strongly carbonate-altered ultramafic unit occurs along an interpreted D2 shear by Cooley and Leatherman (2015). This ultramafic unit returned 0.25 g/t Au in one outcrop sample collected in 2014 (Baker, 2014). This and other host rocks in the vicinity appear highly prospective but little work has been completed to date largely due to the remote nature of the target. Weakly anomalous gold in soil values have been returned from Coin over a footprint of approximately 250 x 500 m. Mapping and rock sampling were completed at Coin in 2017. Quartz veining was found in several old trenches though no significant assay results were returned.

7.3.11 Snib

Historically, this area was part of the Newman Madsen Property acquired by Pure Gold in 2014 and hosts the Newman Rajah Red Lake occurrence, which has been described as quartz veins occurring in a narrow, easterly-trending, mineralized shear zone. Pure Gold completed MMI soil sampling over the Snib target and returned anomalous gold in soil values at the northern and

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southern limits of Snib Lake, associated with quartz veining at the contact of folded ultramafic units. Shearing and strong carbonate alteration were mapped north of the lake (Cooley and Leatherman, 2015). Historically, a small number of core drill holes tested the unconformity between the Balmer and the Confederation Assemblages and returned intercepts of 22.56 g/t Au over 2.0 m from drill hole NM06-02, and 43.51 g/t Au over 0.65 m from drill hole NM-10-02. Limited prospecting in this area by Pure Gold has returned anomalous gold values associated with disseminated pyrrhotite and pyrite. Further investigation of this target is required and will require a complete review of all drilling results. There is approximately 1000 m of poorly tested strike length between the two drill intercepts noted above.

7.3.12 Madsen North/Point

Highly anomalous gold in soil values northeast of the Madsen area (extending over a footprint of approximately 600 m x 300 m) are believed to be related to drainage downstream from the Madsen historical tailings (Baker and Swanton, 2016). The alteration zone which hosts the Austin Deposit trends along the unconformity towards the property boundary, however it is not known to be mineralized here. Limited drilling completed in 2014 by Pure Gold returned only weakly anomalous gold up to 0.4 g/t Au over 8.0 m. While no high-grade drill intercepts occur in the area, access is complicated by tailings infrastructure which has made adequate drilling difficult. Recent geological modelling indicates that the geology is highly prospective and further work is warranted.

7.3.13 8600E

The 8600E target was explored in 1998 by mechanical stripping and recent mapping of these outcrops (Cooley and Leatherman, 2015) suggests that the 8600E target may represent the southern extension of the Fork Zone as the host rocks are continuous and the style of mineralization is similar. Recent drilling by Pure Gold (PG17-359) has tested the current southern limit of the Fork Zone along strike to the north of 8600E. A historical gold occurrence (Madsen #3 Zone) lies on strike between the two targets and is described as a quartz vein from 0.15 m to 0.50 m width, traced over 45.75 m along strike. Sampling in 1935 returned a reported average of 16 channel samples grading 36.3 g/t Au over a width of 0.3 m (Panagapko, 1998). At 8600E, rock sampling by Pure Gold of outcropping iron formation characterized by banded magnetite, pyrrhotite, and amphibole has returned highly anomalous gold values. Drilling directly underneath this surface mineralization in 2017 demonstrated the presence of multiple intercepts grading in excess of 5 g/t Au (up to 22.9 g/t over 1.1 m), hosted in quartz veining spatially associated with both iron formation and altered basalt. Drill testing to date by Pure Gold has been limited, with the zone only tested to 100 m vertical depth and 75 m along strike. As this zone lies along trend between the Fork and Devillier zones, it is considered to be prospective and warrants further work.

7.3.14 No. 1 Shaft

The No. 1 Shaft target is located about one kilometre south-southeast of the Madsen mill complex within Confederation Assemblage rocks. This prospect predates that of the Madsen Deposit. Records of the No. 1 Shaft area are fragmented but some original linens and later plans and sections are archived at the Madsen record collection. These show that the No. 1 Shaft was sunk south of the steeply southeast-dipping No. 1 Vein. Five levels of workings are shown on plan maps from the 1930s.

Detailed mapping by Pure Gold (Baker, 2014) indicates that the No. 1 Shaft mine was developed on a 30–70 cm metre-wide quartz vein that occurs within a layer-concordant sinistral shear zone. The vein has a strike length of about 110 m and has been intersected down to 100 m depth. Grab samples by Pure Gold confirm local high gold grades in both the quartz vein (up to 24.1 g/t Au) and adjacent wall rock (16.9 g/t Au).

7.3.15 Treasure Box

The Treasure Box Target near the north end of Russet Lake is characterized by discontinuous enechelon extensional quartz-tourmaline veins and stockwork veins that locally contain visible gold. Vein swarms vary from 10 to 70 m wide but individual veins are generally <40 cm thick. Gold mineralization in the wall rock to the veins is limited. The veins are hosted in a package of weakly deformed to undeformed basalts and gabbros.

Extensive drilling by Placer Dome and Claude has delineated a package of mineralized veins over a strike length of 165 m and to a vertical depth of 250 m with a typical thickness of 35 m. Placer Dome and Claude drill holes were re-logged during the 2017 field season. The work added several new gold intercepts to the target area and has helped define alteration in the target area.

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8. Deposit Types

The Madsen Gold Project is focused on identifying and delineating Archean-aged orogenic gold deposits (Groves et al., 1998).

8.1 Characteristics

Following Kerrich et al. (2000), orogenic gold deposits are typically associated with crustal-scale fault structures, although the most abundant gold mineralization is hosted by lower-order splays from these major structures. Deposition of gold is generally syn-kinematic, syn- to post-peak metamorphism and is largely restricted to the brittle-ductile transition zone. However, deposition over a much broader range of 200–650°C and 1–5 kbar has been demonstrated. Host rocks are highly variable, but typically include mafic and ultramafic volcanic rocks, banded iron formation, sedimentary rocks and rarely granitoids. Alteration mineral assemblages are dominated by quartz, carbonate, mica, albite, chlorite, pyrite, scheelite and tourmaline, although there is much inter-deposit variation.

8.2 Madsen Gold Project Mineralization Model

At the largest-scale, all significant gold mineralization at Madsen is demonstrably early relative to the most significant, penetrative deformation event (D_2). Quartz veins at 8 Zone and Russet South are boudinaged, recrystallized and folded and are cut by the penetrative S_2 foliation. Mineralized bodies of the Austin, South Austin, A3 and McVeigh are folded and transposed into S_2. Thus, a major component of the deposit model is the expectation that mineralized bodies are deformed and may be dismembered and/or folded. The early timing also implies that the causative, gold-bearing structures (likely D_1) are cryptic and difficult to identify owing to post-mineral deformation and metasomatism. At the property-scale, however, these structures are conspicuous based on patterns of gold mineralization and alteration and importantly these structures transect the Balmer stratigraphy at low-angles. For instance, the Austin and South Austin deposits lie within the same planar structure which cuts across an ultramafic sill (Figure 8-1, Figure 8-2).

At drill core scale, much variation in mineralogy and structural features of gold-bearing zones exists. Typically, these features are linked to the chemical and rheological features of the host rock. At least minor gold mineralization is hosted in most rock types on the property but some important patterns form the basis of the exploration model. Principal among these patterns is the occurrence of the most significant gold mineralization within Balmer basalt adjacent to ultramafic sills (Figure 8-1, Figure 8-2). This pattern is repeated in level plan and cross section throughout the Madsen and Starratt Mines. Most gold has precipitated within several 10s of metres of the intersection of mineralized structures and an ultramafic/ mafic contact. Likely, the more iron-rich basalt encouraged destabilization of gold-bearing bisulfide complexes (considered the most likely transport candidate Mikucki, 1998) where the fluid interacted with the ultramafic / mafic interface. Additionally, mafic rock likely acted more competently promoting fluid pathways and permeability (e.g. Cox et al., 1986). A similar mechanism of chemical and rheological contrast was likely at work where mineralized structures intersected iron formation in close proximity to ultramafic contacts; significant gold mineralization is present in these settings at the Russet South and Fork deposits.

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Within the Madsen deposits a secondary control was apparently provided by early, metre-wide-scale, quartz porphyry intrusive bodies (lithological code QZPY). In detail, the quartz porphyry bodies are preferentially unmineralized (or very weakly mineralized) but the basalt surrounding these bodies is locally exceptionally well-mineralized. The most extreme example of this relationship is within the Austin Deposit at deeper levels within the Madsen Mine (Figure 8-3). In this area the quartz porphyry body forms a largely barren core within the Austin historical ore body, the orientation of which is an effective vector to the South Austin historical ore body on the footwall side of an ultramafic sill. The Madsen geological model interprets that these felsic intrusions emplaced along the same early structures that controlled gold mineralization. These intrusions are sodium-depleted (Mackie, 2016), weakly mineralized and altered suggesting they typically intruded slightly pre-gold deposition.

Thus, the main components of the Madsen Gold Project mineralization model include:

- Significant gold deposition occurred prior to the main, belt-scale deformation event (D_2) within largely planar structures that have been nearly completely recrystalized by overprinting deformation and metamorphism;
- Geometrically, gold deposits were folded by small-scale, localized folds, structurally dismembered by transposition and gold was remobilized into secondary (metamorphic) mineral phases. Effective exploration drill targeting requires anticipation of these shapes and expectation of a heterogeneous gold system;

At a small-scale (10s of metres), characteristics of mineralized rock were heavily influenced by host rock. These controls include both rheological (quartz porphyry dykes) and chemical controls (Balmer mafic versus ultramafic and Balmer mafic versus felsic Confederation rock).

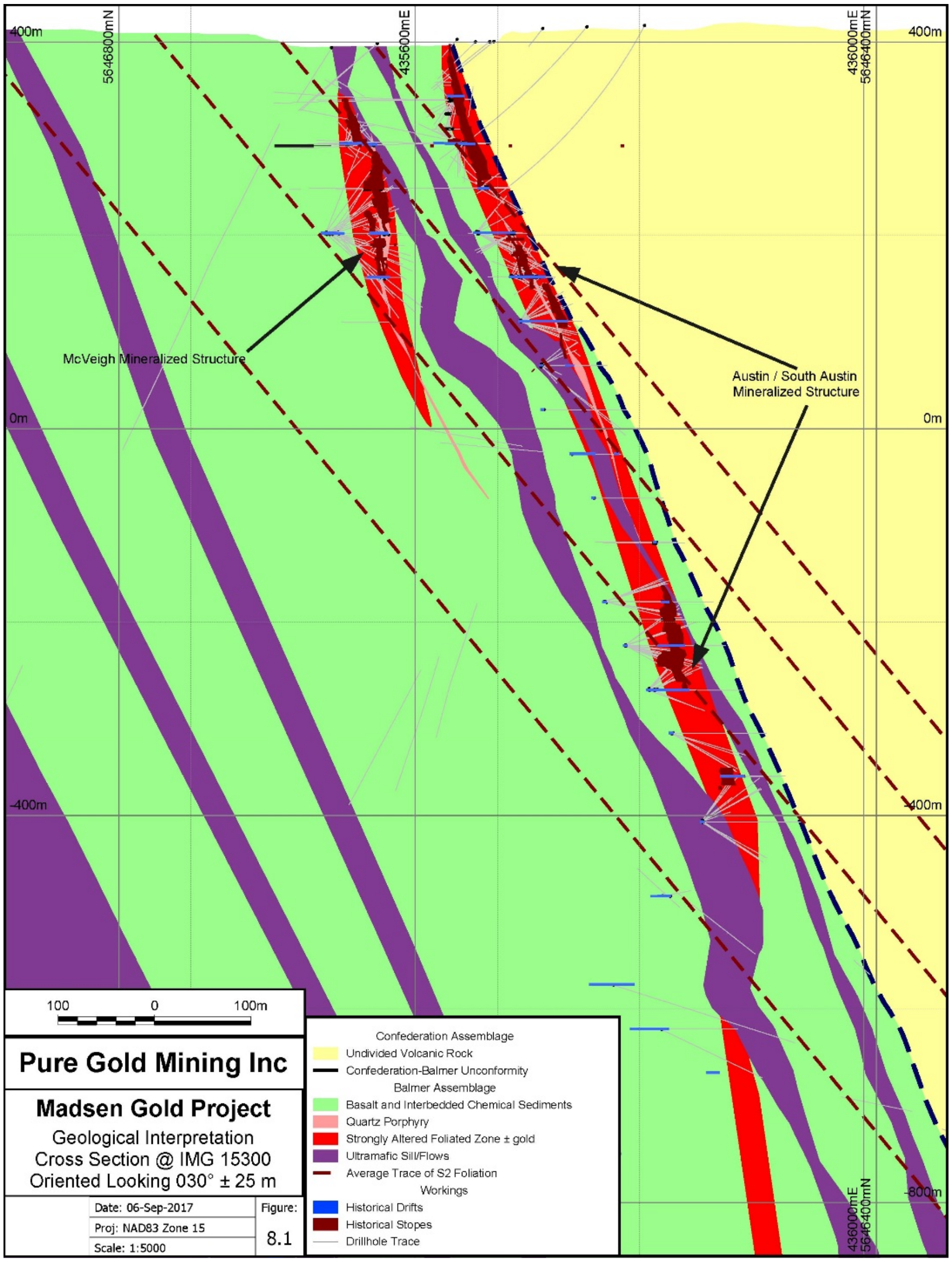

Figure 8-1: Cross sectional geological interpretation showing planar mineralized zones.

Red outline delineates strongly altered Balmer basalt (SAFZ and BSLA) including the Austin at surface near the Balmer/Confederation unconformity, South Austin down dip between ultramafic sills and the McVeigh in the footwall to a lower ultramafic sill. Although now cryptic owing to over-printing deformation and metamorphism during D2, these planar, red-outlined zones of strong alteration and localized gold (mined stopes shown in dark red) are interpreted to be early structures that cut across Balmer stratigraphy during a D1 deformation event. Significantly, the trace of S2 – a belt-scale deformation involving mostly flattening at Madsen – cuts obliquely across gold mineralization and lithological contacts including the unconformity. By D.Baker, September 6, 2017.

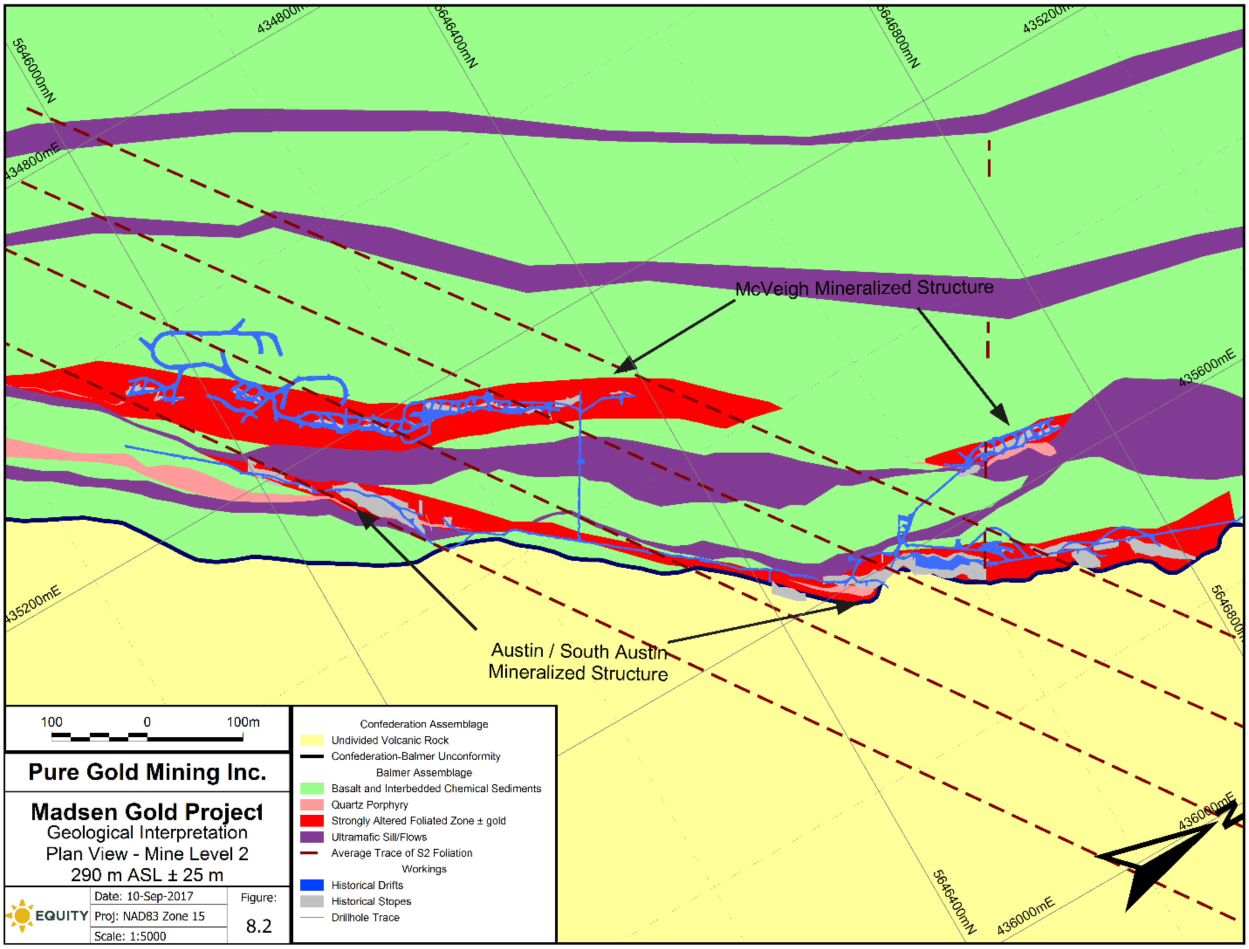

Figure 8-2: Level plan geological interpretation *showing planar mineralized zones with similar geometry to that in cross sectional view (Figure 8.1). Red outline delineates strongly altered Balmer basalt (SAFZ and BSLA) including the Austin at the Balmer/Confederation unconformity, South Austin along strike to the southwest located between ultramafic sills and the McVeigh in the footwall to an ultramafic sill. Although now cryptic owing to over-printing deformation and metamorphism during D2, these planar, red-outlined zones of strong alteration and localized gold (mined stopes shown in grey) are interpreted to be early structures that cut across Balmer stratigraphy during a D1 deformation event. Significantly, the trace of S2 – a belt-scale deformation involving mostly flattening at Madsen – cuts obliquely across gold mineralization and lithological contacts including the unconformity. By D.Baker, September 10, 2017.*

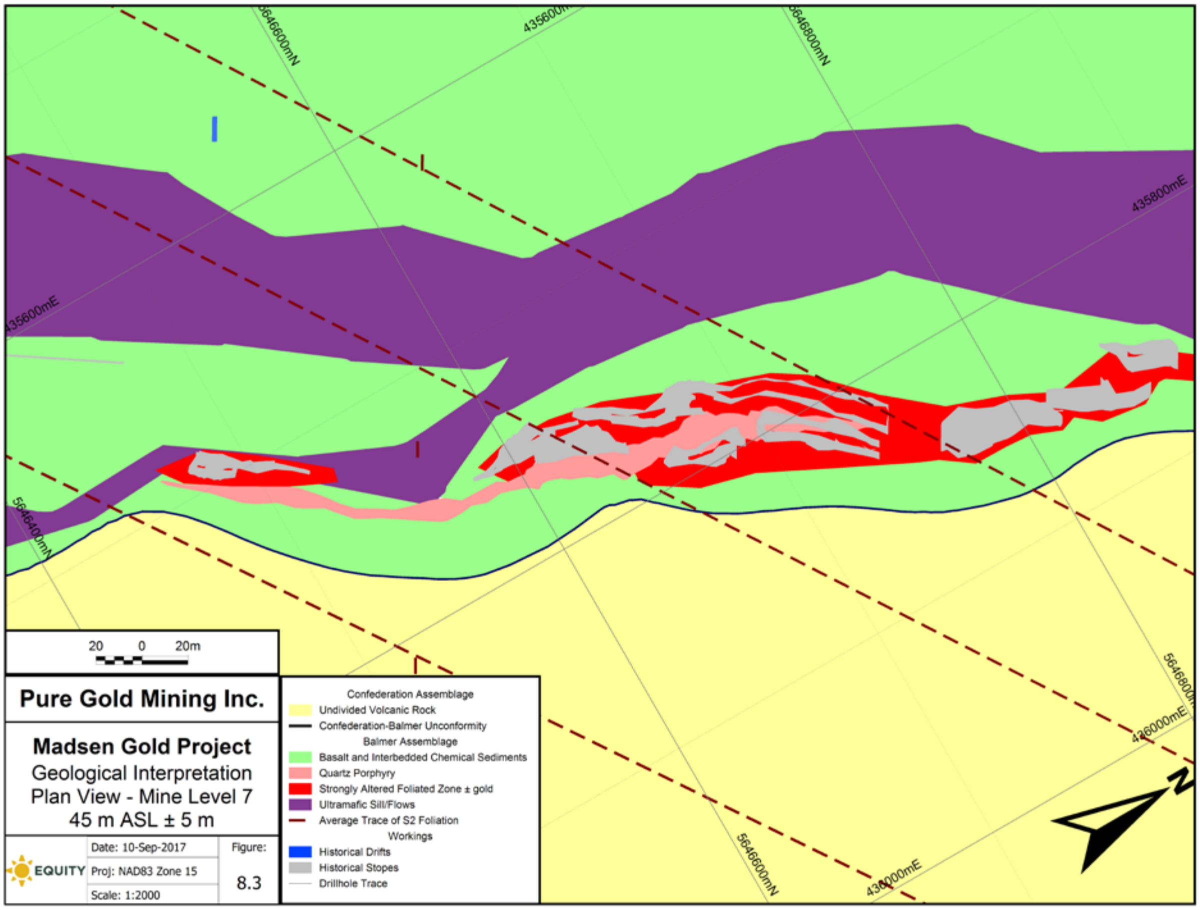

Figure 8-3: Level plan geological interpretation showing intimate relation between gold and quartz porphyry. *Mined-out stope wireframe solids shown in grey. Like planar, gold-bearing zones, the quartz porphyry dykes cut across Balmer stratigraphic contacts and are concordant with gold-bearing zones. Quartz porphyries pre-date gold mineralization (they are sodium-depleted, locally host low-grade gold and are altered) and so likely infiltrated the same cryptic structures, which ultimately focused the hydrothermal fluids that were responsible for gold deposition. By D.Baker, September 10, 2017.*

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9. Exploration

A summary of the historical exploration work completed between 1928 and 2013 is discussed in Section 6.0.

Since acquiring the Madsen Gold Project in 2014, in addition to extensive diamond drill testing Pure Gold has completed several surface exploration campaigns (Table 9.1) focused mostly on geological mapping and rock and soil sampling. An airborne geophysical survey was completed across the property in 2014 to aid in structural interpretation and targeting and two programs of mechanical overburden stripping were completed at the Russet South prospect in 2015. Similar programs of mechanical stripping and outcrop mapping/sampling were conducted on the Dev and Dev Northwest targets in 2016 and 2017. In addition to this outcrop-scale work, all soil geochemical anomalies detected during the MMI soil sampling campaigns were prospected during the 2017 field season. To date these programs have been largely successful in contributing significant new geoscience data relied on to develop a new geological model for mineralization on the property. The sampling programs have delineated new gold anomalous zones in all target areas described in section 7.3 and identified new high-grade gold surface mineralization at several targets. New drilling targets have been developed and significant high grade gold-bearing drill intersections have resulted at Fork, Starratt, and Russet South.

An extensive re-logging program was conducted in 2017, in which core from the programs conducted by Claude and Placer Dome was geologically logged in a manner consistent with the current geological understanding and coding schema, re-sampled where appropriate and photographed. Following this, the core was transported off-site to a newly constructed core storage area on the Russet Lake access road.

Table 9.1: Madsen Gold Project non-drilling exploration 2014–2017

Exploration Technique	Year(s)	Target or prospect	Quantity	Reference
Airborne magnetic survey	2014	Property-wide	1,702.8 line km	CGG (2014)
Drill collar location survey	2014	Property-wide	221 drill collars	Pure Gold database
Geological mapping, rock sampling	2014	Madsen deposit/unconformity, Fork, Madsen North	123 rock	(Cooley and Leatherman, 2014a)
Geological mapping, rock and soil sampling	2014	Property-wide & Russet South grid sampling	37 rock 117 B horizon soil 505 MMI soil 123 lithogeochem	(Baker, 2014a)
Geological mapping, rock sampling	2014	Derlak Lk towards Red Lk, Buffalo	79 rock	(Cooley and Leatherman, 2014b)
Geological mapping, rock and soil sampling	2014	mapping at Russet South and No. 1 Shaft; MMI sampling at Madsen South, Pumphouse, SPfold and Dev grids	29 rock 2,021 MMI soil 8 lithogeochem	(Baker, 2014b)
Geological mapping, rock sampling	2015	Flat Lake, Dev, Hasaga, Buffalo, DeVillier, Snib Lake, McVeigh, Coin Lake, Fork, Shore	410 rock, most analysed by portable XRF only	(Cooley and Leatherman, 2015)
Mechanical stripping, geological mapping, rock sampling	2015	Russet South (Alpha, Beta, Kappa stripped outcrops), Dev, Russet North	202 rock, 72 chip/channel, 3,234 MMI soil	Baker and Swanton (2015)

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Exploration Technique	Year(s)	Target or prospect	Quantity	Reference
Petrography	2015, 2016	Russet South, Madsen	67 thin polished sections	Ross (2015), Leitch (2016)
Mechanical stripping, rock sampling	2015	Russet South	78 rock	Pure Gold database
Mechanical stripping, geological mapping, rock sampling	2016, 2017	Dev, Dev Northwest	296 Rocks	Jones (2016), Pure Gold Database
Soil Sampling	2016	Property-wide	2481 Soils	Pure Gold Database
Geological mapping, rock sampling	2017	Property-wide	143 Rocks	Pure Gold Database
Soil Sampling	2017	Derlak	686 Soils	Pure Gold Database
Historical Core Re-Logging	2017	Property-wide	242 Holes 142,000 m	Pure Gold Database

9.1 Airborne Geophysics

In May, 2014 Pure Gold commissioned CGG Canada Services, Ltd (CGG) of Mississauga, Ontario to carry out a high resolution magnetic airborne geophysical survey over the entire Madsen Property. The purpose of the survey was to provide geophysical support for detailed mapping of the geology and structure of the property.

The survey consisted of 1,702.8 line-km comprising 1,543.6 km of traverse lines (flown east-west at 50 m line spacing) and 159.2 km of tie lines (flown north-south at 500 m line spacing). Nominal ground clearance was 20 m. A GPS electronic navigation system and laser altimeter ensured accurate positioning of the geophysical data. Data were acquired using a MIDAS magnetic system with two helicopter boom-mounted high-sensitivity cesium vapour magnetometers in a horizontal gradient configuration.

Survey data were post processed by Zion Geophysics, Inc. (Zion) to extract as much information as possible. Zion provided processed images to Pure Gold that define subtle lithologic and structural details previously not recognized.

9.2 Collar Location Survey

During 2014 Pure Gold completed a property-wide program to survey a selection of historical drill hole locations to improve confidence in data acquired from historical drill holes Location data were collected with a Trimble ProXRT differential GPS receiver with Omnistar real-time correction, which achieved sub-metre precision. In all, 221 historical collars were surveyed from across the property. Many Madsen Gold Corp. historical collars could not be located due to casing being removed.

9.3 Geological Mapping

Several geological mapping campaigns were completed during the 2014 and 2015 summer field seasons as detailed in reports by Michael Cooley, Lamont Leatherman and Darcy Baker (Cooley and Leatherman, 2014a, b; Baker, 2014a, b; Cooley and Leatherman, 2015; Baker and Swanton, 2016). During the 2017 season, a comprehensive property-wide mapping and prospecting campaign was initiated, designed primarily to follow up on soil and surface rock anomalies.

GPS-enabled field computers were used to map locations and shapes of outcrop exposures and to collect data on lithology, alteration and structure which has resulted in a database of nearly 3,200 individual outcrops over an area of 31 km^2. Mapping efforts were focused on gold-prospective regions particularly along the Confederation Assemblage and Balmer Assemblage unconformable contact and at the Russet South and Fork deposits.

The resultant property-wide geological map with lithological, alteration and structural interpretations is summarized in Figure 7-11. Mapping has defined structures (foliations, folds) relating to different deformation events and constrained the timing of gold mineralization relative to these events.

9.4 Outcrop Stripping

A series of six outcrops were stripped with an excavator by Pure Gold in 2015 to provide bedrock exposure over key areas where previous drilling had intersected gold mineralization. Stripped areas were mapped and sampled in detail. The exposure revealed several structural relations and indications of the timing of gold mineralization that are not apparent in drill core (Baker and Swanton, 2016).

A reconnaissance outcrop stripping program was completed in the Dev area in 2016 to follow up on a series of gold anomalies in surface grab samples and MMI soil samples. Several prospective zones with similar mineralization style to that at Russet South were identified as requiring additional follow-up (Jones, 2016). More extensive stripping of these outcrops and others in the Dev and Dev Northwest areas was conducted in 2017, with channel and grab samples from several of these new exposures returning gold values significant enough to justify further work.

9.5 Rock Geochemistry

Pure Gold has analysed approximately 1,749 surface rock samples using whole rock lithogeochemical, conventional gold plus multi-element or portable XRF analysis. The lithogeochemical samples were collected to determine the composition of the main rock units across the property. Mostly, however, rock samples were collected during mapping and prospecting and analysed to determine gold and pathfinder metal content. Numerous chip and channel samples were collected at the Russet South and Dev outcrops exposed during mechanical stripping. All rock samples collected by Pure Gold are analysed by the same analytical methods for gold and multi-element ICP geochemistry as drill core. While industry best practice techniques are applied to the collection of chip and channel samples, the sampling techniques and results are not considered in themselves to be representative of average gold grades of the zones, but are rather used as one guide to prospectivity of a mineral target prior to drilling.

9.6 Soil Geochemistry

Two soil sampling techniques were trialled by Pure Gold: conventional, B-horizon soil sampling and Mobile Metal Ion (MMI) soil sampling. During the first sampling program in 2014, both types of samples were collected at the same widely-spaced sites across the property. Subsequent surveys focused on collecting follow-up soil samples using only the MMI technique which was deemed to be the most appropriate for most sample sites (Arne, 2014).

MMI soil samples were collected in plastic Ziploc bags from a continuous interval between 10 cm and 25 cm below the organic/inorganic interface. Undecomposed organic material was avoided and excluded from the sample. Depending on the depth to the organic/mineral soil interface and the amount of groundwater, samples were collected with a hand auger or by digging a pit. Sites were photographed, marked with Tyvek tags and data recorded in field notebooks to be entered into Pure Gold's spreadsheet template. Location data was recorded on handheld Garmin GPSs.

Conventional B-horizon soil samples were collected in paper kraft bags from the B soil horizon using a shovel or auger. Undecomposed organic material was avoided and excluded from the sample. Sites were photographed, marked with Tyvek tags and data recorded in field notebooks to be entered into Pure Gold's spreadsheet template. Location data was recorded on handheld Garmin GPSs.

For the initial, property-wide soil sampling program, sample locations were spaced about 1,000 to 500 m apart. For subsequent, follow-up programs MMI samples were collected along east-west grid lines spaced 100 m apart. Sample spacing along these lines was 25 m although sampling sites were modified slightly as appropriate to select a suitable location.

In all, Pure Gold has collected 8,972 MMI soil samples covering the majority of the property that is underlain by Balmer Assemblage rocks. Several regions of anomalous gold exist including some which are not explained by bedrock geology (these are explained in greater detail in Section 7.4). Given the highly sensitive nature of the MMI technique, some broad areas of anomalous gold near historical mine sites are likely due to wind-blown tailings.

9.7 Historical Drill Core Relogging

A property-wide drill core relogging campaign was undertaken in 2017. The program focused on drill core produced by Placer Dome and Claude between 2001–2009. In total, approximately 142,000 m from 242 drill holes were recoded, which updated the historical logging codes to the current Pure Gold logging schema. Additionally, 3,872 new core samples were collected and analyzed for gold and multi-element ICP geochemistry. Magnetic susceptibility was recorded for 10 holes through the 8 Zone Deposit and 43,000 wet and dry core photos were collected. The processed core was moved to a new core storage site constructed in 2017 on the Russet Road.

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9.8 Petrography

Pure Gold has undertaken several petrographic studies of samples selected to characterize timing of mineralization, alteration phases, and igneous precursors (Ross, 2015; Leitch, 2016; Ross, 2016). The results of this work have been integrated along with lithogeochemical studies to refine core logging and geologic mapping schema.

9.9 Exploration Targets

The mineralized zones in described in Section 7.3 are all subject to ongoing exploration by Pure Gold.

9.10 Sampling Methods and Quality

The rock and soil sampling by Pure Gold has been systematic and completed according to a clear set of procedures that are in line with industry best practices. Rock samples provide an indication of the presence of gold but of course are biased by available bedrock exposures. Similarly, soil samples provide an indication of elevated gold within overburden but this material can be transported and is not necessarily indicative of underlying bedrock.

9.11 Interpretation

The Madsen Gold Project non-drilling exploration dataset comprises systematic, property-wide, multifaceted information carefully collected by modern techniques. Combining surface geophysical (magnetic), geochemical and geological information with historical data and drilling data has allowed for a property-wide geology map and delineation of several new targets. This dataset continues to be refined by, for example, infill geological mapping and sampling supported by mechanical trenching, but in the current state it forms a valuable base for exploration work.

10. Drilling

The Mineral Resource Statement reported herein for the Madsen Gold Project is based on historical and recent drill core data. The database, which forms the basis for the Madsen deposit mineral resource estimate, had a cut-off date of April 11, 2017 and includes the results of 178,293 m of drilling from 435 drill holes (Claude and Pure Gold drilling) completed following the 2009 resource estimate. Although the total database included 14,627 drill holes at the cut-off date, only 13,151 of these were used to inform the Madsen deposit resource estimate as the other drill holes were located outside of the area of estimation. Of the drill holes used for the resource estimation within this subset, 245 were drilled by Pure Gold. The mineral resource estimate at the Russet South Deposit considered data from 32,803 metres of drilling from 123 drill holes, of which 110 drill holes were drilled by Pure Gold. The data cut-off used for the resource estimate at Russet South is October 20, 2017. The mineral resource estimate for the Fork deposit considered data from 44,087 metres of drilling from 117 drill holes, of which 21 were drilled by Pure Gold. The data cut-off used for the resource estimate at Fork is October 20, 2017. All diamond drill cores are NQ-sized.

10.1 Historical Drilling

Information about historical drilling on the Madsen Property is described in Sections 6.0 and 14.0.

10.2 Pure Gold Drilling (2014–2017)

From project acquisition through 2017, Pure Gold drilled 550 NQ-sized core holes for 174,711 m of drilling. Drilling within the Madsen deposit was aimed at characterizing the historically mined zones using modern methodologies and on extending the strike and dip extents of known mineralization. Targeted exploration drilling occurred within and adjacent to all of the resource domains (except the 8 Zone) with a focus on resource growth. Additionally, several target areas across the property were tested including Starratt, Fork, Russet South and initial drill holes into several regional targets.

Drill holes completed within the resource domains confirmed data contained in the historical mine compilation and allowed a thorough study of the structural geology, geochemistry, and alteration of the mineralized zones. Information acquired through the latest drilling and supported by surface work is consistent with interpretations that the gold mineralization at Madsen developed early in the tectonic history of the belt, and has been deformed and folded.

Drilling was completed by Major Drilling in 2014 and early 2015 and Hy-Tech drilling from early 2015 to present. All holes were drilled with NQ-size equipment and core was placed in 4 foot-long wooden core boxes. All drill collar casings were preserved and covered with caps labelled with the drill hole name and marked with wooden survey stakes. Hole collar locations were surveyed post-completion using a Trimble ProXRT differential GPS receiver with Omnistar real-time correction, which achieves sub-metre precision. Down-hole surveys in 2014 and 2015 were initially completed with a Reflex EZ-Shot tool every 20 to 30 m. Drill holes were re-surveyed at completion with a Reflex Gyro survey tool from hole bottom to top. Starting azimuths for the gyroscopic instruments and drill alignments were determined with an azimuth pointing system (APS) GPS based compass in 2014 and 2015. In 2016, survey procedures were improved through the replacement of the APS with a Reflex TN14 Gyrocompass for drill alignments and initial gyro orientations. All drilling sites were cleared of any cut timber and debris, re-contoured and re-seeded with a native seed mix post-drilling. All drill holes were logged, photographed, and sampled at the Madsen Mine following the procedures described in Section 10.4. All data collected during core processing is stored in the Reflex Hub (formerly ioHub) cloud database.

10.2.1 Core Processing

Upon initiation of drilling on a hole, the project geologist assigns a logging geologist and geotechnician to the hole. Data collection responsibility for each hole is tasked to the Logging Geologist and supervised by the project geologist. It is the responsibility of the project geologist to validate all drill hole data and ensure transfer to the cloud Hub database on completion of the logging and sampling.

10.2.2 Geological Quick Logging

Immediately following delivery of core from the drill rig to the core shack at morning shift change, the Logging Geologist assigned to each drill hole completes a quick log of geology and mineralization and the results of the quick log are entered into an online tracking sheet. Observations and interpretation are discussed at daily meetings to enable consistent interpretation and adjustments for the planning of subsequent holes. The emphasis is on the mineralized zones and the potential to host gold.

10.2.3 Geotechnical Procedures

All core drilled on the Madsen Gold Project is prepared by a technician prior to geological logging. This preparation work includes reassembly and orientation of drill core pieces, checking and correction of block errors, drawing bottom of hole core orientation marks on core, measuring offset angles of bottom of hole marks, recording loss of orientation lines, and placing down-hole meter marks as well as measuring recovery, rock quality designation and magnetic susceptibility. All downhole measurements are collected to the nearest centimetre.

Each core box is permanently labelled with details of drill hole number, box number and depth interval engraved onto an aluminium tag affixed to the end of the tray. Box intervals are recorded into an Excel file and retained.

10.2.4 Geological Logging

All drill core at Madsen is geologically logged directly into a laptop or tablet computer using the Reflex Logger software which comprises several specific data tables. Geological boundaries and annotations are marked on the core using coloured china markers on the portion of the core to be retained after cutting and sampling. Section 7.3 details the individual lithological units and codes that are used in logging. Due to the focus on mineralization, any major structures (primarily large or gold-hosting veins) are reported both in the lithology table as well as being recorded in structure or vein tables. Lithologies are split out for intervals that are greater than 1 m in core length and/or of geological significance. Mineralized veins 20 cm longer or greater, are logged

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separately. The focus of the geologic logging is to highlight the mineralized zones and to also capture lithology, alteration and veins, and structural data.

10.2.5 Structural Data

All drilling by Pure Gold uses Reflex ACTIII core orientation tools. All core intervals in the Balmer Assemblage target units are oriented with a bottom of core mark and additional intervals of interest such as quartz veins captured in other less prospective rock units. Representative average foliation measurements are logged downhole every 10 to 20 m or on major changes in orientation. Strike and dip of key structural features including vein and lithologic contacts, fold axes, and lineations are recorded using alpha, beta and gamma angles and DIPS software or the GEOTECH module in GEOACCESS 2000, Micromine or Geocalculator software are used to calculate and plot the true strike and dip of structural features. The structural data can then be visualized in Leapfrog or Micromine.

10.2.6 Core Photography

After sample lay-out but prior to sawing, all drill core is photographed both wet and dry using a high quality DSLR camera in a fixed mount with standardized camera settings, lighting and layout. HoleID, core box number, depth blocks, cut lines, and sample marks and tags are visible in the photographs. All digital photograph files are renamed to include the hole number, box numbers and depths (Figure 10-1).

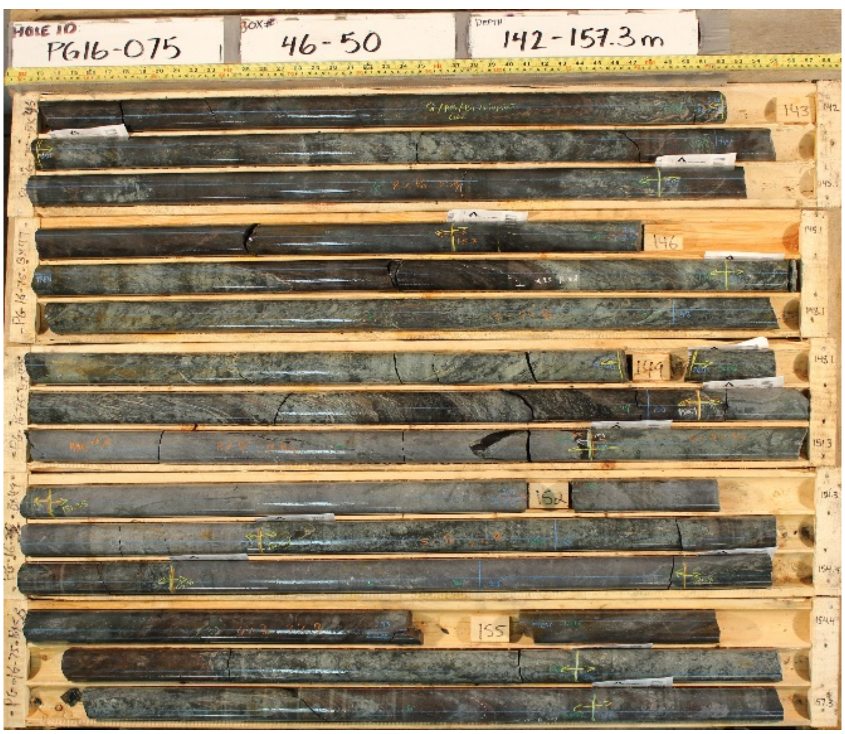

Figure 10-1: Typical core photographs.

10.2.7 Core Storage

After logging, photographing and sampling, the core is cross-stacked, strapped and stored in ordered rows on pallets in a newly created core storage facility at the Madsen project site (Figure 10-2). All returned pulps and coarse reject material from the assay labs are tarped and also stored in this area.

Figure 10-2: Madsen Gold Project core storage facility.

10.3 Summary

Diamond (core) drilling is the most appropriate method for the Madsen Gold Project and this technique has been applied by all operators since early exploration and mining. Historical drilling is tightly-spaced (nominally drilled at 25-foot centres) within mined-out areas but other areas show evidence of alteration and elevated gold but have been drilled at much broader spacing. Based on core recovery measurement of >40,000 individual drill runs completed by Pure Gold, recovery averages 99.6% which is very good and indicative that core recovery is not a factor in the accuracy or reliability of results. Pure Gold's methodology and procedures meet or exceed typical industry standards and to the extent known, historical operators generally operated at standards in line with the times. As such, the drilling conducted at the Madsen Gold Project has produced a reliable geological and geochemical database.

11. Sample Preparation, Analyses and Security

Sampling procedures and methods have evolved significantly over the long history of exploration and mining at the Madsen Gold Project and specific procedures also varied among operators. As such, descriptions of sample preparation, analyses and security are described separately below according to time period and/or operator.

The author is of the opinion that, based on historical information available, the historical sampling, sample preparation, security and analytical procedures were generally in-line with best practices for their time and the sampling, sample preparation, security and analytical procedures undertaken by Pure Gold are inline with best practices. The historical procedures and those undertaken by Pure Gold are adequate for modern targeting, modelling and resource estimation.

11.1 Sampling

11.1.1 Historical Sampling (1936–1982)

Sample preparation, analyses and security procedures for historical samples taken during the operation of the Madsen Mine (core and chip samples) are not documented and therefore difficult to review. Samples were assayed for gold at the mine laboratory but no information exists regarding lab certifications or preparation and assaying procedures. ISO 9000 series standards were first published in 1987, and the ISO 17025 standard was first published in 1999 and as such could not have been applied. Assay results are hand-written or typed on paper logs, level maps and sections.

Sample preparation, analyses and security procedures for historical samples taken by Central Patricia Gold Mines and Cockeram Red Lake Gold Mines between 1943 and 1946 and by Noranda Inc. in 1981 and 1982 are unknown. No information exists regarding lab certifications but as indicated in the preceding paragraph, such early work predates applicable ISO standards. The preparation and assaying techniques are not documented.

11.1.2 Placer Dome (2001–2006)

Placer Dome used two primary laboratories for assaying samples collected from the Madsen Gold Project. All samples from 2001 to 2006 were assayed by XRAL Laboratory in Toronto, Ontario or ALS Chemex Laboratory in Vancouver, British Columbia.

11.1.3 Wolfden and Sabina (2003–2012)

Wolfden submitted samples to Accurassay Laboratories in Thunder Bay, Ontario. Accurassay received ISO 17025 accreditation in 2002 from the Standards Council of Canada. It is unknown which analytical methods were covered under this accreditation.

At Accurassay, samples were prepared using a standard rock preparation procedure consisting of drying, weighing, crushing, splitting, and pulverization. Prepared samples were assayed for gold, platinum, palladium, and rhodium using inductively coupled mass spectroscopy (ICP-MS) as well as for a suite of base metals using ICP-MS.

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Procedures followed by Sabina are recorded in more detail. In 2010 and 2011 Sabina submitted samples to SGS Laboratories (SGS) in Red Lake for sample preparation and analysis. SGS was accredited by the Standard Council of Canada (SCC) to ISO 17025:2005 (accredited laboratory number 598) for gold analysis by fire assay.

All samples were delivered by Sabina personnel to SGS. Sample preparation and assay analysis included crush to 75% passing 2 mm and then pulverizing a 250 g split to 85% passing 75 µm. Samples were assayed by fire assay with an atomic absorption spectroscopy (AAS) finish on 50 g aliquots. A duplicate sample was assayed by SGS as part of their assaying procedures.

In 2012, Sabina submitted samples to Activation Laboratories Ltd. (Actlabs) in Red Lake for sample preparation and analysis. Actlabs was accredited to ISO 9001:2008 by Kiwa International Cert GmbH (certificate number 1109125). Samples were crushed to 90% passing 2 mm after which a 250 g split was pulverized to 95% passing 105 µm. Samples were assayed by fire assay with AAS finish using a 30 g aliquot.

11.1.4 Claude (2006–2013)

Claude used four primary laboratories between 2006 and 2012. SGS Laboratory in Red Lake and TSL Laboratory located in Saskatoon, Saskatchewan were used from 2006 to May 2008, until Claude identified performance issues with samples submitted to the SGS Laboratory in Red Lake and as a result stopped submitting samples to this laboratory. Starting in 2009, Claude submitted samples to Accurassay Laboratories in Thunder Bay, Ontario but experienced lengthy delays in receiving results. Then in 2010, Claude submitted all samples to ALS Limited (ALS) in Thunder Bay for sample preparation and to ALS Vancouver for assaying. All these laboratories are accredited ISO/IEC Guideline 17025 by the Standards Council of Canada for conducting certain testing procedures, including the procedures used for assaying samples submitted by Claude. These laboratories also participate in proficiency testing programs.

These laboratories all used standard rock sample preparation procedures involving coarse crushing dried sample, pulverization of 500 g subsamples to 90% passing 150 mesh screens (105 µm).

All core samples were assayed for gold using a standard fire assay procedure on pulverized subsamples with an atomic absorption finish. Samples assaying more than 1.0 g/t gold were re-analyzed by fire assay with a gravimetric finish. Samples assaying greater than 5.0 g/t gold were re-analyzed using screen metallic fire assay procedures.

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11.1.5 Pure Gold (2014–2016)

During 2014, 2015 and 2016 Pure Gold submitted all samples to ALS Minerals (ALS) Laboratory in Thunder Bay and Vancouver for sample preparation and analysis, respectively. Pure Gold submitted pulp duplicate samples to SGS Laboratory in Burnaby, British Columbia for check assay testing. The ALS laboratory in Vancouver is ISO 9001:2008 and CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified by the Standards Council of Canada (SCC) for the analytical methods used on the Madsen samples (accredited lab 579). The SGS laboratory is CAN-P-159, CAN-P-1578, and CAN-P-4E (ISO/IEC 17025:2005) certified by the SCC for the analytical methods used on the Madsen samples (accredited lab 744).

Samples were dried and crushed to 70% of the sample passing a 2 mm screen (method CRU-31). Initial crushing was followed by a Boyd rotary split of a 1 kg subsample (method SPL-22Y), and pulverization of the split in a ring mill to better than 85% of the ground material passing through a 75 µm screen (method PUL32).

Sample pulps were shipped to the ALS laboratory in Vancouver. Assays for gold were by a 30 g aliquot fire assay followed by aqua regia (HNO_3-HCl) digestion and measurement by atomic absorption spectroscopy (AAS, method Au-AA23). Samples in which the gold concentration exceeded 5 ppm were re-assayed from the same pulp by method Au-GRA21, fire assay of a 30 g aliquot, parting with nitric acid (HNO_3) followed by gravimetric gold determination. In cases of significant visible gold in samples, the complete interval was re-assayed by method Au-SCR24, screened fire assay (metallic screen). In addition to the gold assays, multi-element geochemical trace level analyses were completed by method ME-ICP61, induction coupled plasma-atomic emission spectroscopy (ICP-AES) following digestion by hydrofluoric (HF), nitric (HNO_3) and perchloric ($HClO_4$) acids followed by a hydrochloric (HCl) acid leach.

As routine external quality control methods for the samples re-assayed by method Au-SCR24 were not practical, for this method Pure Gold relied on the internal quality control performed by ALS and a comparison with the initial assays by methods Au-AA23 and Au-GRA21.

11.1.6 Pure Gold (2017)

In 2017, Pure Gold submitted all samples to SGS Minerals Services (SGS), which is independent of Pure Gold, in Red Lake for sample preparation and gold analysis, with additional analyses conducted at SGS's Vancouver facility. Some samples were diverted to the SGS Laboratories in Lakefield and Burnaby for preparation and analyses after being delivered to the Red Lake laboratory due to capacity limitations in Red Lake related to staffing.

The SGS laboratory in Red Lake is CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified for the analytical methods used on the Madsen samples (accredited lab 598). The SGS laboratory in Vancouver is CAN-P-1587, CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified for the analytical methods used on the Madsen samples (accredited lab 744). The SGS laboratory in Lakefield is CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified for the analytical methods used on the Madsen samples (accredited lab 184).

Samples were dried and weighed (method G_WGH79) and crushed to 75% of the sample passing a 2 mm screen (method G_CRU21, method G_CRU22 where sample weight is >3.0 kg). Initial crushing was followed by a split (to obtain a sample weight of 1.0–1.5 kg), and then pulverization of the split in a chromium steel bowl to better than 85% of the ground material passing through a 75 µm screen (method PUL47).

Analysis for gold was conducted at the SGS laboratory in Red Lake, by a 30 g fire assay with an atomic absorption spectroscopy finish (method GE_FAA313). In cases where the assay value returned >5 ppm Au, a follow up gravimetric analysis was conducted (30 g fire assay with a gravimetric finish, method GO_FAG303). In cases where visible gold was noted during core logging, a screen metallic gold analysis was conducted in addition to the AAS and gravimetric analytical procedures (screen to 106 µm followed by fire assay, method codes GO_FAS31K and GO_FAS51K for samples <1 kg and >1 kg respectively). In addition to the gold assays, 49-element geochemical trace level analyses were completed in the Burnaby laboratory by method GE_ICM40B, induction coupled plasma-atomic emission spectroscopy (ICP-AES) and induction coupled plasma mass spectrometry (ICP-MS) following digestion by hydrofluoric (HF), nitric (HNO_3), perchloric ($HClO_4$) and hydrochloric (HCl) acids.

11.2 Sample Security

Sample security is not described in early records in accordance with standards in place at the time.

11.2.1 Claude (2006–2013)

Claude implemented chain of custody and sample security procedures for their work starting in 2006 as documented and directly observed by Cole et al. (2010). Procedures generally involved sample handling by appropriately qualified staff, controlling access to sampling facilities and documentation of sample dispatch and receipt at laboratories.

11.2.2 Pure Gold (2014–2017)

Currently (and during the 2014–2017 drilling programs), Madsen Gold Project personnel employ the following security and chain of custody procedures:

i. Core is placed in wooden core boxes by drilling contractors, covered with wooden lids, and sealed with fiber tape.
ii. Core boxes are delivered to the locked and fenced logging facility by drill crew members at twice daily shift changes via truck or snowmobile.
iii. Core shack personnel open and sort core boxes for logging.
iv. Core awaiting sawing (sampling) is stored in wooden racks in the core shack.
v. Core is sawn and bagged into pre-labelled sample bags by samplers under the supervision of the senior sampler and project geologist.
vi. Sample bags are placed inside pre-labelled rice sacks.

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vii. Rice sacks containing bagged samples are sealed and palletized (or placed within plastic shipping totes) within the core shack.

viii. Shrink-wrapped pallets of rice sacks are shipped directly from the core shack to laboratory preparation facilities. During 2014–2016 programs, Manitoulin Transport Trucking Services LTL of Winnipeg, Manitoba transported pallets to ALS Minerals laboratory in Thunder Bay, Ontario for sample preparation. After 2016, pallets are collected from the Madsen Mine site by SGS personnel and driven to their Red Lake facility.

ix. Access to the core logging facility is restricted to authorized staff.

x. Hardcopy chain of custody forms and sample analytical instructions are included with each shipment with copies sent by email. The analytical labs (ALS from 2014–2016 and SGS in 2017) reported all shipments were received intact.

11.3 Quality Assurance and Quality Control Programs

Quality control measures are typically set in place to ensure the reliability and trustworthiness of exploration data. These measures include written field procedures and independent verifications of aspects such as drilling, surveying, sampling and assaying, data management and database integrity. Appropriate documentation of quality control measures and regular analysis of quality control data are important as a safeguard for project data and form the basis for the quality assurance program implemented during exploration.

Analytical control measures typically involve internal and external laboratory control measures implemented to monitor the precision and accuracy of the sampling, preparation and assaying processes. They are also important to prevent sample mix-up and monitor the voluntary or inadvertent contamination of samples. Assaying protocols typically involve regular duplicate and replicate assays and insertion of quality control samples. Check assaying is typically performed as an additional reliability test of assaying results. This typically involves re-assaying a set number of sample rejects and pulps at a secondary umpire laboratory.

11.3.1 Historical Period (1927–2000)

There are no records to indicate if specific analytical quality control measures were implemented by any operator during early exploration activities or at the mine laboratory during the operation of the Madsen Mine (1936–1976). Neither is there any information regarding analytical quality control measures implemented by Claude between 1998 and 2000.

11.3.2 Placer Dome (2001–2006)

Placer Dome annual reports indicate that analytical quality control measures were implemented, however the details of these measures and the analytical quality control data were not transferred to Claude in 2006.

11.3.3 Wolfden and Sabina (2003–2012)

Wolfden and Sabina implemented external analytical quality control measures on core sampling. The exact extent of the implemented program is unknown, and data prior to 2006 are unavailable. Implemented measures included using control samples (blank and standard reference material). Quality control samples were inserted into the sample stream on regular intervals. A sample blank was inserted every 25 samples, and a standard inserted every 75 samples.

The blank material was sourced from an outcrop in the southwest corner of Wolfden's Bonanza/Follansbee property. These samples were assayed by Accurassay Laboratories to ensure suitability. The performance of the blank material is unknown.

A 2006 drilling report noted that two different standards were used, SK21 that had a certified assay of 4.048 g/t Au and SN16 that had a certified assay of 8.367 g/t Au. Certificates are not available and the source of the standards in unknown. The report suggests performance issues with standard SK21 as the average assay value was approximately 10% higher than the accepted value. However, only 21 assay results are available which is too few to extract meaningful statistical information from the results.

Sabina submitted blank and standard material in the sample stream of at a rate of one quality control sample type in 20 samples. No information is available detailing the type and source of the reference material and whether it was from a commercial vendor or produced by Sabina in-house.

11.3.4 Claude (2006–2013)

The exploration work conducted by Claude since 2006 was carried out using a quality assurance and quality control program in line with industry best practices. Standardized procedures were used in all aspects of exploration data acquisition and management including mapping, surveying, drilling, sampling, sample security, assaying, and database management.

Claude relied partly on the internal analytical quality control measures implemented by the primary laboratories. Assay results for quality control samples inserted by the primary laboratories were submitted with routine assaying results and reviewed for consistency by Claude personnel.

Additionally, Claude implemented external analytical quality control measures to monitor the reliability of the assaying results delivered by the primary laboratories. External control samples (blanks, field or CRM samples or field duplicate) were inserted at a rate of approximately 13% within each batch of samples submitted for preparation and assaying.

Field duplicate samples were inserted at a rate of one in 50 for all batches of drilling samples submitted for assaying. Duplicate core samples were collected by splitting in half the remaining split core over the same length.

For the drilling program in 2009, Claude used four reference control samples purchased from Rocklabs in New Zealand (Table 11.1: CRMs used by Claude (2009–2013). The silica sand blank material was sourced from Accurassay.

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Table 11.1: CRMs used by Claude (2009–2013)

Standard	Source	Year(s) in use	Gold Assays (ppm Au)	
			Certified Value	**SD**
SE29	Rocklabs Ltd	2009	0.597	0.016
SH35	Rocklabs Ltd	2009	1.323	0.044
SL46	Rocklabs Ltd	2009	5.867	0.34
SQ36	Rocklabs Ltd	2009	30.04	1.2
SG40	Rocklabs Ltd	2010–2013	0.976	0.022
SL46	Rocklabs Ltd	2010–2013	5.867	0.17
SH41	Rocklabs Ltd	2010–2013	1.344	0.041
SH55	Rocklabs Ltd	2010–2013	1.375	0.045
SL61	Rocklabs Ltd	2010–2013	5.931	0.057
SQ36	Rocklabs Ltd	2010–2013	30.04	0.024
SN38	Rocklabs Ltd	2010–2013	8.573	0.158

Starting in 2010, Claude changed some of the standard reference materials used during the drill programs. A total of seven gold standards were alternated (Table 11.1: CRMs used by Claude (2009–2013)). Certified blanks included material from Rocklabs and Canadian Resource Laboratories.

A blank and a standard were inserted every 20 samples. The inserted standard typically alternated between three medium to low grade standards (SG40, SL46 and SH41). In addition, a high-grade standard and a blank were inserted after any sample containing visible gold.

No independent laboratory check assay tests were performed. Field duplicate samples were collected at a rate of one in 50 samples. Laboratory duplicate samples were not collected or assayed.

11.3.5 Pure Gold (2014–2017)

Currently (and during the 2014–2017 drilling programs), Madsen Gold Project personnel implement a Quality Assurance and Quality Control (QAQC) program comprising of insertion of blank, CRM and duplicate samples into the drill core or rock sample streams. Results of gold analyses on these samples are monitored and corrective measures implemented where deficiencies identified.

Field duplicate and preparation duplicate samples are alternately inserted every 20 samples. Field duplicates are obtained by quartering the core and submitting the two quarters in sequence to the lab. Preparation duplicates consist of a second split of the coarse reject of the selected sample and are collected by the laboratory during the sample crushing stage. Preparation duplicates are assigned the sample number immediately succeeding the original and in shipping are represented by a labeled empty bag containing the assigned sample tag. A list of preparation duplicates and instructions for preparation are included with each sample submittal form.

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Blank sample material consists of commercially available marble landscape rock. An average weight of approximately 2 kg is used for each blank sample. Blank samples are routinely inserted every 20th sample, with two additional blanks following intervals containing visible gold.

Standards used by Pure Gold between 2014 and 2017 range from low, medium and high-grade standards for routine analysis, with a higher-grade gold standard for intervals with visible gold. These standards were selected to cover all potential analytical gold methods. Three primary standards were inserted on a rotating basis in roughly equal proportions every 20th sample, and the fourth high-grade standard was inserted occasionally when visible gold was identified in core. The standards used in these categories varied over the course or program, dictated largely by availability of standard from commercial suppliers. Standard IDs, along with the supplier and certified gold values are listed in Table 11.2. Pure Gold requested extra cleaning of both crusher and pulverizer (ALS Codes: WSH-21 and WSH-22) during sample preparation of samples collected from within mineralized intervals (including shoulder samples).

Table 11.2: CRMs used by Pure Gold (2014–2017)

Supplier	Standard ID	Year(s) in use	Use Case	Gold Assays (ppm Au)	
				Certified Value	SD
Ore	OREAS6pc	2015	Low Grade	1.52	0.07
CDN	CDN-GS-	2016–	Low Grade	1.07	0.05
Rocklabs	SG56	2014–	Low Grade	1.027	0.01
Rocklabs	SH55	2016	Low Grade	1.375	0.05
CDN	CDN-GS-	2017	Low Grade	1.08	0.05
Ore	OREAS	2016–	Medium Grade	3.03	0.08
Ore	OREAS	2014–	Medium Grade	3.04	0.08
CDN	CDN-GS-	2014–	High Grade	5.27	0.17
Rocklabs	SL61	2015–	High Grade	5.931	0.06
CDN	CDN-GS-	2016–	High Grade	6.06	0.15
Rocklabs	SQ 36	2014–	High Grade	30.04	0.02
CDN	CDN-GS-	2016–	High Grade	22.94	0.56
Rocklabs	SQ87	2016	High Grade	30.87	0.21

11.4 Specific Gravity Data

Historically, the Madsen Mine used a tonnage factor of 11.25 cubic feet per ton to convert volumes into tonnages. This factor was determined from a bulk sample of Austin ore in 1938 and proven to be adequate through nearly 40 years of production. This tonnage factor is equivalent to a specific gravity of 2.84.

Specific gravity was measured for 256 split core samples taken from a variety of rock types for auriferous and barren material from three surface drill holes drilled by Claude (Table 11.3). Significantly, these values do not vary much between rock types or between auriferous and barren rock.

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Table 11.3: Summary of specific gravity data for the Austin Deposit

Specific Gravity	1	2	3	4
Mean	2.90	2.90	2.91	2.91
Standard Error	0.01	0.01	0.01	0.01
Standard Deviation	0.11	0.10	0.10	0.11
Sample Variance	0.01	0.01	0.01	0.01
Kurtosis	1.63	-0.85	-0.32	1.38
Skewness	0.92	0.27	0.32	0.83
Range	0.66	0.41	0.53	0.66
Minimum	2.71	2.71	2.71	2.71
Maximum	3.37	3.12	3.24	3.37
COV	0.04	0.03	0.03	0.04
Count	227	188	217	256

1: All material within modelled Austin solid
2: Only "tuffaceous material" within modelled Austin solid
3: All "tuffaceous material" (not modelled)
4: All drill samples undifferentiated (all material types)

Claude continued to collect specific gravity data from core using the water displacement method until approximately mid-2012. At the end of the data collection, a total of 3,010 specific gravity determinations were completed on core from all areas of the Madsen Mine as well as from a number of other exploration targets. The average specific gravity has a value of 2.91.

Pure Gold conducted a program of specific gravity determinations on selected intervals of core using the ALS water displacement method (OA-GRA08) at the analytical preparation stage in 2016. A total of 3,013 samples were selected from a full range of lithologies and flagged for measurement at the ALS prep lab. Results for the most common rocks types within the vicinity of mineralization are summarized in Figure 11-1. The overall average specific gravity for these rock types is 2.91, which is 2.5% higher than 2.84, the value used during 40 years of mining and in the current Mineral Resource estimate.

The program was not continued into the 2017 season as there was judged to be sufficient data on the Madsen mineral domains for the current level of study.

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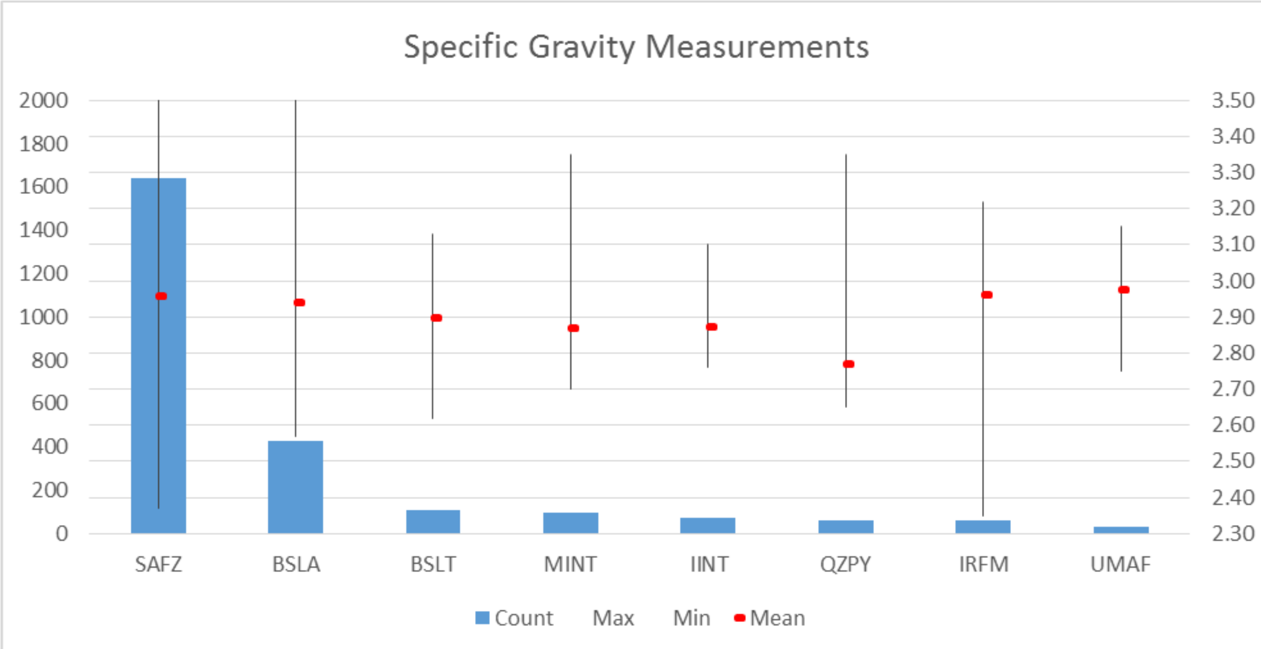

Figure 11-1: Summary of specific gravity data by rock type from Pure Gold study

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12. Data Verification

Owing to the long history of exploration and production at Madsen, there have been numerous campaigns of data verification, validation and reconciliation. The most comprehensive recorded verification effort (Cole et al., 2010) was conducted during the digitization of the hardcopy mining-era database, prior to Pure Gold's acquisition of the property. This work was initiated by Claude in 1998, advanced by Placer Dome from 2002–2006 and completed by Claude with assistance from SRK during 2008 and 2009 (Table 12.1). The result was a historical database comprising 13,617 drill holes with lithological intervals and 550,687 gold assays. This database has been the foundation for drill-targeting and geological interpretation by Pure Gold and has been substantially added to and verified during recent drilling campaigns. The combined database up to April 11, 2017 forms the basis of the mineral resource estimates on the Austin, South Austin, A3, 8 Zone and McVeigh domains contained herein. Mineral resource estimates on the Russet South and Fork domains are calculated based on a combined database up to October 20, 2017.

Table 12.1: Digitization of the historical drill hole database from Cole et al. (2010)

Date	Activity	Results
1998 to 2001	Database creation by Claude	3,834 drill holes digitized from paper logs
2002 to 2006	Data entry by Placer Dome	4,031 drill holes, expanded from previous database
Feb-Nov 2008	Further data entry	13,042 drill holes, expanded from previous database
Nov-Dec 2008	Database validation	Logical data checks and 3D graphical checks of 4% of data Discovery of 24 significant errors on average per drill hole
Dec-Apr 2009	Numerical data check/correction	Record by record verification and correction of header, survey and assay tables
Feb-Apr 2009	Initial 5% validation	Identification of collar coordinate and survey issues Conversion issues of original orientations recorded in quadrant degrees Prevalent assay table errors identified in area with visible gold or no samples
Apr - May 2009	Lithology table	Systematic re-entry of lithology with standardized code
Apr -May 2009	Additional data entry	731 new paper logs found and digitized 705 additional "stope definition" logs digitized 115 Placer Dome drill logs digitized
May 2009	Final 5% validation	No major error detected Validation of all assays greater than 2 ounces of gold per ton Final count of 13,617 drill holes after validation
Jun 2009	Drillhole renaming	New standardized naming convention
Jun 2009	Lithology table validation	3D graphical validation Errors checked, verified and corrected in GEMS

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The qualified person has consulted to the Madsen Gold Project since 2014 and has completed data verification throughout this work including:

- Confirmation of hundreds of historical assay, lithological and collar location database records with hard copy drill logs stored in the Madsen site archive;
- In-field location confirmation of numerous drill hole casings during geological mapping across the Madsen Property;
- Independent drill hole database validation using Micromine software drill database validation tools;
- Confirmation of consistent use of historical lithological logging codes by comparison with modern drilling data;
- Validation of geological sectional interpretations with level plan geological interpretations including reference with original hard copy mine level plans; and
- Review of consultant QAQC reports and verification of their conclusions on CRM and blank sample analyses;

12.1 Database Validation based on Logged Lithological Intervals

Using the historical drill hole database, data from modern (Pure Gold) drilling and with reference to the original mine level plans and cross sections, author Baker conducted systematic geological interpretation of the Madsen Mine along 100 foot-spaced section lines corresponding to the original imperial mine grid. In total, 140 sectional and 32 level plan interpretations have been completed extending from the southwestern end of Starrat, across Russet South and northeast to Coin Lake. Initially, only sectional interpretations for the top 16 levels of the Madsen Mine were created but later this interpretation was extended beyond the lowermost depths of the historical workings. Sectional interpretations were reconciled using level plans constructed at the elevation of the historical workings and ultimately the level plans were used to build a 3D wireframe geological model in Leapfrog.

The drillhole database includes nearly 237,000 downhole lithological intervals coded according to schemes current to the era of drilling as digitized during database construction. Given that the database contains drillholes spanning nearly 70 years of exploration, the coding schemes varied with time so some interpretation of these codes is required prior to geological interpretation. Initially, upon acquisition of the project, Pure Gold built a code equivalence table and recoded the database (preserving the original code) to the modern coding scheme. Baker used this scheme and verified many intervals by referring to recent adjacent Pure Gold drill holes. The initial recoded scheme was deemed useful and consistent enough to accurately interpret the most important geological units including the lower Confederation Assemblage contact, altered rocks, ultramafic sills and quartz porphyry intrusive rocks. Several minor changes to the recoding of the original lithological codes were made to refine the interpreted codes.

12.2 Drill Hole Location and Survey Data

As qualified person, author Baker has personally collected GPS location data confirming numerous surface drill holes from various eras including Placer Dome, Claude and Pure Gold collar locations. Invariably they match the drill hole database which comprises converted historical location data and modern survey location data collected during a focused survey program in 2014 (described in section 9.2). Earlier surface and underground drill hole locations cannot be confirmed but, in general, the database coordinates of underground drill hole collars are consistent with the geological units encountered in Pure Gold drilling and there is no evidence that any systematic shift or errors exist in the database. Importantly, this confirmation has largely been completed in UTM coordinate space which tests the conversion from the original coordinate system (Imperial Mine Grid).

Conversely at the Russet South Deposit, most pre-1998 drill hole collars seem poorly located based on logged lithologies and could not be located or positively identified on the ground primarily due to lack of locatable suitable geo-reference points on the local grids. Since these could not be systematically surveyed and therefore verified, the historical intercepts for Russet South have not been used in the calculation of the resource, which has relied entirely on holes drilled by Pure Gold between 2014-2017.

Downhole survey methods for the earliest (mostly underground) drilling were rudimentary compared with today's gyroscopic survey methods. Original drill logs indicate that a variety of methods were employed or in some cases, no downhole surveying was completed. Magnetic survey methods are problematic at Madsen owing to highly magnetic rock types (ultramafic and iron formation units) which prompted Claude and Pure Gold to implement gyroscopic downhole tool technology. As such, the locations of the downhole drill traces will have variable precision based on the era of drilling (survey method used) and the length of hole (longer holes deviate more). Given that most underground drilling – and particularly the closely-space resource definition holes – are short holes, the deviation expected is limited. The longer exploration holes tend to be more recent holes which are well-surveyed by modern gyroscopic tools. Pure Gold has also re-surveyed many important holes drilled by previous operators which only had magnetic survey data.

In conclusion, the collar locations for the historical drill hole database are well-compiled, have been translated accurately from mine grid coordinates and are adequate for the purpose of this report. Downhole survey data exhibit variable precision in line with the technology used at the time of drilling, but most recent drill holes have been surveyed with high-precision gyroscopic tools. All Pure Gold completed drill holes have been located with sub-meter differential GPS and surveyed downhole with modern gyroscopic survey tools.

12.3 Analytical Data Verification

Analytical quality control measures were generally not used prior to 2009 as detailed in section 11.3. Several operators make mention of the existence of quality control programs but provide little details. Implementation of rigorous analytical quality control measures for Madsen geochemical samples began in 2009 by Claude. Original records of these programs are sparse but

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SRK reports on the procedures and results of Claude's program and the authors had direct access to the work program (Cole et al., 2010).

Upon acquisition of the project, Pure Gold implemented a more robust quality control program as detailed in section 11.3.5. Data generated to the end of 2016 drilling campaigns from analyses of certified standard reference material, blank, field, coarse reject (preparation), pulp and umpire duplicate samples were plotted and interpreted independently by Gary Lustig and Dennis Arne (Arne, 2014; Lustig, 2015; Arne, 2016). Quality control samples for the 2017 drilling campaign included in this mineral resource estimate have been reviewed by Chris Lee (Jutras et al., 2017). These analyses show generally acceptable performance of Pure Gold's quality control samples. Overall compliance rates for these samples are near 100% but given the large number of quality control samples submitted, numerous issues and areas for improvement have been high-lighted. These have been addressed through sample re-analysis, discussion with laboratory management and through improvements in core shack and sampling protocols. For example, some carry-over of gold was detected within blank samples in 2016 but with the insertion of extra blank samples and requests for quartz washes of crushing equipment, this effect has been largely mitigated.

Duplicate sample analytical data was reviewed in great detail to assess the uncertainties associated with the various stages of sampling, crushing and pulverization and to advise on sampling and analytical protocols (Arne, 2016). Analytical precision implied by these duplicates pairs is generally within the acceptable range for gold deposits characterized by coarse gold (Abzalov, 2008; Arne, 2016).

All Pure Gold drilling data is verified and uploaded to the Reflex Hub cloud database, including quality control samples. The Reflex Hub automatically generates reports illustrating performance of quality control samples. A review of these reports indicates generally acceptable performance. Failures were identified and addressed by Pure Gold upon receipt of analytical certificates.

12.4 Other Data Verification

Two independent drill hole database reviews were commissioned by Pure Gold (Mackie, 2015, 2017) on sub-sets of drill holes completed by various operators. Mackie (2017) concludes that the drill hole database is of high quality and reliability and is a reasonable rendition of historic data and this opinion is shared by the current author.

12.5 Summary

The very large Madsen Gold Project drilling database is built from historical and modern work that spans nearly 70 years. Records of quality control or data handling procedures are largely non-existent prior to 2009. The early work was, of course, in hard-copy only and it took nearly 11 years of effort to translate this into a digital database (Cole et al., 2010). Use and verification of this database shows that it is of high-quality, largely free of errors and highly effective even if assessment of the original data collection methods is not possible. Work by Pure Gold has been conducted with clear data handling protocols and an industry-standard quality control program making verification of these data much easier.

Given the long history at Madsen, the geographic, geological and analytical data housed in the Madsen Project database is highly robust, well-organized, easy to use and effective for interpretation work and decision-making and is appropriate for mineral resource estimation.

13. Mineral Processing and Metallurgical Testing

No metallurgical testing has been conducted by the current issuer; however, historic records of mineral processing and gold recovery for the Madsen mine are voluminous and remain the only metallurgical data available. For about 40 years of operation the mill nominal capacity ranged from 350 to 850 tons per day. Madsen Red Lake Gold Mines Limited's annual report for 1951 reports yearly average gold recoveries as follows: 96.15% for 1949, 95.44% for 1950, and 94.58% for 1951.

A report by the Ontario Department of Mines (Ferguson, 1965) states that "Gold recovery in the (Madsen) mill has averaged 94.00% during the time that the mill has been in operation. During 1962 the milling operation recovered 92.7% of the gold contained in the ore."

The early Madsen mill used the Merrill-Crowe process as the separation technique for removing gold from a cyanide solution. The historic Madsen mill was decommissioned in the late 1970s. The present Madsen mill was purchased from Placer Dome and relocated from the Dona Lake mine site in Pickle Lake, Ontario in the 1990s. The present mill uses the more efficient carbon-in-pulp (CIP) gold recovery process and has a nominal capacity of 600 tons per day. Mill records from Madsen Gold Corp and Claude during 1998-1999 show average monthly mill throughput of 14,840 tons at an average head grade of 6.51 g/t gold and average recoveries of 90.09%.

While metallurgical testing has not been completed to date, an average mill recovery of 92% has been assumed on the basis of actual operating data from the plant, and factored into the choice of cut-off grade used to report the current mineral resource estimate. Pure Gold plans to complete further metallurgical testing to confirm grade-recovery relationships and optimize design.

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14. Mineral Resource Estimate

The current mineral resource estimate of the Madsen Project comprises the Madsen, Fork and Russet South deposits. The Madsen mineral resource estimate was disclosed on August 2, 2017 and forms the basis for the PEA announced on September 14, 2017. The Fork and Russet South deposits are considered to be satellite deposits to the main Madsen deposit, and the estimated mineral resources for these two deposits were disclosed on December 14, 2017. Details of the Madsen mineral resource estimate were first described in Section 14 of a technical report filed by the company on October 30, 2017, which is reproduced here in its entirety in Section 14.1, and details of the satellite mineral resource estimates are summarized here for the first time in Section 14.2. The current mineral resource estimate of the Madsen Project follows a drilling program of 550 holes from surface and underground undertaken by Pure Gold from 2014 to 2017 and a resultant new geological model.

The zones within the Madsen mineral resources include the Austin, South Austin, McVeigh, A3, and the 8 Zone deposits. A separate block model was built for each of these mineral zones, with the A3 domain being part of the South Austin zone block model. All measurements are metric with coordinates in the local metric mine grid.

The estimation of the mineral resources of two satellite deposits of the Madsen Gold Project, Fork and Russet South, was also added to this study. The Fork deposit is located approximately 1.5 km southwest of the Madsen Deposit, while the Russet South Deposit is located approximately 1.75 km northwest of the Madsen Deposit. Separate block models were produced for each satellite deposit. All measurements are metric with coordinates in the UTM system.

The geologic interpretations were carried out by Pure Gold's personnel while the estimation of gold grades into a mineral resource was carried out by Mr. Marc Jutras, Principal, Mineral Resources at Ginto Consulting Inc. Mr. Jutras is an independent qualified person as defined under National Instrument 43-101.

These mineral resource estimations were primarily undertaken with the Vulcan® software and utilities internally developed in GSLIB-type format. The mineral resource domains were generated in the Leapfrog® software. The following sections outline the procedures undertaken to calculate the mineral resource, first for the Madsen main deposits, followed by the Madsen satellite deposits.

14.1 Madsen Deposit (Austin, South Austin, McVeigh, 8 Zone)

14.1.1 Drill Hole Data

This section describes the mineral resource estimate for the Madsen gold deposit only, which forms the basis of the Potentially Mineable Resource under consideration in the current PEA. The drill hole database supporting the Madsen mineral resource estimate was provided by Pure Gold with a cut-off date of April 11, 2017. It is comprised of 14,627 holes located within the Madsen Property area. There are 355 holes drilled by Pure Gold from 2014 to 2017 with a total of 114,583.5 m of drilling. Since the 2009 mineral resource estimation by Claude Resources, which had a cut-off date of September 27, 2009, an additional 435 holes with 178,293 m of drilling were added, where 80 holes with 63,709.5 m of drilling are from Claude Resources Inc. All holes are diamond drill holes. There are 1,292 holes drilled from surface and 13,333 holes drilled from underground. All 355 holes completed by Pure Gold to April 11, 2017 were drilled from surface.

A few changes were made to the original drill hole database:

- 205 holes without any Au assays were removed (no logs found, abandoned holes, geotechnical holes).
- assays with 0.000 g/t Au values were changed to 0.002 g/t Au.
- assays with -1.000 g/t Au values (missing assays) were changed to 0.005 g/t Au.
- assays with -0.050 g/t Au values (below detection limit) were changed to 0.025 g/t Au.
- assays with -0.005 g/t Au values (below detection limit) were changed to 0.003 g/t Au.
- 121 holes with logs but no Au assays were considered barren and replaced with values of 0.005 g/t Au.
- 29 duplicate holes had their X coordinate increased by 0.05 m. These holes had the same x, y, z, azimuth and dip values but with different names, depths, and Au assays.
- 63 drill hole names with more than 12 characters were brought back to 12 characters. The first 9 characters were kept and a "Z" with a 2-digit counter was added.
- hole 05NM30: a down-hole survey at 0.0m was added with an azimuth value of -59.31° and dip of -41.0°.
- hole M1 was removed as no down-hole surveys are available.
- holes TB0703, TB0704, TB0705, and TB0175 had their down-hole dips changed from 0.0° to -90°.

14.1.1.1 Drill Hole Data Statistics

The Madsen drill hole database as of April 11, 2017 is comprised of 14,627 drill holes with 683,909 gold assays in grams per tonne. Multi-element analyses are also available for the more recent drilling as well as other geologic information including alteration, lithology, veining, mineralization, structure, magnetic susceptibility, specific gravity, ICP geochemistry, and geotechnical data.

Statistics on the drill hole database are presented in Table 14.1 and in Figure 14-1. As seen in

Figure 14.1, the average drill hole depth is 78.3 m, with depths varying from 1.2 m to 2,543.0 m. Most of the underground holes are of short lengths while the surface holes are of much longer lengths. Sample lengths are observed to be 1.64 m on average, with samples lengths varying from 0.001 m to 1,249.5 m, and with the most common sampling length being 1.52 m (5 feet).

Gold grade statistics on the original samples are presented in Table 14.2 at various cut-off grades. It can be seen from this Table that the metres and accumulation (grade x thickness) of gold have similar and consistent decreasing patterns with increasing grade cut-offs. It is also noted that the average gold grades of samples at elevated cut-offs is more than twice the cut-off grade, indicating the presence of a large proportion of higher grade samples.

Table 14.1: Drill hole summary

Operator	Years	Number of Holes	Metres	Number of Assays
Russet Red Lake Gold Mines	1944 to 1947	105	8,449.4	2,070
Aiken-Russet Red Lake Mines	1968, 1969, 1974, 1977	46	4,640.9	1,044
Madsen R.L. Gold Mines	1936 to 1976	12,572	675,033.7	456,438
Noranda Inc.	1981, 1982	27	4,994.8	2,539
United Reef Petroleum	1987	24	5,466.6	2,348
Red Lake Buffalo Resources	1988, 1990	18	2,511.2	442
Madsen Gold Corp.	1992 to 1998	556	30,312.2	24,947
Placer Dome Inc.	2001 to 2005	114	60,832.7	32,493
Claude Resources Inc.	1998 to 2012	631	204,837.8	93,403
Pure Gold Mining Inc.	2014 to 2017	355	114,583.5	48,430
Others		179	34,098.4	19,755
Total		14,627	1,145,776.9	683,909

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Pure Gold Mining Inc. - *Exploratory Data Analysis* *Drill Hole Data Statistics*

Tue Aug 1 21:00:46 2017

Madsen Project - Ontario - Drill Hole Database - April 11, 2017

Collar Data	Number of Data	Mean	Standard Deviation	Coefficient of Variation	Minimum	Lower Quartile	Median	Upper Quartile	Maximum	Number of 0.0 values	Number of < 0.0 values
Easting (X)	14627	4949.48	848.317	0.171	1125.68	4523.15	4846.19	5372.19	11016.3	–	–
Northing (Y)	14627	2418.21	415.291	0.172	69.76	2212.1	2390.7	2514.69	6610.03	–	–
Elevation (Z)	14627	993.764	351.031	0.353	222.1	745.8	1033.3	1307.5	1538.4	–	–
Hole Depth	14627	78.306	125.173	1.599	1.22	27.43	45.72	76.2	2543.0	–	–
Azimuth	14627	177.55	118.59	0.668	0.0	109.26	180.39	213.57	359.99	–	–
Dip	14627	-5.837	33.321	-5.709	-90.0	-28.0	0.0	0.0	90.0	–	–
Overburden	14627	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–	–
Survey Data											
Azimuth	44109	172.084	147.137	0.855	0.0	19.61	179.46	334.7	360.0	–	–
Dip	44109	-55.285	13.022	-0.236	-90.0	-62.79	-54.83	-46.94	86.0	–	–
Assay Data											
Interval Length (from to)	683909	1.635	5.98	3.657	0.001	0.8	1.52	1.53	1249.46	57	0
AU_GPT	683909	1.279	19.623	15.344	0.0	0.003	0.17	0.34	6661.03	872	0

Figure 14-1: Statistics on the Madsen Drill Hole Database

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Table 14.2: Statistics on gold grades of original samples

Statistics of Gold Assays Above Cut-Off								
Cut-Off g/t	Total Metres	Increm. Percent	Avg. Au g/t	grd-thk g/t-m	Increm. Percent	Std. Dev.	Coef. of Var.	# of Samples
0.0	1,145,776.9	100.0	1.28	1,466,594.4	100.0	19.648	15.313	683,907
1.0	78,936.8	54.1	9.34	737,269.7	50.3	55.089	5.900	84,913
2.0	48,075.6	33.6	13.56	651,905.1	44.4	67.651	4.989	55,676
3.0	30,825.3	21.1	18.65	574,891.8	39.2	81.067	4.348	38,289
4.0	25,049.8	17.2	21.73	544,332.2	37.1	88.582	4.076	31,839
5.0	19,586.2	13.4	26.07	510,612.2	34.8	98.595	3.782	25,454
6.0	16,793.7	11.5	29.17	489,872.2	33.4	105.393	3.613	22,130
7.0	13,973.9	9.6	33.29	465,191.1	31.7	114.088	3.427	18,727
8.0	12,525.1	8.6	35.99	450,778.3	30.7	119.604	3.323	16,948
9.0	10,797.0	7.4	40.04	432,311.9	29.5	127.608	3.187	14,773
10.0	9,930.2	6.8	42.47	421,735.6	28.8	132.315	3.115	13,678

14.1.1.2 Location, Orientation, and Spacing of Drill Holes

The location of the drill holes in the resource area is presented in Figure 14-2 for the Madsen project area. As seen in this Figure, although a large proportion of the drill holes are located within the area of interest, drill holes in surrounding areas are also observed. The latter are however not part of the current study.

Statistics on drill hole spacing are presented in Table 14.3 for each zone within the area of interest and within the high-grade and low-grade units. The overall average drill spacing is 6.3 m in the high-grade zones and 9.5 m in the low-grade zones, while the overall median drill spacing is 5.9 m in the high-grade zones and 6.8 m in the low-grade zones. These results indicate a very tight drill spacing in the area of interest.

With regard to the orientation of the drill holes, although a multitude of orientations is observed, two main orientations of drilling are noted at azimuths of 0° and 180°. Along those orientations dips vary from +90° to -90° (Figure 14-3), which represents the bottom half of a sphere, displays the various azimuth and dip angles of the downward drill holes for the Madsen project.

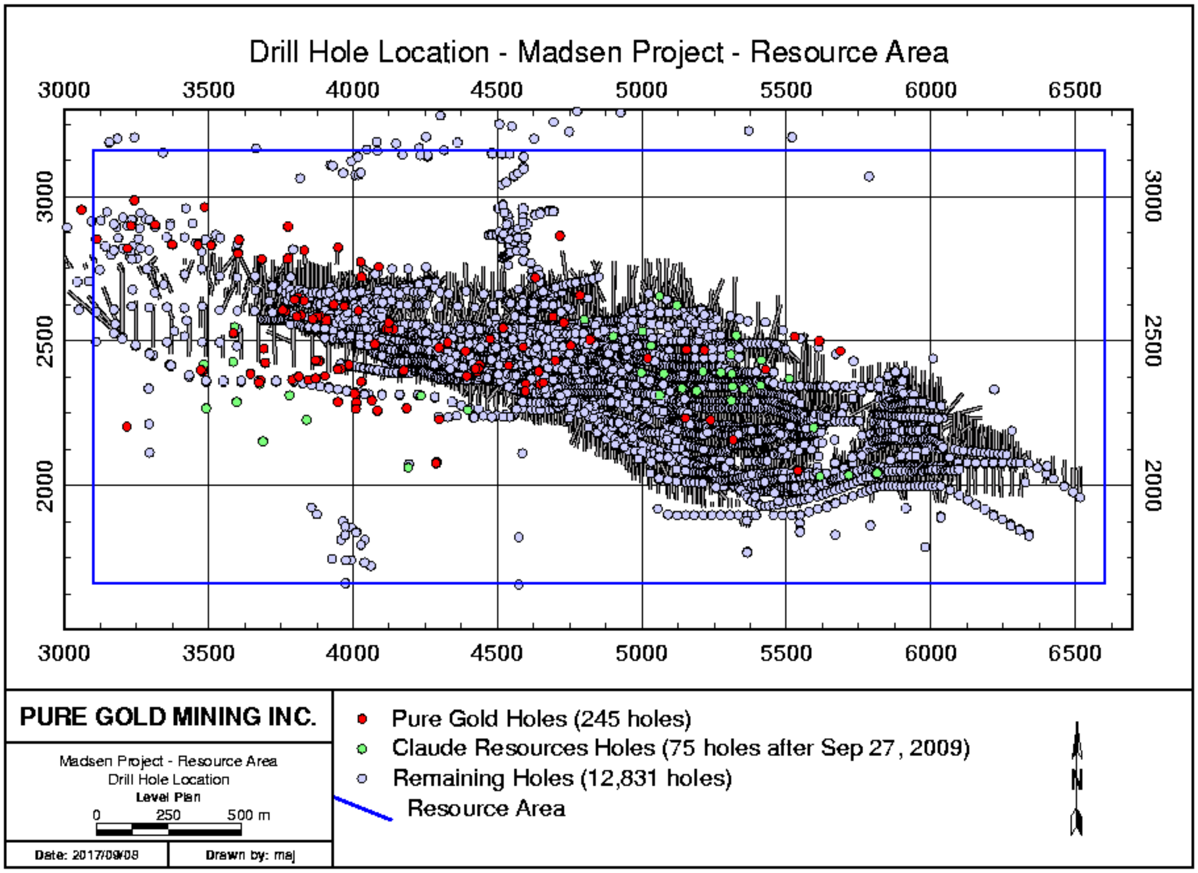

Figure 14-2: Drill hole location map – resource area.

Table 14.3: Drill hole spacing statistics

	Mean (m)		Median (m)	
	High-Grade Zone	Low-Grade Zone	High-Grade Zone	Low-Grade Zone
Austin	6.2	7.4	6.1	6.6
South Austin	6.1	7.1	5.8	6.4
McVeigh	6.9	19.2	5.4	10.6
8 Zone	7.1	-	4.9	-
A3	7.7	10.1	5.6	7.4
All	6.3	9.5	5.9	6.8

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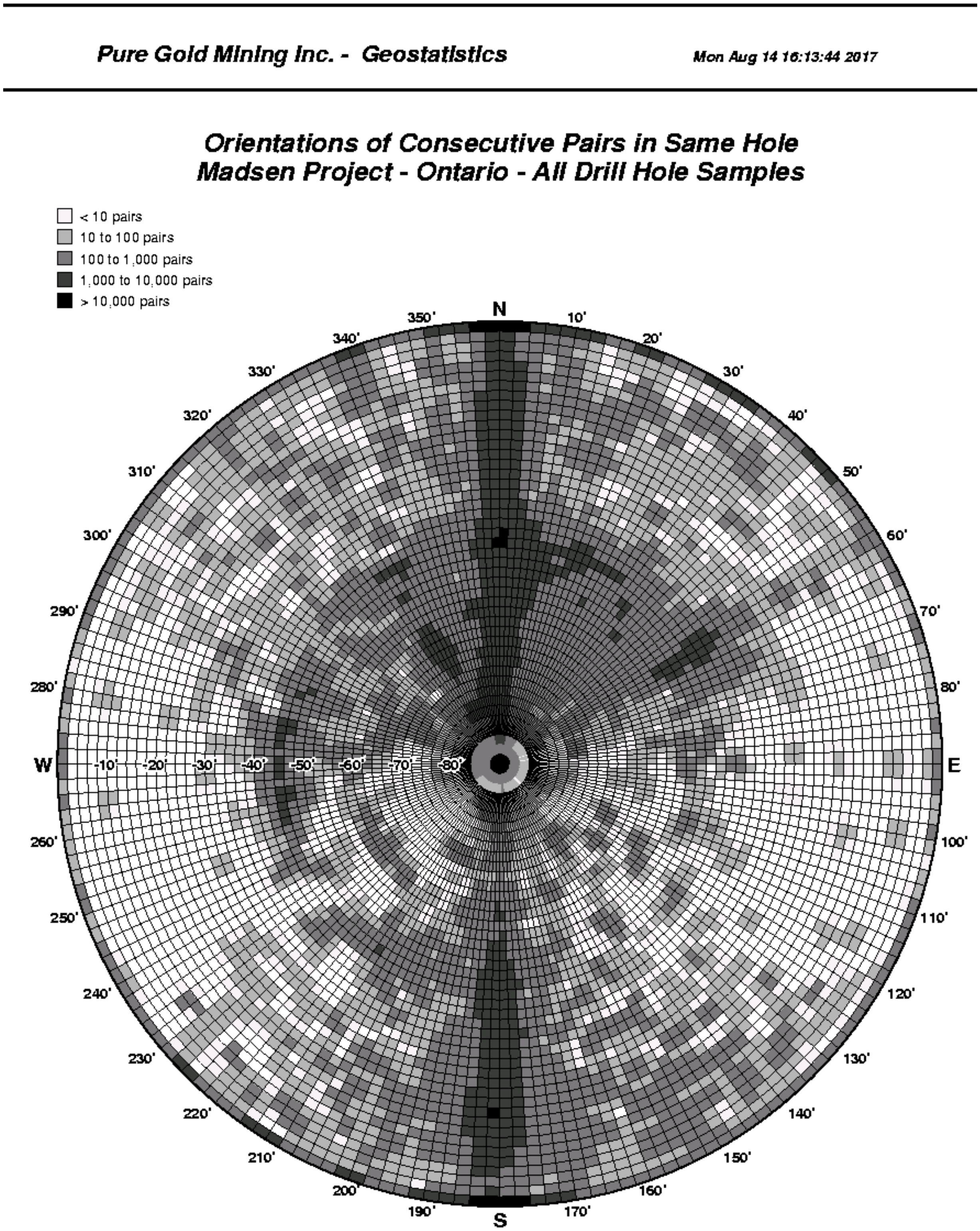

Figure 14-3: Stereonet of drill hole orientations at Madsen

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14.1.2 Geologic Modelling

The domains modelled include the Austin, the South Austin, the McVeigh, the 8 Zone, and the A3. Geological domain models were developed by Pure Gold's personnel for each specific zone, including both "high grade domains" and "low grade domains". A low-grade domain was not modelled for the 8 Zone due to the discrete nature of the quartz vein hosted mineralization in that domain. The geologic domains were built using the recently developed understanding that the mineralization: (i) was emplaced within an early cryptic structure that transects the Balmer stratigraphy, and that this structure has been, (ii) transposed, metamorphosed and annealed during D_2 deformation. The continuity of mineralization is therefore restricted to relatively narrow corridors within the 'SAFZ' unit (see Section 7) and may be strongly undulating and/or fold repeated. High grade domains have been wireframed to capture this continuity which is defined by a rapid change in gold grades, corresponding in general to a grade of approximately 3 g/t Au. Low grade domains represent the broader alteration halo (SAFZ unit), in which high grade intercepts exist but do not exhibit the same high degree of continuity.

Three-dimensional modelling of the mineral resource domains was performed using Leapfrog© software; specifically, Leapfrog's Vein Modelling Tool. The high grade domains were defined using drill hole composites of 3 g/t Au and greater for all holes in the database, which served as snapping points for the interpolation of 3-D surfaces to form the hanging wall and footwall contacts of each domain. The outer boundaries of each high grade domain were then manually clipped to an approximate distance of 50 m away from the nearest drill hole to restrict undue extrapolation of any grade estimates. A minimum width of 2 m was applied to each high grade domain where there were no data to show otherwise. Modelling of the low grade domains was performed by the personnel at Equity Exploration Consultants Ltd., who used manually digitized wireframes to primarily capture the logged SAFZ unit, but also rare mineralization within other adjacent units.

The Austin and South Austin high grade domains are mainly oriented east-west at an azimuth of 095° (mine grid), dipping to the south at -65°, and plunging to the east at approximately -35°. The McVeigh high grade domains are broadly sub-parallel to the Austin domains, but plunge in the opposite direction at about 75°.The high grade 8 Zone is slightly different, with a shape more elongated along a shallower dip of -40°. The low grade domains are similarly oriented along the east-west direction, dipping to the south at -65°, and plunging to the east at -40°. The low grade domains enclose the high grade domains. Examples of the high and low grade domains for each zone are presented in Figure 14-4 to 14.9.

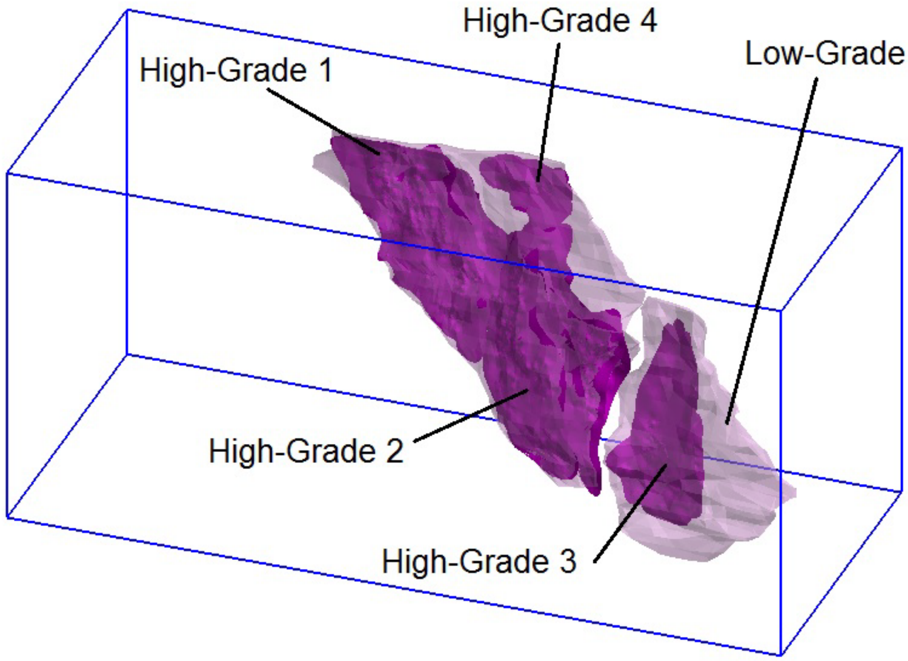

Figure 14-4: Geologic model of the Austin Domain – viewed to the northwest

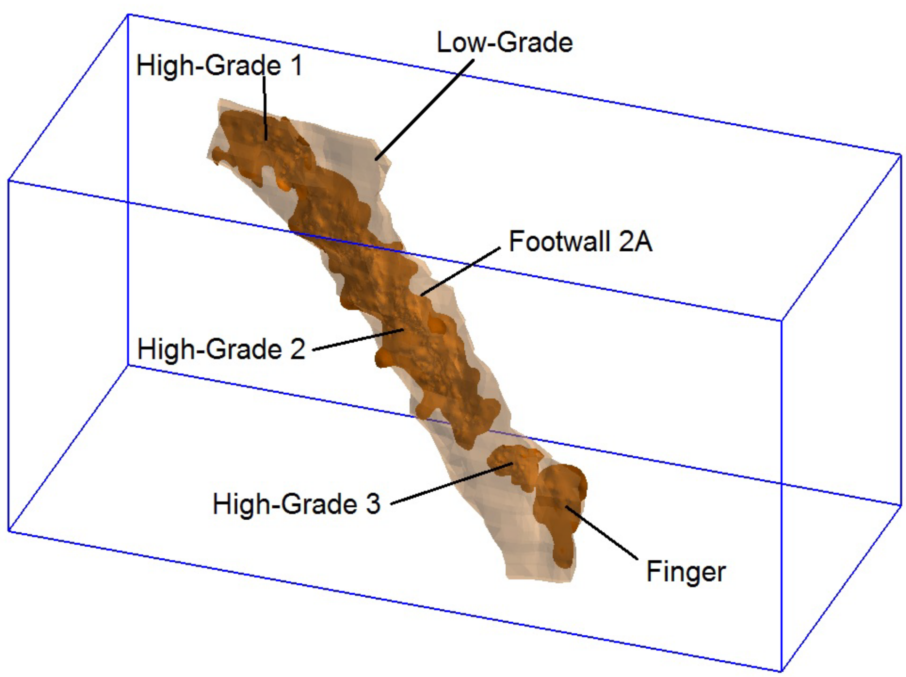

Figure 14-5: Geologic model of the South Austin Domain – viewed to the northwest

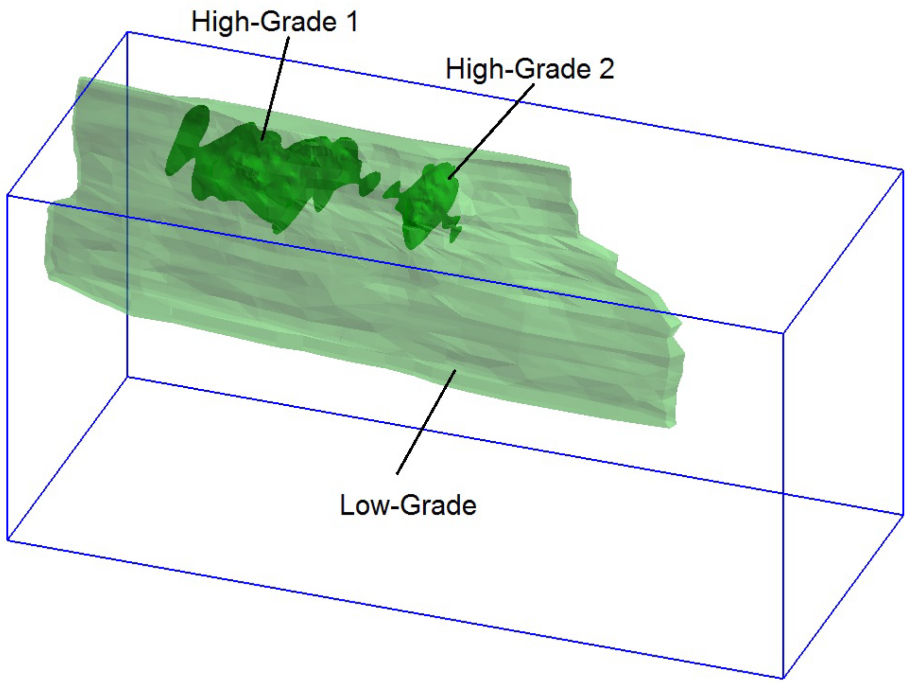

Figure 14-6: Geologic model of the McVeigh Domain – viewed to the northwest

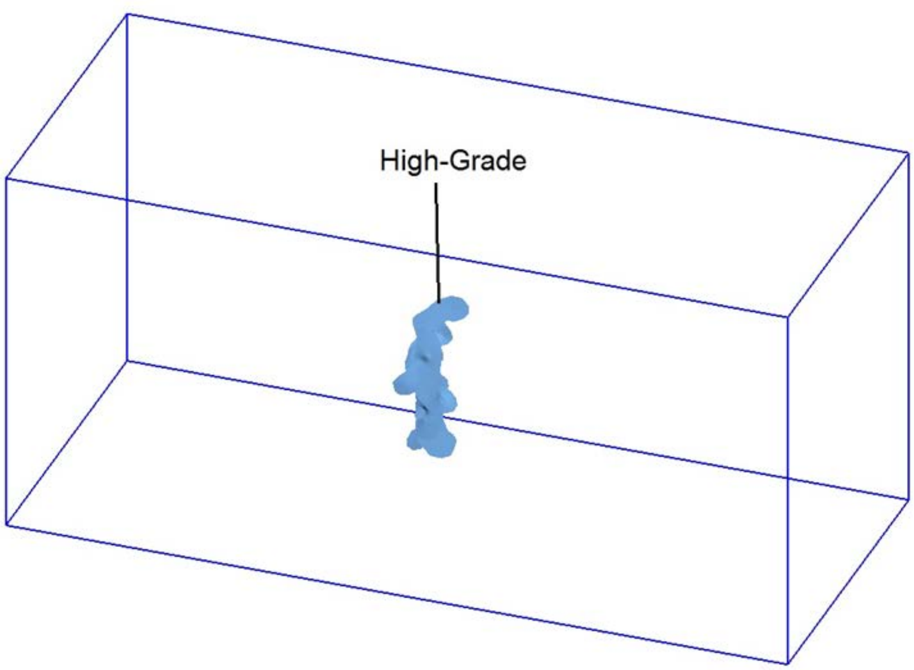

Figure 14-7 Geologic model of the 8 Zone Domain – viewed to the northwest

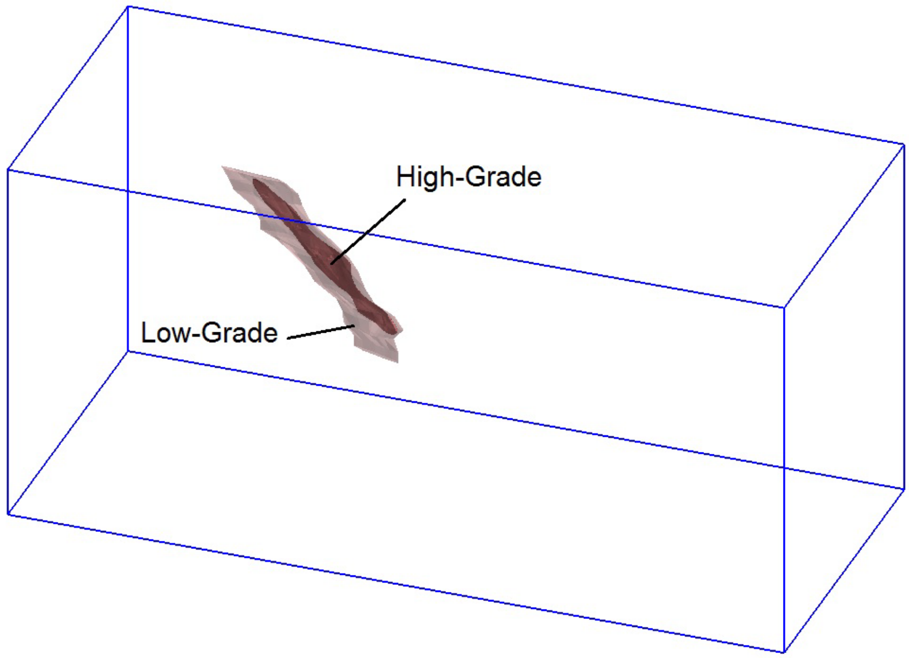

Figure 14-8: Geologic model of the A3 Domain – viewed to the northwest

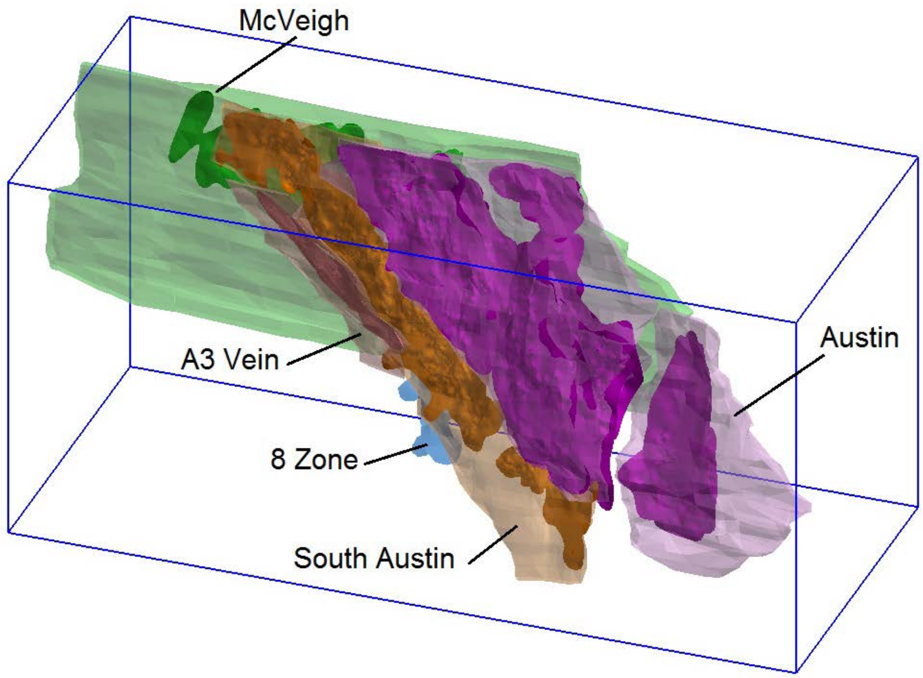

Figure 14-9: Geologic model (All Domains) – viewed to the northwest

These new domains differ significantly from the previous domain models used in the previous SRK mineral resource estimate in that the high grade domains are much narrower. Where the previous model had one high grade domain, the current model has in some cases as many as 4 discrete high grade domains within the same volume. Average thicknesses of the 39 current high grade wireframes are between 5 m and 10 m, up to a maximum of 30 m; whereas the previous model domains were closer to 50 m, on average. A comparison of the different generations of domain models to the mined stopes from historic production shows that the distribution and dimensions of the current domains are a closer approximation to what was mined. This correlation provides a high level of confidence that the current domain model is a reasonable representation of the high grade mineralization at Madsen and is acceptable as a basis for the mineral resource estimate.

14.1.2.1 Geologic Domain Codes

From the modeling of the geologic controls on mineralization, a set of rock codes were defined for each of the zones. Table 14.4 is a list of codes for the zones of interest of the Madsen project.

Table 14.4: Geologic domain codes for the Madsen Gold Project

Zone	Domain Codes	Description	Volume m^3
Austin	1	high-grade 1	3,904,939.7
	2	high-grade 2	3,447,707.2
	3	high-grade 3	2,195,302.7
	4	high-grade 4	574,595.1
	5	low-grade	97,260,437.9
South Austin	1	high-grade 1	432,412.8
	2	high-grade 2	2,593,704.8
	3	high-grade 3	172,624.8
	4	finger zone	205,259.3
	5	footwall 2a zone	94,677.3
	6	low-grade	38,018,515.1
McVeigh	1	high-grade 1	1,887,209.0
	2	high-grade 2	430,703.5
	3	low-grade	286,740,744.0
8 Zone	1	high-grade	793,069.8
A3	1	high-grade	235,963.4
	2	low-grade	4,165,604.4

The topographic surface at Madsen was obtained by a sub-meter Lidar survey down-sampled to a 5m resolution and utilized as built for the estimation of the mineral resources. An example of this surface is presented in Figure 14-10.

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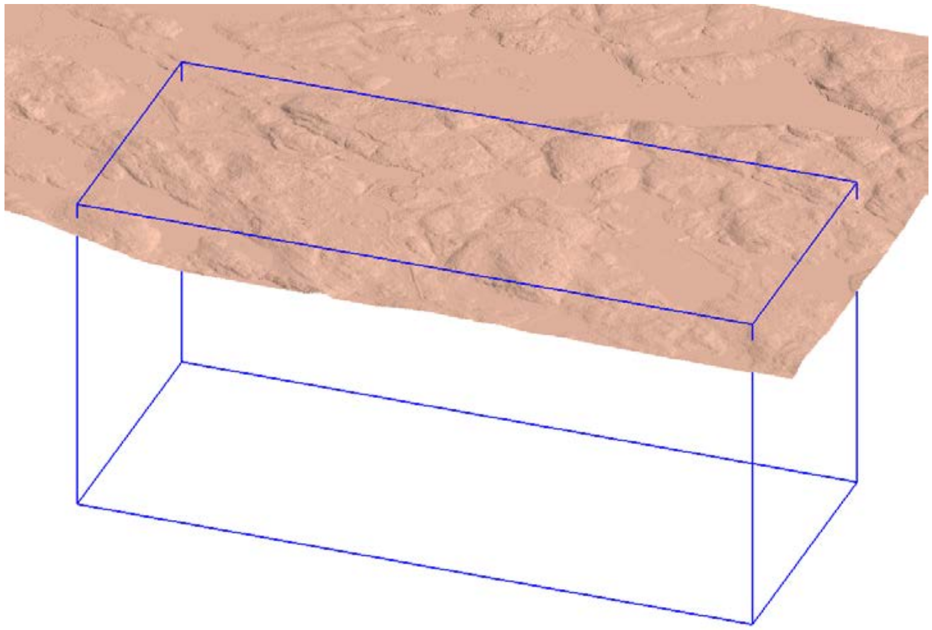

Figure 14-10: Topographic surface at Madsen – viewed to the northwest

14.1.2.2 Dykes

A series of barren post-mineral dykes are observed within the resource area at Madsen. Due to their geometric complexity, it is quite difficult to correlate them from one hole to the next and consequently to model them with wireframes. As an alternative approach, an indicator technique was selected. In this procedure, the dykes from the lithology database were first regrouped into intermediate intrusives (IINT) and mafic intrusives (MINT) by Pure Gold's personnel. An indicator code of 1.0 was assigned for each dyke interval and 0.0 for all others. A histogram of dyke lengths was computed and showed that the most common dyke length was 1.0m with 40% of the data. The indicator data was then composited to 1.0m regular intervals. A variographic study was performed on the IINT and MINT composited indicator dyke data with results presented in Table 14.5.

Table 14.5: Variography results for indicator dykes at Madsen

Parameters	01 – intermediate intrusives (IINT)			02 – mafic intrusives (MINT)		
	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	95°	185°	185°	105°	195°	195°
Dip**	0°	-65°	25°	0°	-45°	45°
Nugget Effect C_0	0.249			0.123		
1st Structure C_1	0.126			0.064		
2nd Structure C_2	0.202			0.274		
1st Range A_1	13.8m	12.4m	5.2m	48.5m	57.1m	88.9m
2nd Range A_2	125.0m	90.3m	35.5m	141.0m	111.0m	116.0m

**positive clockwise from north*
***negative below horizontal*

The indicator dyke composites were then estimated within the mineralized zones of interest of the resource area. An ordinary kriging interpolation method was utilized to estimate dyke proportions into a block model corresponding to that of the gold grade estimates (see Section 14.1.6).

A minimum of 2 samples and maximum of 12 samples were utilized to calculate an estimate. The search ellipsoid was dimensioned and oriented according to the variogram parameters for each type of dyke. The resulting estimate represents a proportion of dyke within each block with values varying from 0.0 (no dyke) to 1.0 (all dyke). These estimates of dyke proportions were kept to later edit the block model of gold grade estimates.

14.1.2.3 Underground Mined Voids

The original wireframes of the underground mined voids from the 2009 resource estimate by Claude Resources were utilized in the current study, as no new underground development was carried out since then. The voids were grouped into 5 separate units as follows: stopes, drifts, shafts, raises, and ramps. The stope wireframes were expanded 15 feet in all directions to provide a geotechnical buffer in order to address the more degraded condition of the underground stopes. No geotechnical buffer was developed for the 8 Zone due to the more discrete nature of the quartz vein-hosted mineralization. For each set of wireframes, a fraction value representing the proportion of the block inside the wireframe was calculated and stored for each block of the block model. These values were kept to later edit the block model of gold grade estimates. The underground voids are displayed in Figure 14-11.

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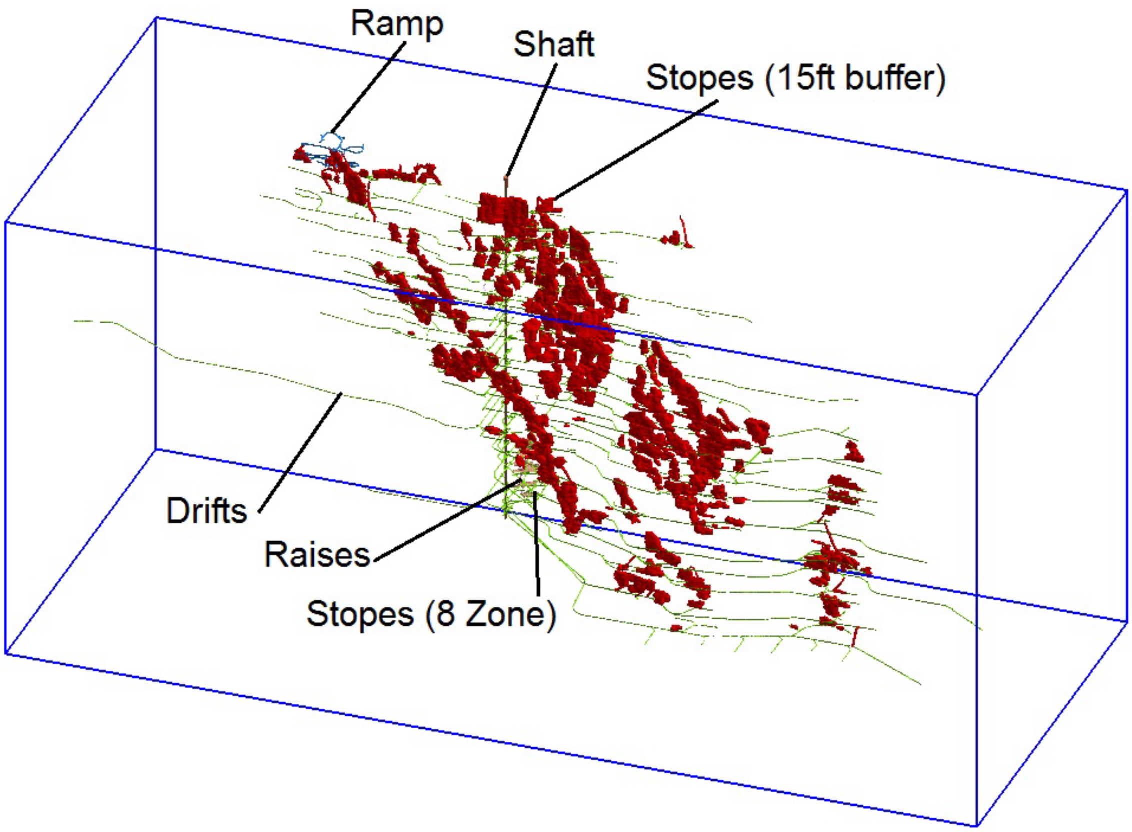

Figure 14-11: Underground mined voids at Madsen – viewed to the northwest

14.1.3 Compositing

Statistics were computed on the original sample lengths and it was noted that the most common sample length for the Austin, South Austin, McVeigh, and A3 zones is 1.52 m (5ft), with 45% of the data. For the 8 Zone, statistics on the sample length show that the most common sampling length is 0.3 m, with 23% of the data.

For the Austin, South Austin, McVeigh, and A3 zones, the compositing length was set at 1.52 m to reflect the most common sampling length, as well as providing a satisfactory ratio of sample length to block height (1:2). For the 8 Zone the most common sampling length of 0.3 m represents a low ratio of sample length to block height of 1:10 and for such a compositing length of 0.60m, representing a multiple of 0.3 m and a ratio of 1:5, was selected.

The compositing process consisted in starting the compositing at the collar of each hole with continuous composite intervals. At the contact with a different unit from the geology model, a last interval was composited, while a new set of regular composite lengths is generated within the other unit. Within the Austin, South Austin, McVeigh, 8 Zone, and A3 zones, a total of 407,218 composites were generated from 13,151 holes. A summary of statistics on the composites at Madsen is presented in Table 14.6.

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Table 14.6: Drill hole composites summary at Madsen

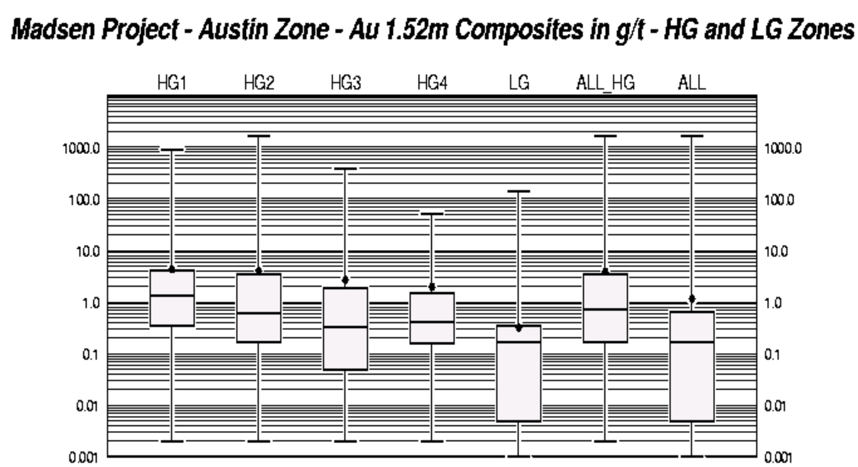
Company	# of Holes	%	# of Composites	%	# of Meters	%	Average Au Grade g/t
Austin	8,235	62.6	228,410	55.8	316,572.3	55.6	1.16
South Austin	4,214	32.0	103,776	25.3	145,142.4	25.5	1.18
McVeigh	1,364	10.4	68,469	16.7	98,556.1	17.3	0.42
8 Zone	217	1.7	3,858	0.9	2,192.3	0.4	7.93
A3	362	2.3	5,179	1.3	7,192.2	1.2	0.49
All	13,151	100.0	409,692	100.0	569,655.3	100.0	1.03

14.1.4 Exploratory Data Analysis (EDA)

A set of various statistical applications was utilized to provide a better understanding of the gold grade populations within the various mineralized zones.

14.1.4.1 Univariate Statistics

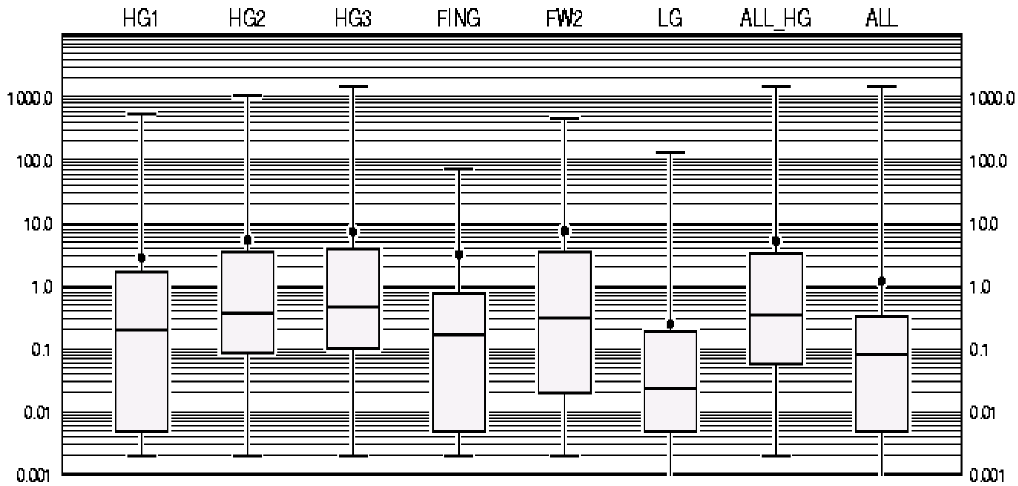
Basic statistics were performed on the gold grades of the Austin, South Austin, McVeigh, 8 Zone, and A3 composites. Histograms and probability plots indicated that the gold grade distributions resemble positively skewed lognormal populations. Basic statistics results are presented as boxplots per unit for each zone in Figure 14-12 to Figure 14-16. As seen in these figures, the gold grade populations are more heterogeneous with coefficients of variation (CV) greater than 3.0 in many of the units. This is most likely attributable to high gold grade values found in these unit.



	HG1	HG2	HG3	HG4	LG	ALL_HG	ALL	
Number of data	26028	19192	11260	1018	170914	57498	228410	Number of data
Mean	4.266	4.02	2.659	1.968	0.319	3.839	1.156	Mean
Std. Dev.	14.491	17.898	9.016	4.672	0.926	14.8	7.416	Std. Dev.
Coef. of Var.	3.397	4.452	3.39	2.374	2.906	3.855	6.416	Coef. of Var.
Maximum	911.559	1648.33	391.64	51.43	136.46	1648.33	1648.33	Maximum
Upper quartile	4.138	3.38	1.868	1.471	0.34	3.44	0.649	Upper quartile
Median	1.301	0.596	0.324	0.406	0.17	0.703	0.17	Median
Lower quartile	0.34	0.17	0.05	0.16	0.005	0.17	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.001	0.002	0.001	Minimum
Number of holes	3108	2673	1348	198	8082	7296	8235	Number of holes

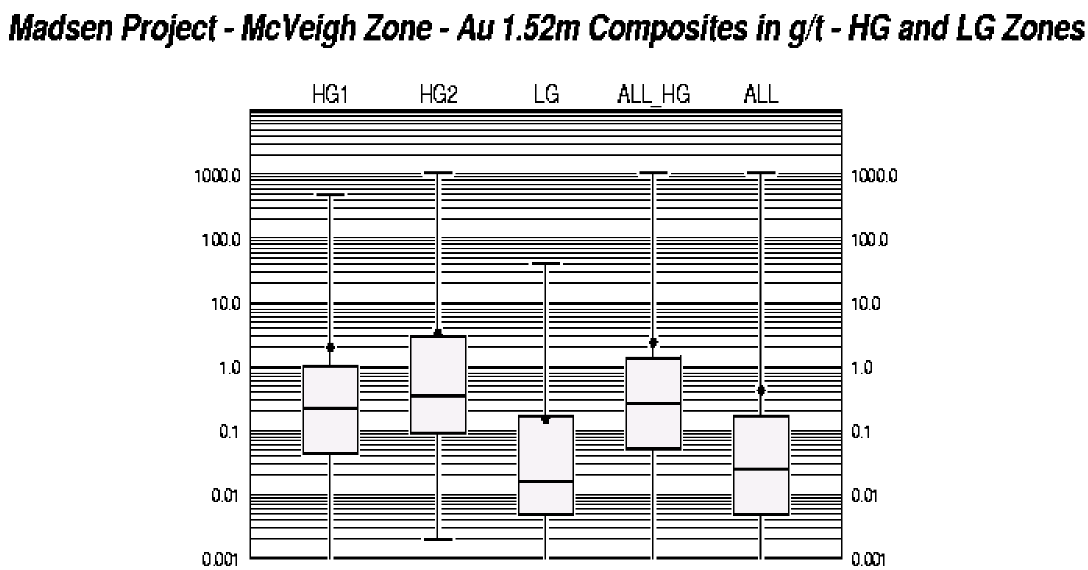
Figure 14-12: Basic statistics of gold – Austin Zone

Madsen Project - South Austin Zone - Au 1.52m Composites in g/t - HG and LG Zones



	HG1	HG2	HG3	FING	FW2	LG	ALL_HG	ALL	
Number of data	2345	15801	1424	512	931	82763	21013	103776	Number of data
Mean	2.791	5.29	7.295	3.16	7.392	0.245	5.197	1.179	Mean
Std. Dev.	12.37	20.951	49.539	8.637	26.079	1.399	23.389	10.421	Std. Dev.
Coef. of Var.	4.432	3.96	6.791	2.733	3.528	5.719	4.5	8.838	Coef. of Var.
Maximum	543.77	1038.76	1470.65	70.175	461.939	129.383	1470.65	1470.65	Maximum
Upper quartile	1.699	3.43	3.913	0.777	3.43	0.184	3.198	0.327	Upper quartile
Median	0.194	0.37	0.469	0.17	0.313	0.023	0.34	0.083	Median
Lower quartile	0.005	0.086	0.101	0.005	0.02	0.005	0.059	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.002	0.0	0.002	0.0	Minimum
Number of holes	592	2384	231	138	273	4172	3395	4214	Number of holes

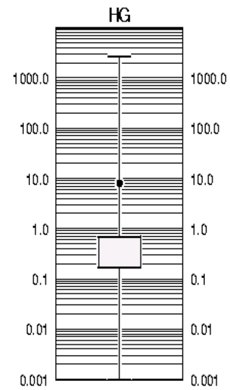
Figure 14-13: Basic statistics of gold - South Austin Zone



	HG1	HG2	LG	ALL_HG	ALL	
Number of data	6255	2855	59359	9110	68469	Number of data
Mean	1.972	3.255	0.151	2.366	0.421	Mean
Std. Dev.	11.191	22.613	0.469	15.625	5.521	Std. Dev.
Coef. of Var.	5.674	6.947	3.11	6.603	13.112	Coef. of Var.
Maximum	481.287	1049.9	40.321	1049.9	1049.9	Maximum
Upper quartile	1.027	2.868	0.17	1.37	0.17	Upper quartile
Median	0.223	0.34	0.016	0.255	0.025	Median
Lower quartile	0.043	0.092	0.005	0.052	0.005	Lower quartile
Minimum	0.0	0.002	0.0	0.0	0.0	Minimum
Number of holes	606	382	1360	988	1364	Number of holes

Figure 14-14: Basic statistics of gold – McVeigh Zone

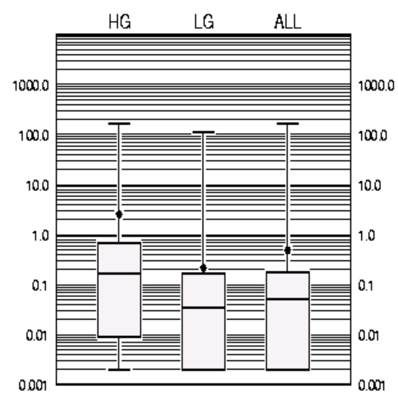
Madsen Project - 8 Zone - Au 0.6m Composites in g/t - HG Zone



	HG	
Number of data	3858	Number of data
Mean	7.929	Mean
Std. Dev.	73.555	Std. Dev.
Coef. of Var.	9.276	Coef. of Var.
Maximum	2684.47	Maximum
Upper quartile	0.69	Upper quartile
Median	0.17	Median
Lower quartile	0.17	Lower quartile
Minimum	0.001	Minimum
Number of holes	217	Number of holes

Figure 14-15: Basic statistics of gold – 8 Zone

Madsen Project - A3 Vein - Au 1.52m Composites in g/t - HG and LG Zones



	HG	LG	ALL	
Number of data	667	4512	5179	Number of data
Mean	2.559	0.217	0.49	Mean
Std. Dev.	10.313	2.112	4.112	Std. Dev.
Coef. of Var.	4.03	9.75	8.395	Coef. of Var.
Maximum	163.2	112.307	163.2	Maximum
Upper quartile	0.69	0.17	0.18	Upper quartile
Median	0.17	0.035	0.052	Median
Lower quartile	0.009	0.002	0.002	Lower quartile
Minimum	0.002	0.002	0.002	Minimum
Number of holes	197	362	362	Number of holes

Figure 14-16: Basic statistics of gold – A3

14.1.4.2 Capping of High-Grade Outliers

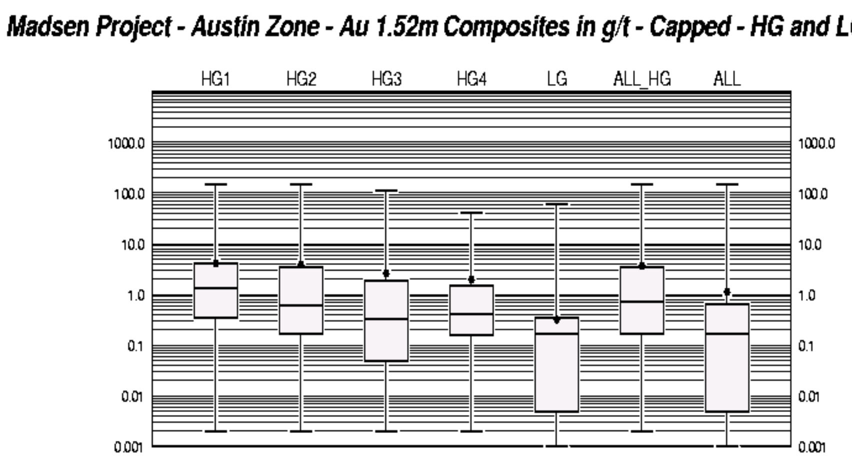
It is common practice to statistically examine the higher grades within a population and to trim them to a lower grade value based on the results from specific statistical utilities. This procedure is performed on high-grade values that are considered outliers and that cannot be related to any geologic feature. In the case at Madsen, the higher gold grades were examined with three different tools: the probability plot, decile analysis, and cutting statistics. The usage of various investigating methods allows for a selection of the capping threshold in a more objective and justified manner. For the probability plot method, the capping value is chosen at the location where higher grades depart from the main distribution. For the decile analysis, the capping value is chosen as the maximum grade of the decile containing less than an average of 10% of metal. For the cutting statistics, the selection of the capping value is identified at the cut-off grade where there is no correlation between the grades above this cut-off. The resulting compilation of the capping thresholds is listed in Table 14.7. One of the objectives of the capping strategy is to have less than 10% of the metal affected by the capping process. This was achieved in most of the cases, however in some instances it was noted that the capping had a greater effect on the metal content, indicating that few higher-grade outliers were quite different than the population in general by carrying a good proportion of the metal content.

Table 14.7: List of capping thresholds of higher gold grade outliers

Domain	Units	Capping Threshold g/t	% Metal Affected	Number of Comps Capped
Austin	high-grade 1	150.0	4.0	24
	high-grade 2	150.0	4.0	25
	high-grade 3	110.0	3.0	12
	high-grade 4	40.0	1.0	5
	low-grade	60.0	1.0	7
South Austin	high-grade 1	80.0	9.0	4
	high-grade 2	250.0	3.0	16
	high-grade 3	180.0	21.0	4
	finger zone	40.0	6.0	8
	footwall 2a zone	180.0	5.0	3
	low-grade	60.0	2.0	12
McVeigh	high-grade 1	100.0	8.0	11
	high-grade 2	90.0	12.0	5
	low-grade	15.0	2.0	8
8 Zone	high-grade	450.0	22.0	14
A3	high-grade	80.0	9.0	4
	low-grade	60.0	6.0	2

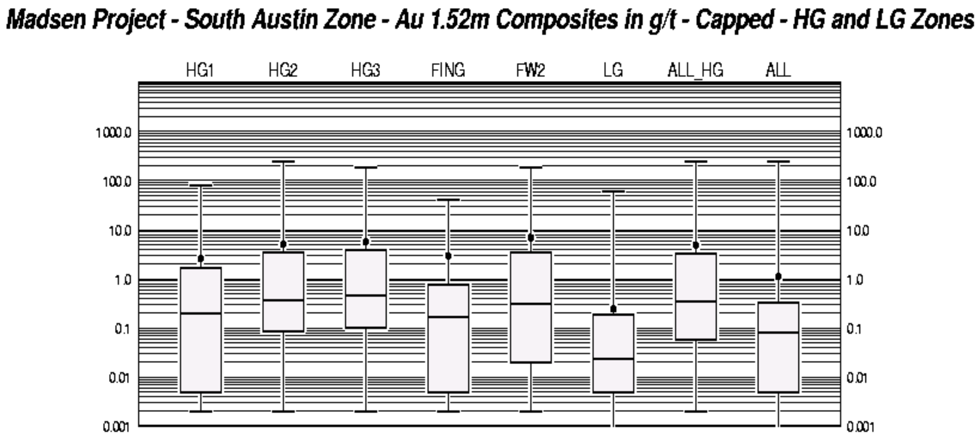
Basic statistics were re-computed with the gold grades capped to the thresholds listed in Table 14.7. Boxplots of Figure 14-17 to 14.21 display the basic statistics resulting from the capping of the higher gold grade outliers. It can be observed from those Figures that the coefficients of variation are in general below or close to 3.0 for the different gold grade populations. However, a few units display a coefficient greater than 3.0, as seen for the LG unit at South Austin, the HG1 unit at McVeigh, the HG unit at 8 Zone, and the HG and LG units at A3. The effect of the capping of higher gold grade outliers has slightly reduced the overall mean gold grade by 3.2% at Austin, by 5.2% at South Austin, by 8.4% at McVeigh, by 24.3% at 8 Zone, and by 6.3% at A3. The greater reduction observed at 8 Zone is due to a high-grade outlier carrying a large portion of the metal and thus having a greater influence on the population's average gold grade.

Because of the generally low coefficients of variation observed for the gold grade populations of the major units at Madsen, it was concluded that there is no need to treat the higher-grade composites differently than the lower grade composites during the estimation process. Ordinary kriging was thus selected as a well-suited estimation technique in this case.



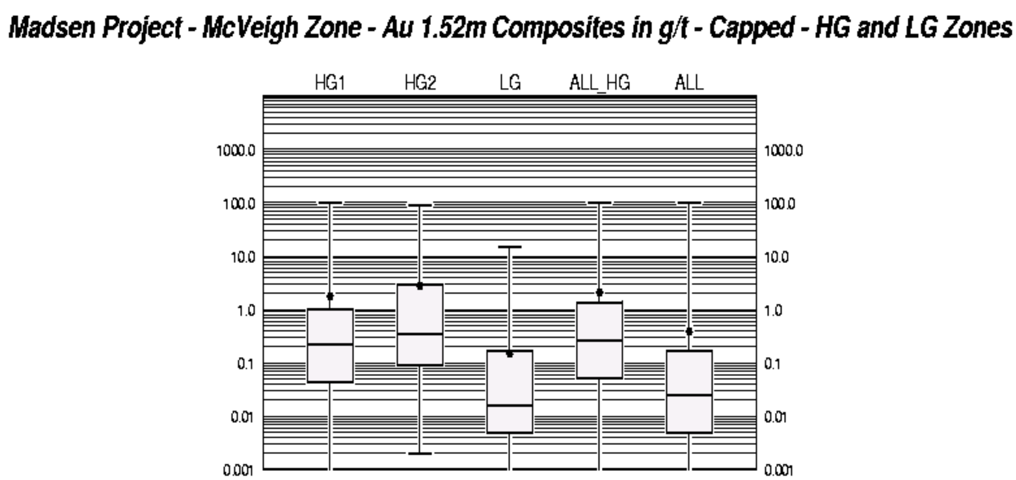
	HG1	HG2	HG3	HG4	LG	ALL_HG	ALL	
Number of data	26028	19192	11260	1018	170914	57498	228410	Number of data
Mean	4.105	3.824	2.589	1.954	0.319	3.686	1.119	Mean
Std. Dev.	9.613	10.515	7.45	4.539	0.908	9.512	4.917	Std. Dev.
Coef. of Var.	2.342	2.75	2.878	2.323	2.851	2.581	4.393	Coef. of Var.
Maximum	150.0	150.0	110.0	40.0	60.0	150.0	150.0	Maximum
Upper quartile	4.138	3.38	1.868	1.471	0.34	3.44	0.649	Upper quartile
Median	1.301	0.596	0.324	0.406	0.17	0.703	0.17	Median
Lower quartile	0.34	0.17	0.05	0.16	0.005	0.17	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.001	0.002	0.001	Minimum
Number of holes	3108	2673	1348	198	8082	7296	8235	Number of holes

Figure 14-17: Basic statistics of capped gold grades – Austin



	HG1	HG2	HG3	FING	FW2	LG	ALL_HG	ALL	
Number of data	2345	15801	1424	512	931	82763	21013	103776	Number of data
Mean	2.568	5.086	5.676	2.952	6.955	0.242	4.885	1.117	Mean
Std. Dev.	7.419	15.769	16.143	7.412	20.611	1.202	15.252	6.95	Std. Dev.
Coef. of Var.	2.89	3.101	2.844	2.511	2.963	4.971	3.122	6.221	Coef. of Var.
Maximum	80.0	250.0	180.0	40.0	180.0	60.0	250.0	250.0	Maximum
Upper quartile	1.699	3.43	3.913	0.777	3.43	0.184	3.198	0.327	Upper quartile
Median	0.194	0.37	0.469	0.17	0.313	0.023	0.34	0.083	Median
Lower quartile	0.005	0.086	0.101	0.005	0.02	0.005	0.059	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.002	0.0	0.002	0.0	Minimum
Number of holes	592	2384	231	138	273	4172	3395	4214	Number of holes

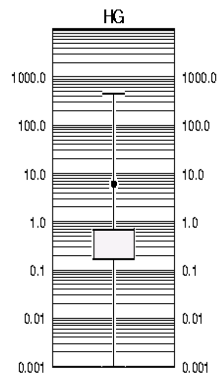
Figure 14-18: Basic statistics of capped gold – South Austin



	HG1	HG2	LG	ALL_HG	ALL	
Number of data	6255	2855	59359	9110	68469	Number of data
Mean	1.776	2.785	0.149	2.086	0.386	Mean
Std. Dev.	6.606	6.898	0.388	6.713	2.456	Std. Dev.
Coef. of Var.	3.719	2.477	2.595	3.218	6.368	Coef. of Var.
Maximum	100.0	90.0	15.0	100.0	100.0	Maximum
Upper quartile	1.027	2.868	0.17	1.37	0.17	Upper quartile
Median	0.223	0.34	0.016	0.255	0.025	Median
Lower quartile	0.043	0.092	0.005	0.051	0.005	Lower quartile
Minimum	0.0	0.002	0.0	0.0	0.0	Minimum
Number of holes	606	382	1360	988	2348	Number of holes

Figure 14-19: Basic statistics of capped gold – McVeigh

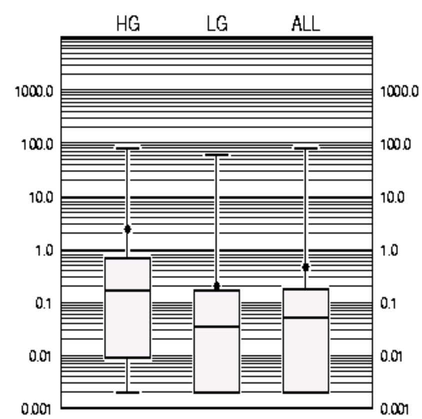
Madsen Project - 8 Zone - Au 0.6m Composites in g/t - Capped - HG Zone



	HG	
Number of data	3858	Number of data
Mean	5.999	Mean
Std. Dev.	36.289	Std. Dev.
Coef. of Var.	6.05	Coef. of Var.
Maximum	450.0	Maximum
Upper quartile	0.69	Upper quartile
Median	0.17	Median
Lower quartile	0.17	Lower quartile
Minimum	0.001	Minimum
Number of holes	217	Number of holes

Figure 14-20: Basic statistics of capped gold – 8 Zone

Madsen Project - A3 Vein - Au 1.52m Composites in g/t - Capped - HG and LG Zones



	HG	LG	ALL	
Number of data	667	4512	5179	Number of data
Mean	2.408	0.203	0.46	Mean
Std. Dev.	8.684	1.456	3.342	Std. Dev.
Coef. of Var.	3.606	7.186	7.268	Coef. of Var.
Maximum	80.0	60.0	80.0	Maximum
Upper quartile	0.69	0.17	0.18	Upper quartile
Median	0.17	0.035	0.052	Median
Lower quartile	0.009	0.002	0.002	Lower quartile
Minimum	0.002	0.002	0.002	Minimum
Number of holes	197	362	559	Number of holes

Figure 14-21: Basic statistics of capped gold – A3

14.1.4.3 Declustering

In general, there is a tendency to drill more holes in higher grade areas than in lower grade areas when delimiting a potential ore body. As a result, the higher grade portion of a deposit will be overly represented and would translate into a bias towards the higher grades when calculating statistical parameters of the population. Thus, a declustering method is utilized to generate a more representative set of statistical results within the zone of interest. In this case, a polygonal declustering technique was applied to the composites of the high-grade zones of Austin, South Austin, McVeigh, 8 Zone, and A3. This approach consists of assigning the volume of a polygon, defined by the halfway distance between a sample and its surrounding neighbours, as a weight for each sample within the high-grade mineralized zone. Therefore, a sample that is isolated will have a larger weight than a sample located in a densely sampled area.

Comparisons of average gold capped and declustered grades with the capped and un-declustered gold averages show little clustering overall with only slight decreases or increases in average declustered grades. The regular pattern of the tight underground definition drilling is most likely responsible for the limited clustering observed. A reduction of 10.0% of the mean gold grade was observed at South Austin and A3, while increases of 2.2%, 5.4%, and 1.5% were noted at Austin, McVeigh, and 8 Zone, respectively.

The average grade from the declustered statistics provides an excellent comparison with the average grade of the interpolated blocks, as a way to assess any overall bias of the estimates.

14.1.5 Variography

A variographic analysis was carried out on the gold grade composites within the different geologic domain units at Austin, South Austin, McVeigh, 8 Zone, A3. The objective of this analysis was to spatially establish the preferred directions of gold grade continuity. In turn, the variograms modeled along those directions would be later utilized to select and weigh the composites during the block grade interpolation process. For this exercise, all experimental variograms were of the type relative lag pairwise, which is considered robust for the assessment of gold grade continuity.

Variogram maps were first calculated to examine general gold grade continuities in the XY, XZ, and YZ planes. The next step undertaken was to compute omni-directional variograms and down-hole variograms. The omni-directional variograms are calculated without any directional restrictions and provide a good assessment of the sill of the variogram. As for the down-hole variogram, it is calculated with the composites of each hole along the trace of the hole. The objective of these calculations is to provide information about the short scale structure of the variogram, as the composites are more closely spaced down the hole. Thus, the modeling of the nugget effect is usually better derived from the down-hole variograms.

Directional variograms were then computed to identify more specifically the three main directions of continuity. A first set of variograms were produced in the horizontal plane at increments of 10 degrees. In the same way a second set of variograms were computed at 10° increments in the vertical plane of the horizontal direction of continuity (plunge direction). A final set of variograms at 10° increments were calculated in the vertical plane perpendicular to the horizontal direction

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of continuity (dip direction). The final variograms were then modeled with a 2-structure spherical variogram, and resulting parameters presented in Table 14.8 to 14.12 for gold populations of the different zones.

The directions of gold grade continuity are in general agreement with the orientation of the mineralized zone, with best directions of continuity trending east-west and down-dip at approximately -65°. The ranges of gold grade continuity along the principal direction (strike) vary from 28m to 47m in the high-grade units and from 36m to 55m in the low-grade units. Along the minor direction (dip), the ranges of continuity vary from 26m to 41m in the high-grade units and from 40m to 50m in the low-grade units. Finally, along the vertical direction (across strike and dip), the ranges of continuity vary from 11m to 21m in the high-grade units and from 29m to 31m in the low-grade units. The modeled variograms have relatively low nugget effects with values varying from 8% to 27% of the sill for the high-grade units and from 13% to 27% of the sill for the low-grade units.

The experimental variograms are considered of good quality throughout the Madsen deposit, most likely due to the tighter spaced drilling in the mineralized zones.

Table 14.8: Modeled variogram parameters for gold composites at Austin

Parameters	1 – high-grade 1			2 – high-grade 2			3 – high-grade 3		
	Principal	Minor	Vertical	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	90°	180°	180°	95°	185°	185°	100°	190°	190°
Dip**	0°	-65°	25°	0°	-65°	25°	0°	-65°	25°
Nugget Effect C_0	0.288			0.598			0.301		
1st Structure C_1	1.113			1.202			1.735		
2nd Structure C_2	0.448			0.409			0.393		
1st Range A_1	5.7m	7.8m	4.6m	5.2m	5.7m	4.6m	6.2m	7.3m	6.2m
2nd Range A_2	40.6m	35.8m	20.7m	43.9m	31.5m	14.3m	34.7m	38.4m	18.0m
Parameters	4 – high-grade 4			5 – low-grade					
	Principal	Minor	Vertical	Principal	Minor	Vertical			
Azimuth*	90°	180°	180°	95°	185°	185°			
Dip**	0°	-60°	30°	0°	-65°	25°			
Nugget Effect C_0	0.366			0.451					
1st Structure C_1	0.872			1.107					
2nd Structure C_2	0.562			0.345					
1st Range A_1	6.2m	7.3m	7.3m	3.0m	4.1m	2.5m			
2nd Range A_2	40.6m	28.2m	15.9m	48.2m	40.1m	29.3m			

**positive clockwise from north*
***negative below horizontal*

Table 14.9: Modeled variogram parameters for gold composites at South Austin

Parameters	1 – high-grade 1			2 – high-grade 2			3 – high-grade 3		
	Principal	Minor	Vertical	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	95°	185°	185°	100°	190°	190°	95°	185°	185°
Dip**	-5°	-70°	20°	-25°	-70°	20°	0°	-60°	30°
Nugget Effect C_0	0.569			0.447			0.682		
1st Structure C_1	1.338			1.645			1.140		
2nd Structure C_2	0.661			0.389			0.733		
1st Range A_1	1.9m	4.1m	1.9m	3.5m	3.5m	3.5m	7.8m	7.8m	5.2m
2nd Range A_2	42.2m	40.0m	10.5m	46.5m	41.1m	14.8m	39.0m	26.1m	14.8m
Parameters	4 – finger			5 – footwall 2a			6- low-grade		
	Principal	Minor	Vertical	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	100°	190°	190°	95°	185°	185°	95°	185°	185°
Dip**	10°	-65°	25°	-15°	-80°	10°	0°	-65°	25°
Nugget Effect C_0	0.225			0.785			0.583		
1st Structure C_1	1.422			1.480			1.124		
2nd Structure C_2	1.054			0.504			0.433		
1st Range A_1	5.7m	13.7m	10.0m	2.5m	4.1m	2.5m	2.5m	2.5m	2.5m
2nd Range A_2	33.0m	41.0m	13.7m	39.5m	35.7m	10.5m	55.1m	49.2m	30.9m

**positive clockwise from north*
***negative below horizontal*

Table 14.10: Modeled variogram parameters for gold composites at McVeigh

Parameters	1 – high-grade 1			2 – high-grade 2			3 – low-grade		
	Principal	Minor	Vertical	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	95°	185°	185°	80°	170°	170°	95°	185°	185°
Dip**	0°	-80°	10°	0°	-70°	20°	0°	-65°	25°
Nugget Effect C_0	0.256			0.425			0.264		
1st Structure C_1	1.188			1.552			1.114		
2nd Structure C_2	0.758			0.444			0.575		
1st Range A_1	4.1m	4.1m	5.7m	1.9m	4.6m	4.1m	3.0m	10.5m	7.3m
2nd Range A_2	34.7m	38.4m	13.2m	28.2m	30.9m	14.3m	36.3m	50.2m	30.4m

**positive clockwise from north*
***negative below horizontal*

Table 14.11: Modeled variogram parameters for gold composites at 8 Zone

Parameters	1 – high-grade		
	Principal	Minor	Vertical
Azimuth*	15°	105°	15°
Dip**	40°	0°	-50°
Nugget Effect C_0	0.170		
1st Structure C_1	1.038		
2nd Structure C_2	0.605		
1st Range A_1	6.2m	7.3m	4.1m
2nd Range A_2	35.2m	27.1m	11.6m

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Table 14.12: Modeled variogram parameters for gold composites at A3

Parameters	1 – high-grade			2 – low-grade		
	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	100°	190°	190°	95°	185°	185°
Dip**	0°	-80°	10°	0°	-65°	25°
Nugget Effect C_0	0.602			0.583		
1st Structure C_1	1.446			1.124		
2nd Structure C_2	0.568			0.433		
1st Range A_1	7.3m	6.8m	9.5m	2.5m	2.5m	2.5m
2nd Range A_2	38.0m	28.8m	12.7m	55.1m	49.2m	30.9m

**positive clockwise from north*
***negative below horizontal*

14.1.6 Gold Grade Estimation

The estimation of gold grades into a block model was carried out with the ordinary kriging technique. The estimation strategy and parameters were tailored to account for the various geometrical, geological, and geostatistical characteristics previously identified. A separate block model of gold grade estimates was assigned to each of the zones with a total of 4 block models: Austin, South Austin and A3, McVeigh, 8 Zone. The estimate of the A3 domain was included as a part of the South Austin block model due to its spatial proximity. Each block model has the same grid definition, as presented in Table 14.13. It should be noted that the origin of the block model corresponds to the lower left corner, the point of origin being the exterior edges of the first block. A block size of 3 m (easting) x 3 m (northing) x 3 m (elevation) was selected to better reflect the geometrical configuration and anticipated underground production rate. The block model is orthogonal with no rotation applied to it.

Table 14.13: Block grid definition

Madsen					
Coordinates	Origin m	Rotation (azimuth)	Distance m	Block Size m	Number of Blocks
Easting (X)	3,100.0	0°	3,504.0	3.0	1,168
Northing (Y)	1,660.0		1,500.0	3.0	500
Elevation(Z)	-100.0		1,680.0	3.0	560
Number of Blocks		327,040,000			

The database of 1.52 m capped gold grade composites was utilized as input for the grade interpolation process at Austin, South Austin, McVeigh, and A3, while for the grade estimation of the 8 Zone, the database of 0.6m capped gold composites was utilized.

The size and orientation of the search ellipsoid for the estimation process was based on the variogram parameters modeled for gold. A minimum of 2 samples and maximum of 12 samples were selected for the block grade calculations. Hard boundaries were assigned in the estimation of each unit. No other restrictions, such as a minimum number of informed octants, a minimum number of holes, a maximum number of samples per hole, etc., were applied to the estimation process. A summary of the estimation parameters is presented in

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Table 14.14.

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Table 14.14: Estimation parameters for gold

Estimation Parameters – Gold Grade – Madsen Project								
Rock Code	minimum # of samples	maximum # of samples	search ellipsoid – long axis - azimuth/dip	search ellipsoid – long axis - size	search ellipsoid – short axis - azimuth/dip	search ellipsoid – short axis - size	search ellipsoid – vertical axis - azimuth/dip	search ellipsoid – vertical axis - size
Austin								
1	2	12	90°/0°	41.0m	180°/-65°	36.0m	180°/25°	21.0m
2	2	12	95°/0°	44.0m	185°/-65°	32.0m	185°/25°	14.0m
3	2	12	100°/0°	35.0m	190°/-65°	38.0m	190°/25°	18.0m
4	2	12	90°/0°	41.0m	180°/-60°	28.0m	180°/30°	16.0m
5	2	12	95°/0°	48.0m	185°/-65°	40.0m	185°/25°	29.0m
South Austin								
1	2	12	95°/-5°	42.0m	185°/-70°	40.0m	185°/20°	11.0m
2	2	12	100°/-25°	47.0m	190°/-70°	41.0m	190°/20°	15.0m
3	2	12	95°/0°	39.0m	185°/-60°	26.0m	185°/30°	15.0m
4	2	12	100°/10°	33.0m	190°/-65°	41.0m	190°/25°	14.0m
5	2	12	95°/-15°	40.0m	185°/-80°	36.0m	185°/10°	11.0m
6	2	12	95°/0°	55.0m	185°/-65°	49.0m	185°/25°	31.0m
McVeigh								
1	2	12	95°/0°	35.0m	185°/-80°	38.0m	185°/10°	13.0m
2	2	12	80°/0°	28.0m	170°/-70°	31.0m	170°/20°	14.0m
3	2	12	95°/0°	36.0m	185°/-65°	50.0m	185°/25°	30.0m
8 Zone								
1	2	12	15°/40°	35.0m	105°/0°	27.0m	15°/-50°	12.0m
A3								
1	2	12	100°/0°	38.0m	190°/-80°	29.0m	190°/10°	13.0m
2	2	12	95°/0°	55.0m	185°/-65°	49.0m	185°/25°	31.0m

The grade estimation process consisted of a three-pass approach with the parameters of the first pass as presented in

Table 14.14. The estimation parameters of the second and third passes are the same with the exception of an enlarged search ellipsoid by 1.5 times and 3 times the dimensions from the first pass, respectively. In this case, priority was given to estimates from the first pass, followed by estimates from the second pass for un-estimated blocks from the first pass, and finally the estimates of the third pass for un-estimated blocks from the first and second passes. Only blocks within the high-grade and low-grade zones were estimated.

In the planning of the grade estimation strategy in an environment where previous extensive underground mining occurred, two scenarios where investigated: estimation with grades outside mined stopes only and estimation with grades inside and outside mined stopes. To better understand the behaviour of drill hole gold grades in the vicinity of stope boundaries, contact plots were performed. In these plots, the average gold grades are compared on both side of the stope contacts in increments of distance away from the contacts. Contact plots for the Austin, South Austin, McVeigh, and 8 Zone areas are displayed in Figure 14-22.

From the plots in Figure 14-22, it can be seen that no abrupt changes in gold grades are observed on both sides of stope contacts. For Austin, South Austin, and McVeigh mineralized zones, the changes in gold grades are more transitional, while they are more similar at 8 Zone. For these reasons it was decided to proceed with a grade estimation procedure where all drill hole gold grades inside and outside stopes were utilized. Mined underground voids were then extracted from the block model.

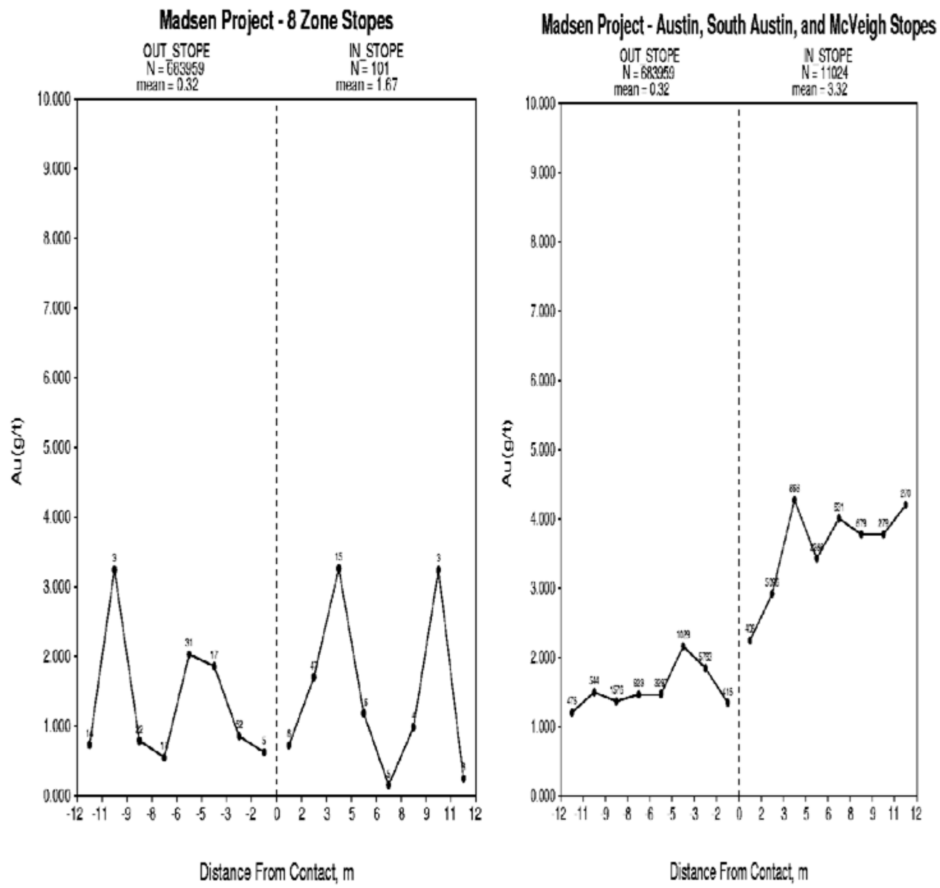

Figure 14-22: Contact plots of gold grades in the vicinity of mined stopes at Madsen

14.1.7 Validation of Grade Estimates

Validation tests were carried out on the estimates to examine the possible presence of a bias and to quantify the level of smoothing/variability.

14.1.7.1 Visual Inspection

A visual inspection of the block estimates with the drill hole grades on plans, east-west and north-south cross-sections was performed as a first check of the estimates. Observations from stepping through the estimates along the different planes indicated that there was good agreement between the drill hole grades and the estimates. The orientations of the estimated grades were also as expected according to the projection angles defined by the search ellipsoid. Examples of cross-sections and level plans for gold grade estimates of the different mineralized domains are presented in Figure 14-23 to Figure 14-32.

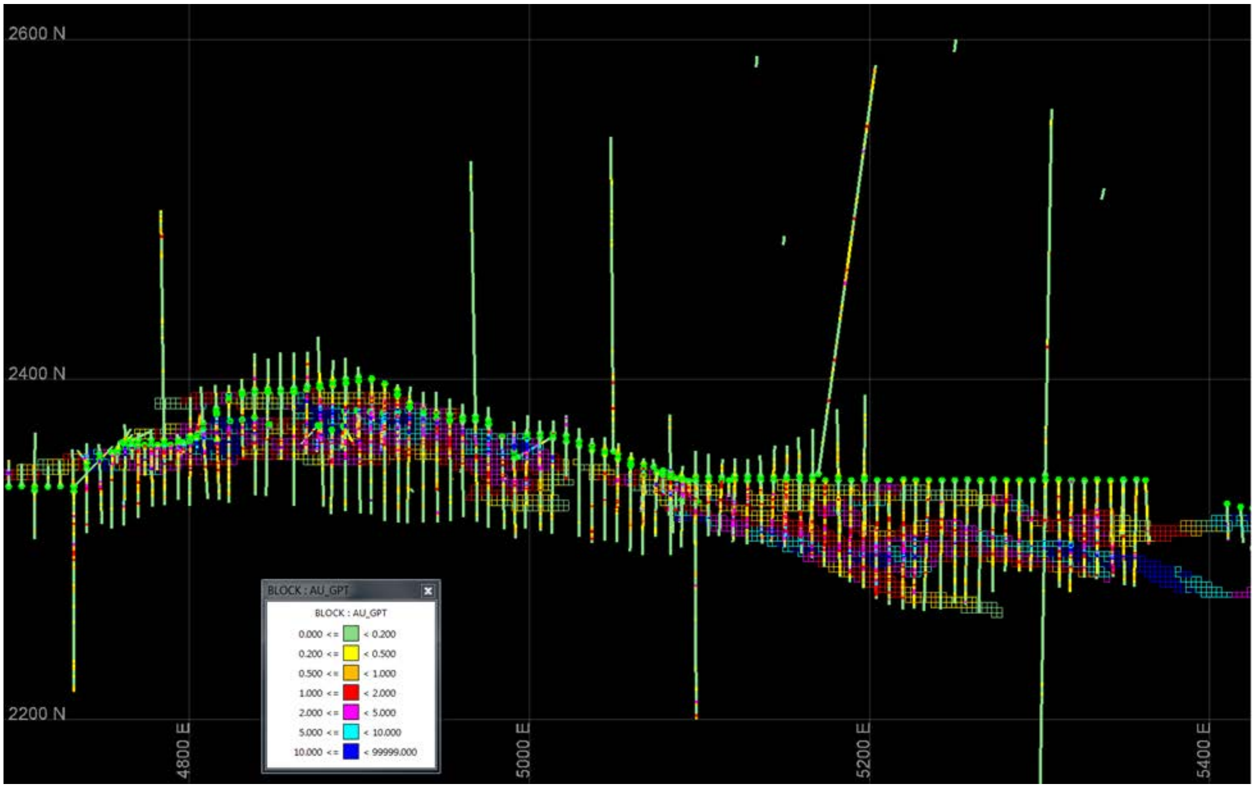

Figure 14-23 Gold Block Grade Estimates and Drill Hole Grades at Austin – High-Grade 1 and 2 – Level 985 El.

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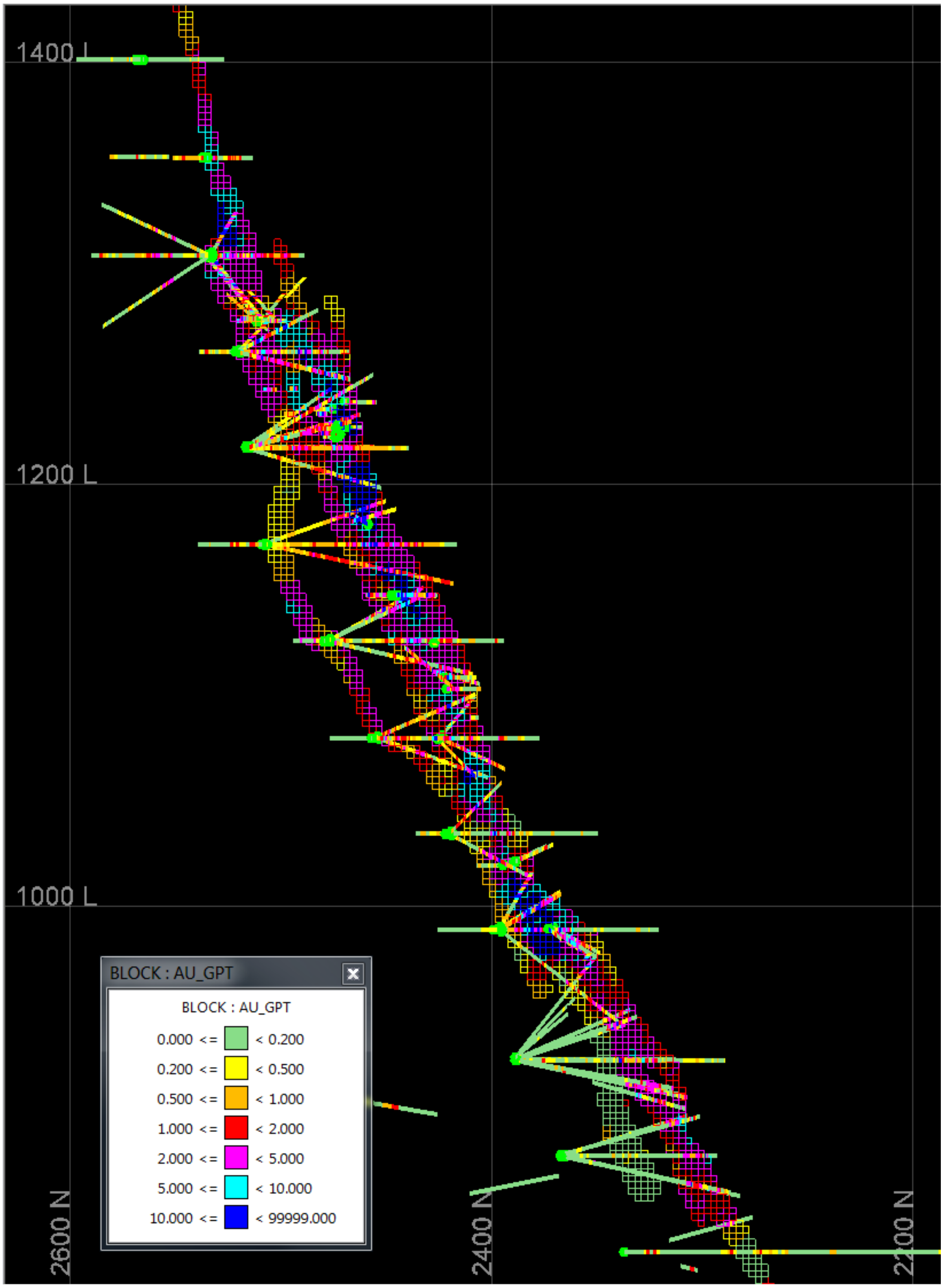

Figure 14-24 Gold Block Grade Estimates and Drill Hole Grades at Austin – High-Grade 1 - North-South Section 4880E.

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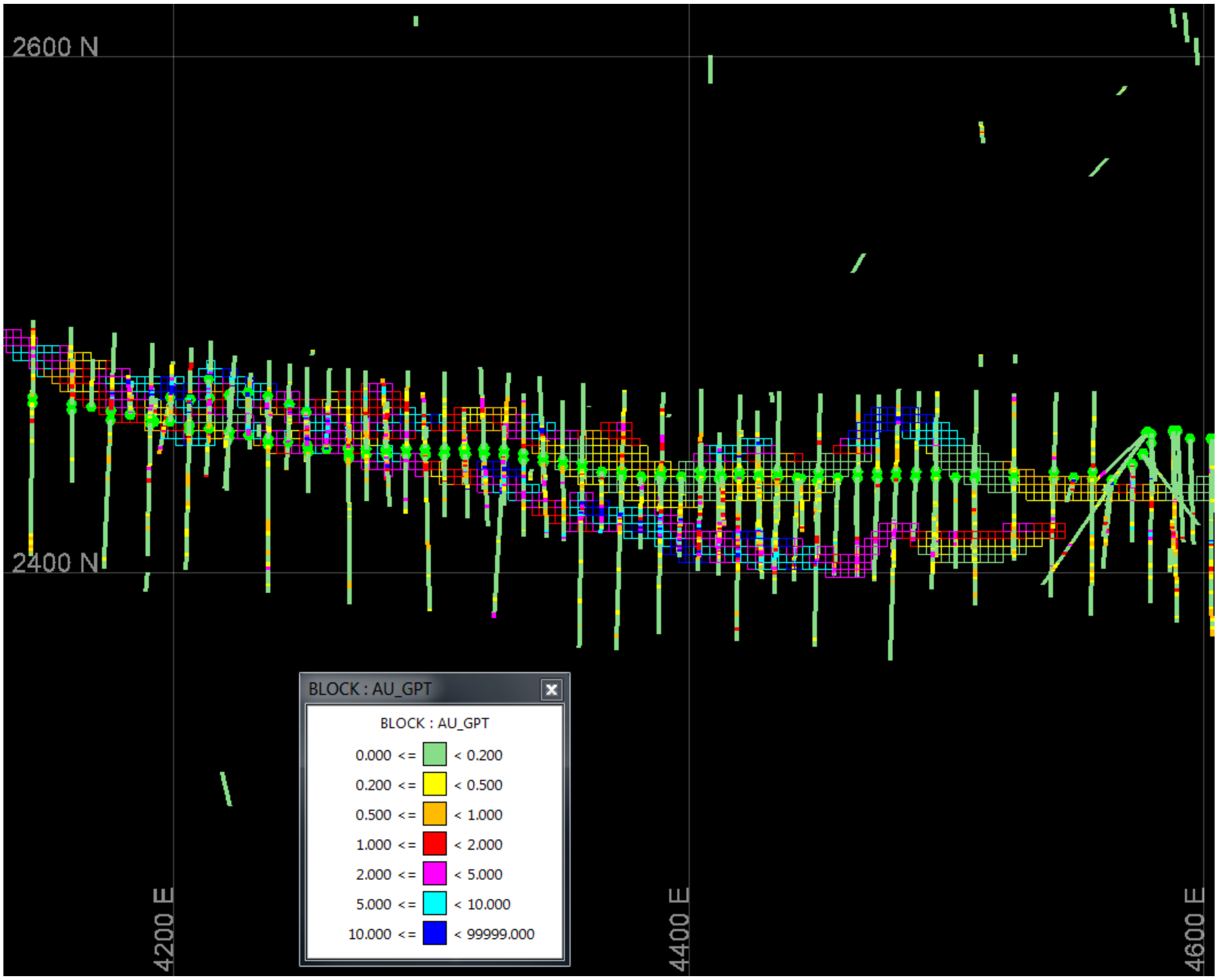

Figure 14-25 Gold Block Grade Estimates and Drill Hole Grades at South Austin – High-Grade 2 – Level 1125 El.

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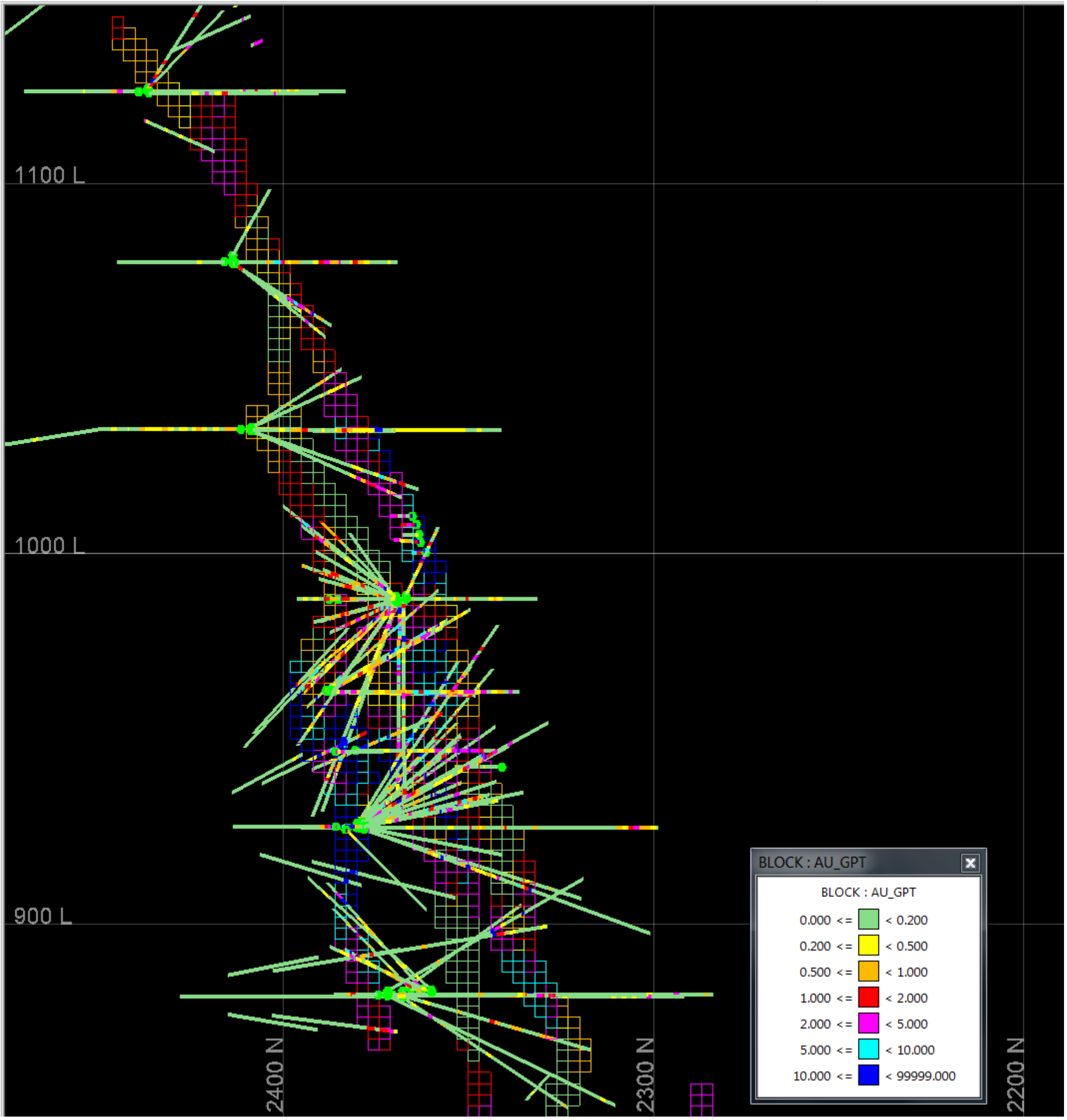

Figure 14-26 Gold Block Grade Estimates and Drill Hole Grades at South Austin – High-Grade 2 and FW2 - North-South Section 4550E

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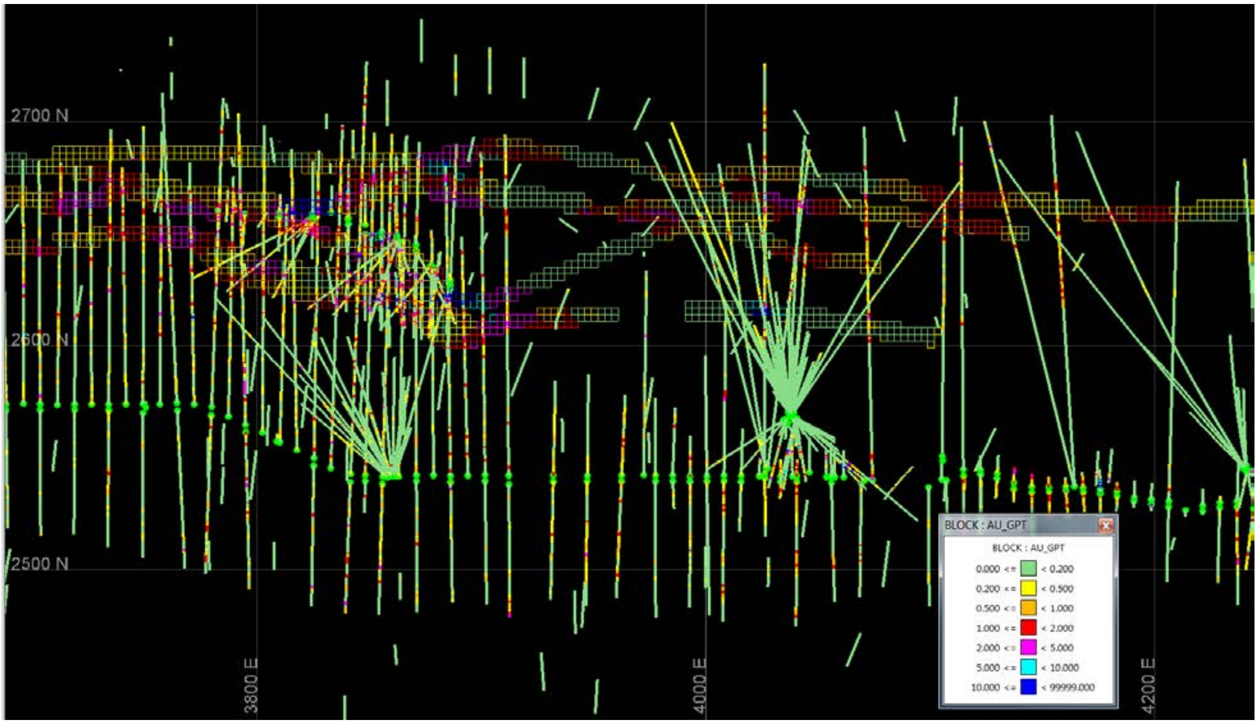

Figure 14-27 Gold Block Grade Estimates and Drill Hole Grades at McVeigh – High-Grade 1 – Level 1315 El.

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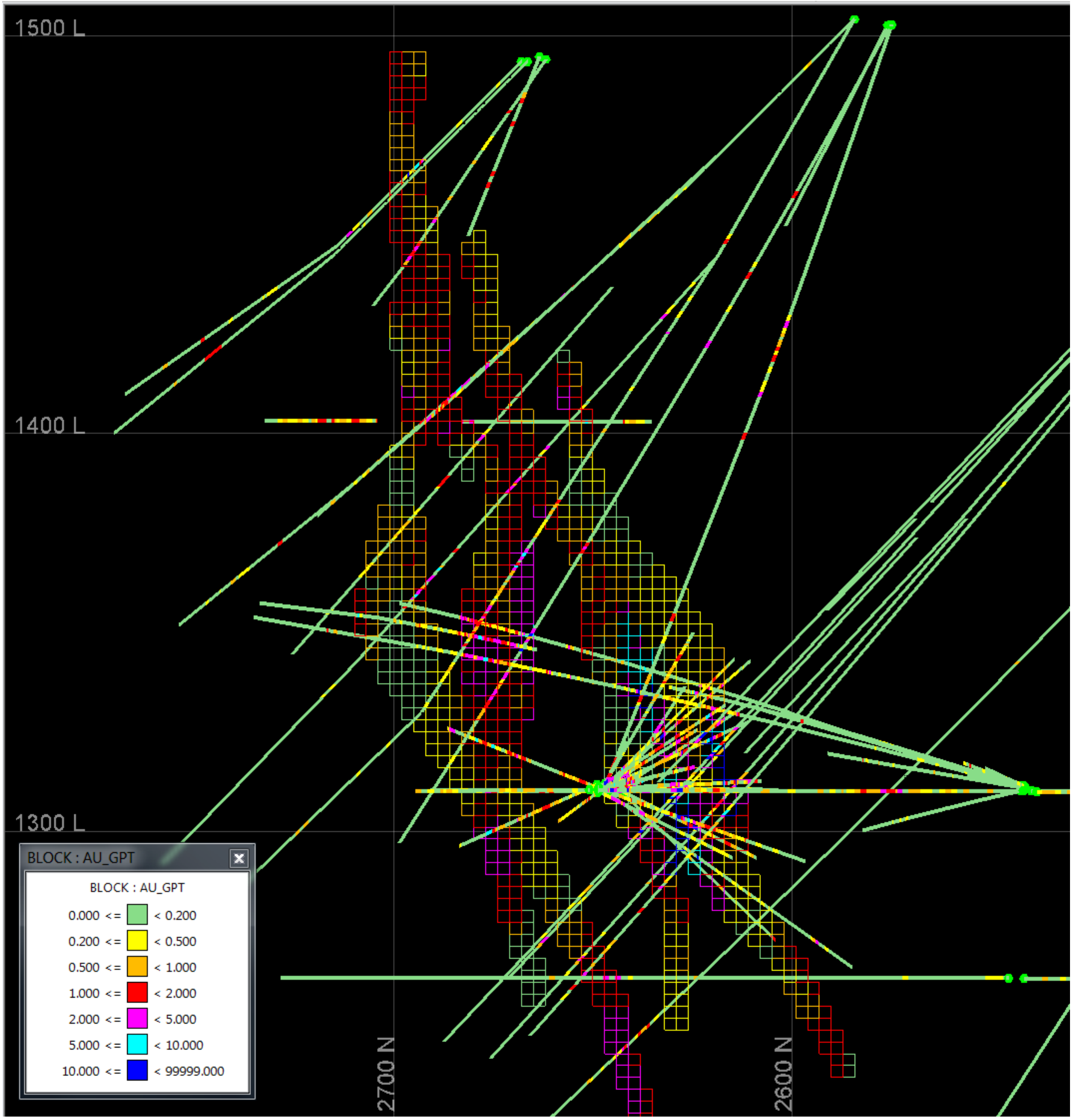

Figure 14-28 Gold Block Grade Estimates and Drill Hole Grades at McVeigh – High-Grade 1 - North-South Section 3865E

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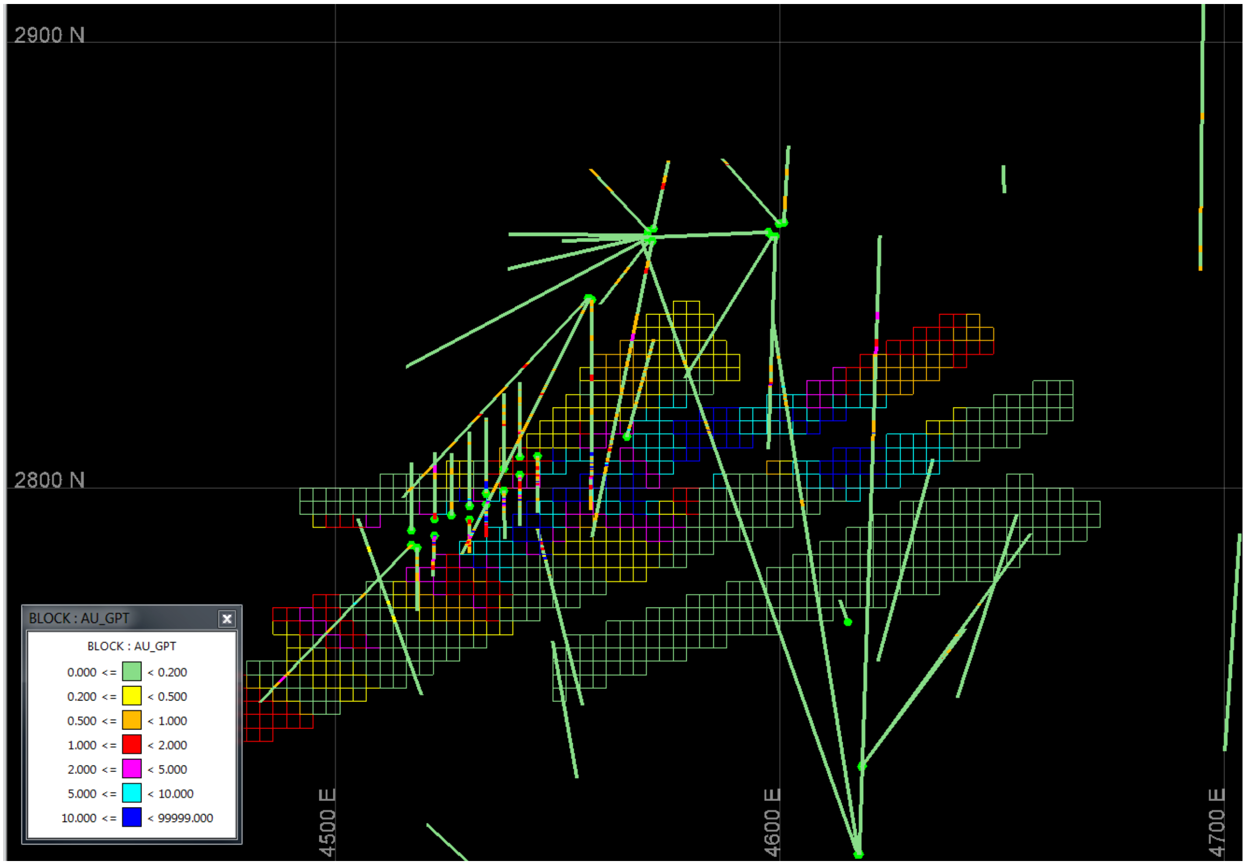

Figure 14-29 Gold Block Grade Estimates and Drill Hole Grades at 8 Zone – High-Grade – Level 260 El.

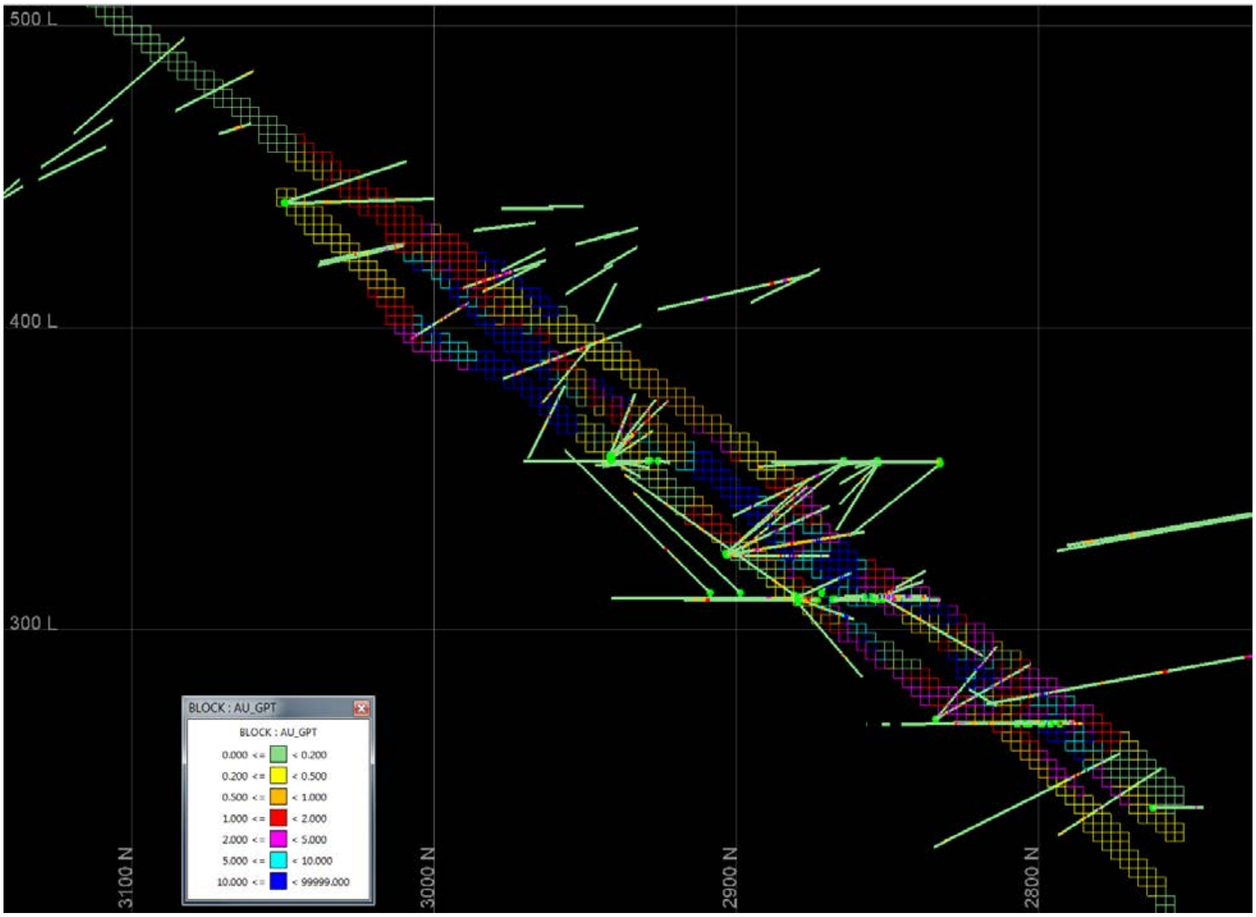

Figure 14-30: Gold Block Grade Estimates and Drill Hole Grades at 8 Zone – High-Grade - North-South Section 4540E.

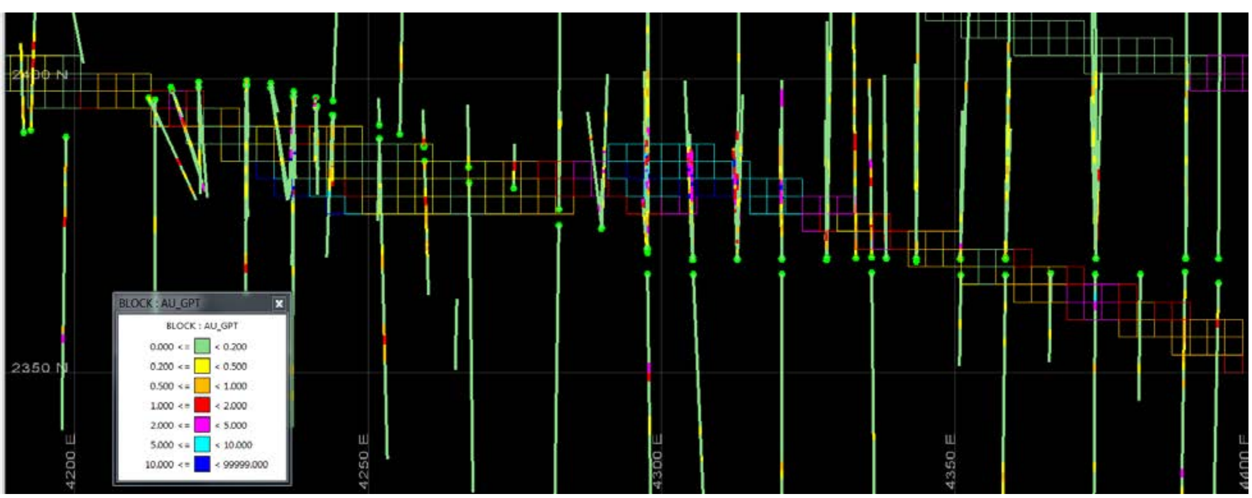

Figure 14-31: Gold Block Grade Estimates and Drill Hole Grades at A3 – High-Grade – Level 990 El.

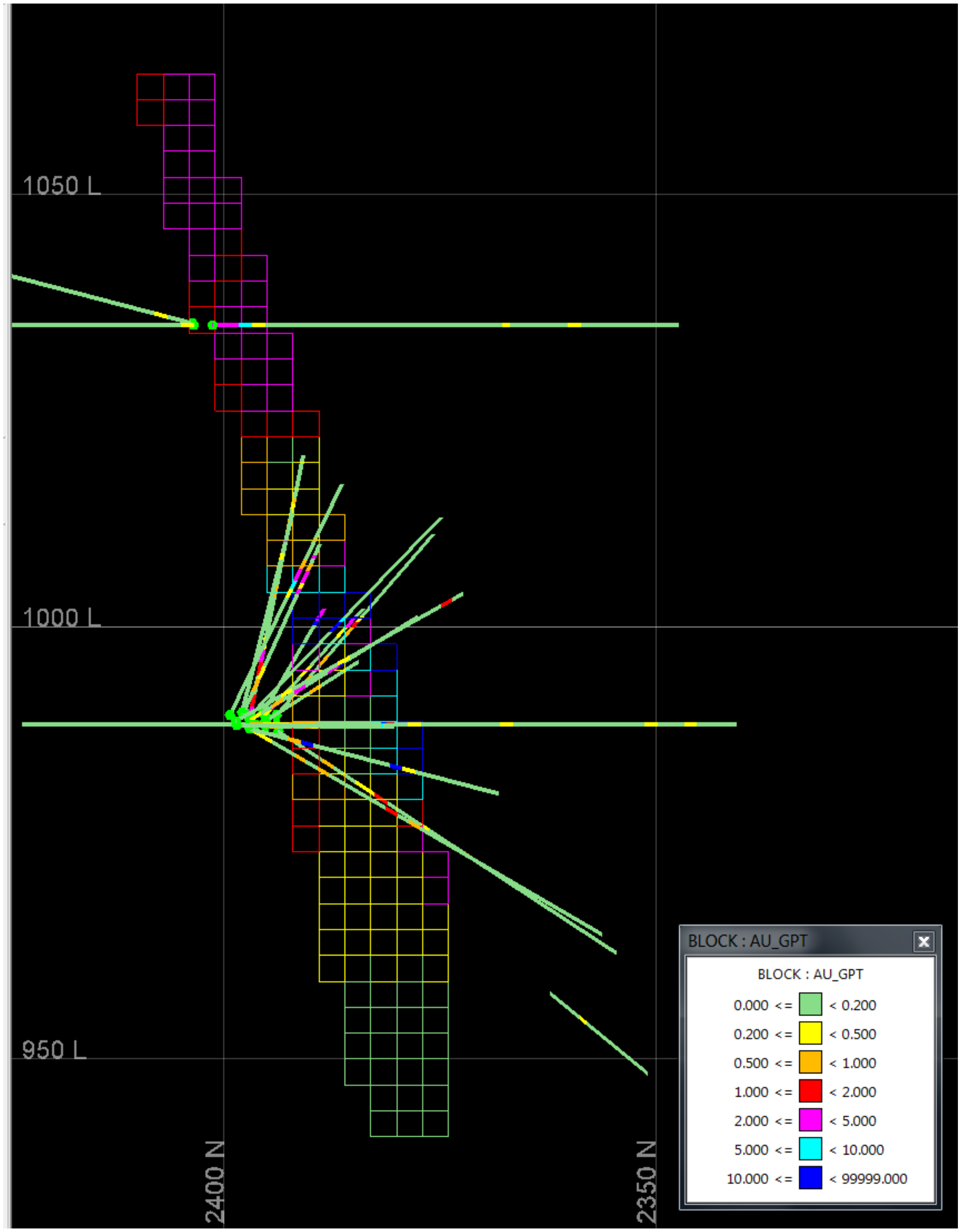

Figure 14-32: Gold Block Grade Estimates and Drill Hole Grades at A3 – High-Grade - North-South Section 4240E.

14.1.7.2 Global Bias Test

The comparison of the average gold grades from the declustered composites and the estimated block grades examines the possibility of a global bias of the estimates. As a guideline, a difference between the average gold grades of more than ± 10% would indicate a significant over- or under-estimation of the block grades and the possible presence of a bias. It would be a sign of difficulties encountered in the estimation process and would require further investigation.

Results of this average gold grade comparison are presented in Table 14.15 for the different high-grade mineralized zones at Madsen.

Table 14.15: Average gold grade comparison – polygonal-declustered composites with block estimates – high-grade zones

Statistics	Declustered Composites	Block Estimates
Austin		
Average Gold Grade g/t	3.76	3.42
Difference	-9.0%	
South Austin and A3		
Average Gold Grade g/t	4.39	4.27
Difference	-2.7%	
McVeigh		
Average Gold Grade g/t	2.16	1.95
Difference	-9.7%	
8 Zone		
Average Gold Grade g/t	6.09	6.21
Difference	-2.0%	

As seen in Table 14.15, the average gold grades between the declustered composites and the block estimates are within the acceptable limits of the tolerance. Therefore, it can be concluded that no significant global bias is present in the gold grade estimates.

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14.1.7.3 Local Bias Test

A comparison of the grade from composites within a block with the estimated grade of that block provides an assessment of the estimation process close to measured data. Pairing of these grades on a scatterplot gives a statistical valuation of the estimates. The estimated block grades should be similar to the composited grades within the block, without being exactly the same value. Thus, a high correlation coefficient will indicate satisfactory results in the interpolation process, while a medium to low correlation coefficient will be indicative of larger differences in the estimates and would require a further review of the interpolation process. Results from the pairing of composited and estimated grades within blocks pierced by a drill hole are presented in Table 14.16 for the high-grade gold zones at Madsen.

As seen in Table 14.16 for gold, the block grade estimates are very similar to the composite grades within blocks pierced by a drill hole, with high correlation coefficients, indicating satisfactory results from the estimation process.

Table 14.16: Gold grade comparison for blocks pierced by a drill hole – paired composite grades with block grade estimates – high-grade zones

Data	Average Gold Grade g/t	Correlation Coefficient
Austin		
Composites	3.84	0.807
Block Estimates	3.80	
South Austin and A3		
Composites	4.98	0.736
Block Estimates	5.02	
McVeigh		
Composites	2.23	0.782
Block Estimates	2.27	
8 Zone		
Composites	7.19	0.637
Block Estimates	7.47	

14.1.7.4 Grade Profile Reproducibility

The comparison of the grade profiles of the declustered composites with that of the estimates allows for a visual verification of an over- or under-estimation of the block estimates at the global and local scales. A qualitative assessment of the smoothing/variability of the estimates can also be observed from the plots. The output consists of three graphs displaying the average grade according to each of the coordinate axes (east, north, elevation). The ideal result is a grade profile from the estimates that follows that of the declustered composites along the three coordinate axes, in a way that the estimates have lower high-grade peaks than the composites, and higher low-grade peaks than the composites. A smoother grade profile for the estimates, from low to high grade areas, is also anticipated in order to reflect that these grades represent larger volumes than the composites.

Gold grade profiles are presented in Figure 14-33 to Figure 14-36 for the high-grade zones at Madsen.

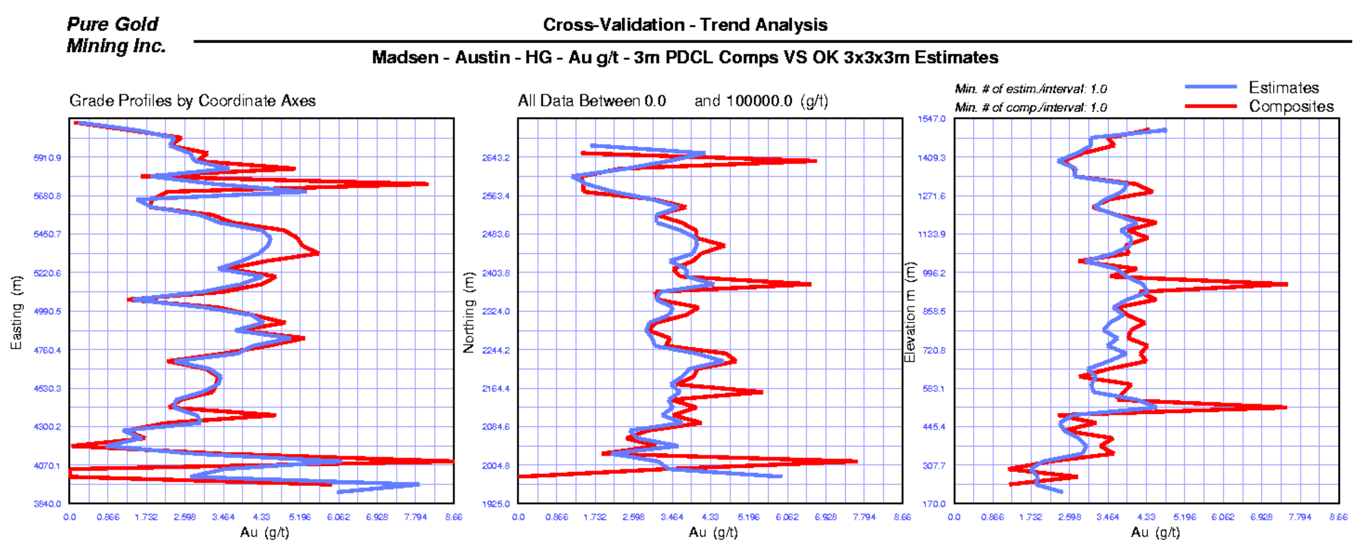

Figure 14-33: Gold Grade Profiles of Declustered Composites and Block Estimates – High-Grade Zones – Austin - Madsen Project.

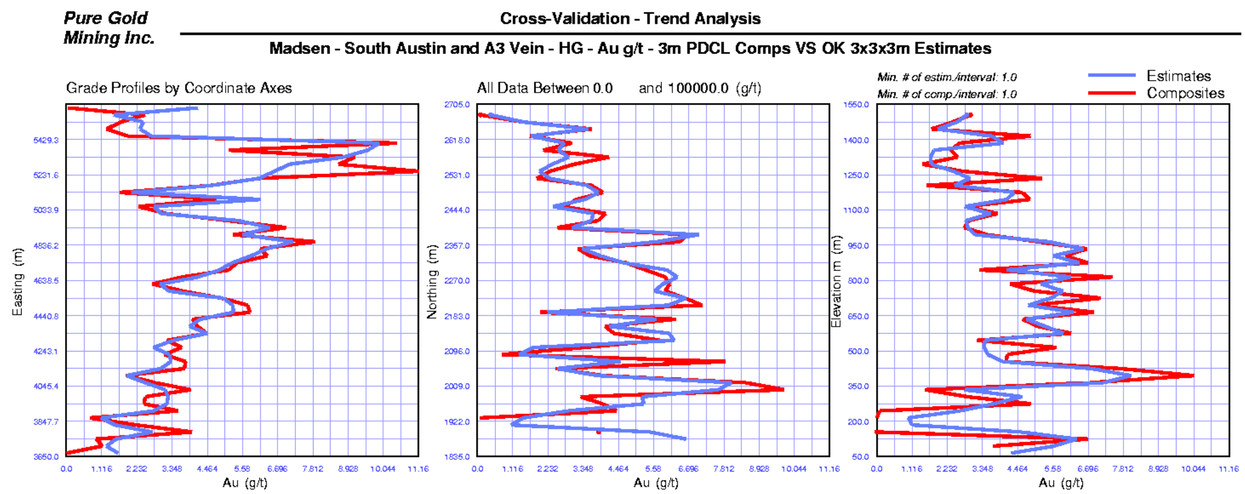

Figure 14-34: Gold Grade Profiles of Declustered Composites and Block Estimates – High-Grade Zones – South Austin and A3 - Madsen Project.

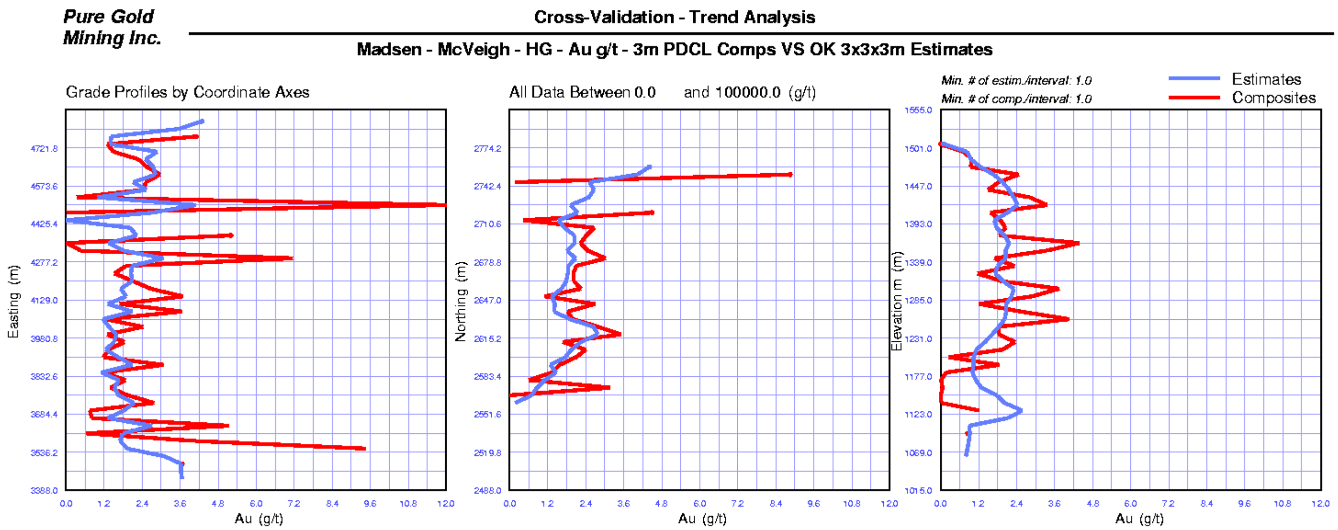

Figure 14-35: Gold Grade Profiles of Declustered Composites and Block Estimates – High-Grade Zones – McVeigh - Madsen Project.

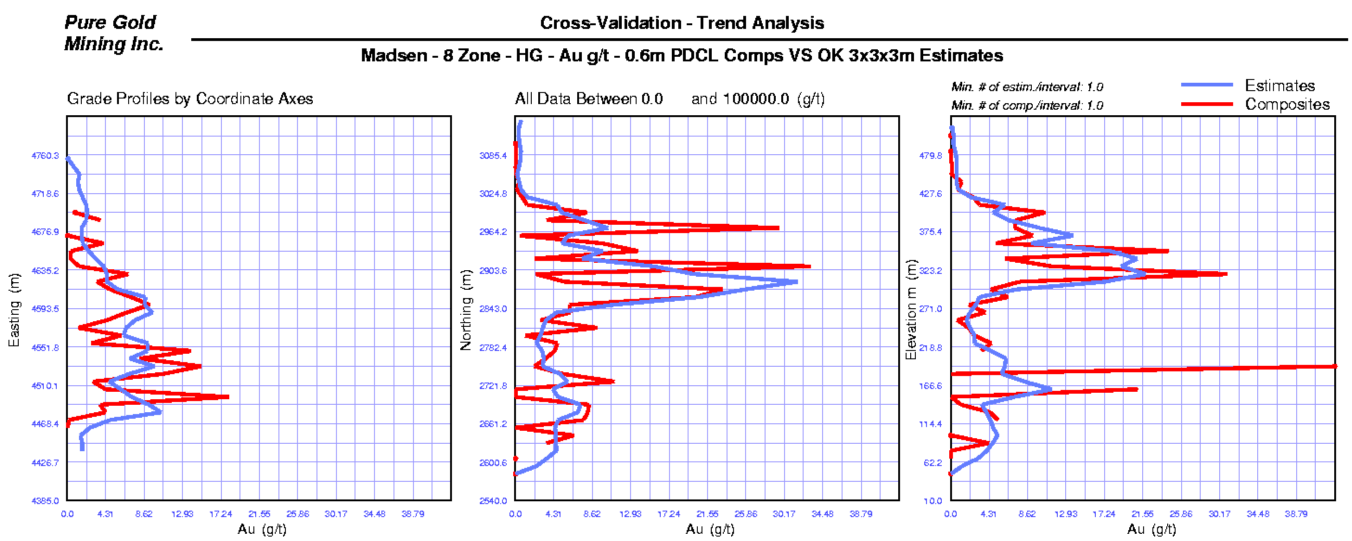

Figure 14-36: Gold Grade Profiles of Declustered Composites and Block Estimates – High-Grade Zone – 8 Zone.

From the plots of Figure 14-37 to Figure 14-40, it can be seen that the grade profiles of the declustered composites are well reproduced by those of the block estimates and consequently that no global or local bias is observed. As anticipated, some smoothing of the block estimates can be seen in the profiles, where estimated grades are higher in lower grade areas and lower in higher grade areas. To quantify the level of smoothing of the estimates, further investigation is required (section 14.1.7.5, Level of Smoothing/Variability).

14.1.7.5 Level of Smoothing/Variability

The level of smoothing/variability of the estimates can be measured by comparing a theoretical distribution of block grades with that of the actual estimates. The theoretical distribution of block grades is derived from that of the declustered composites, where a change of support algorithm is utilized for the transformation (Indirect Lognormal Correction). In this case, the variance of the composites' grade population is corrected (reduced) with the help of the variogram model, to reflect a distribution of block grades (3m x 3m x 3m). The comparison of the coefficient of variation (CV) of this population with that of the actual block estimates provides a measure of smoothing. Ideally a lower CV from the estimates by 5 to 30% is targeted as a proper amount of smoothing. This smoothing of the estimates is desired as it allows for the following factors: the imperfect selection of blocks at the mining stage (misclassification), the block grades relate to much larger volumes than the volume of core (support effect), and the block grades are not perfectly known (information effect). A CV lower than 5 to 30% for the estimates would indicate a larger amount of smoothing, while a higher CV would represent a larger amount of variability. Too much smoothing would be characterized by grade estimates around the average grade, where too much variability would be represented by estimates with abrupt changes between lower and higher-grade areas.

Results of the level of smoothing/variability analysis are presented in Table 14.17 for the different high-grade zones at Madsen. As observed in this Table, the CVs of the gold estimates are within or close to the targeted range, towards the higher end of the smoothing level. A possible measure to reduce this observed smoothing would be to decrease the number of samples at the grade estimation stage.

Table 14.17: Level of smoothing/variability of gold estimates

CV – Theoretical Block Grade Distribution	CV – Actual Block Grade Distribution	Difference
Austin		
1.978	1.342	-32.1%
South Austin and A3		
2.096	1.497	-28.6%
McVeigh		
1.914	1.427	-25.4%
8 Zone		
3.541	2.725	-23.0%

14.1.8 Resource Classification

The mineral resource was classified as indicated and inferred based on the variogram ranges of the second structures. The average distance of samples from the block center was utilized as the classification criterion. The classification distances for each mineralized zones are provided in

Table 14.18.

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Table 14.18: Classification distances

Mineralized Zone	Indicated	Inferred
Austin	≤ 30.0m	>30.0m
South Austin	≤ 30.0m	>30.0m
McVeigh	≤ 27.0m	>27.0m
8 Zone	≤ 25.0m	>25.0m
A3	≤ 30.0m	>30.0m

It should be noted that there are no mineral resources in the measured category, mainly due to some uncertainty associated with the historical data.

14.1.9 Editing of the Block Model

The block model of gold grade estimates was edited with the mined voids, the dykes, and the topographic surface at Madsen.

14.1.9.1 Underground Mined Voids

The underground voids from the historical mining at Madsen were provided as 3-D wireframes that were developed by SRK for Claude Resources' 2009 resource estimate. As previously mentioned in section 14.1.2.3, the mined voids were grouped into 5 different types: stopes, ramps, shafts, raises, and drifts. A geotechnical buffer of 15 feet was added to the stope wireframes to reflect their more degraded condition at Austin, South Austin, and McVeigh. No geotechnical buffer was developed for the stope wireframes of the 8 Zone due to the more discrete nature of the quartz vein-hosted mineralization. All wireframes of the underground mined voids were validated in Vulcan©.

The editing of the block model with the mined voids consisted of determining the exact fraction of the stope within each block and storing this information in a variable. This fraction variable with values ranging from 0.0 (no stopes) to 1.0 (all stope), was then utilized to affect the specific gravity in the calculation of the block tonnage: sg x (1.0 – stope fraction) x 3 m x 3 m x 3 m. The gold grade within the stope was assigned a 0.0 g/t value.

14.1.9.2 Dykes

The proportion of dyke within each block was estimated with an indicator approach, as described in section 14.1.2.2. The dyke variable was utilized to dilute the gold grade estimates of the block model with a 0.0 g/t Au grade, since the dykes were considered barren. The dyke variable has values ranging from 0.0 (no dyke) to 1.0 (all dyke). The final gold grade was derived as follows: Au final = Au estimate x (1.0 – dyke fraction).

14.1.9.3 Topographic Surface

The percentage of block below the topographic surface was stored in a variable and utilized in the tonnage calculation of each block. The topography variable was utilized to affect the specific gravity in the calculation of the block tonnage: sg x (below topo percentage) / 100.0.

14.1.10 Mineral Resource Calculation

The mineral resource was calculated for 3 m (X) x 3 m (Y) x 3 m (Z) blocks with a constant specific gravity (SG) value of 2.84. Statistics on the specific gravity measurements from the Pure Gold drill holes indicated similar results as the historical value of 2.84, and for such it was kept for the tonnage calculations.

For the mineral resource's tonnage calculation, the proportion of underground mined voids and proportion below topographic surface of each block was integrated in the tonnage computation. Only gold grade estimates outside the stopes with a 15 ft geotechnical buffer and outside all other underground mined voids were kept for the reporting of the mineral resources. As well, the fraction of each block within the high-grade and low-grade zones was accounted for in the tonnage and grade calculations. For the mineral resource's gold grade calculation, the estimates were diluted to the proportion of dyke material within each block.

The indicated and inferred mineral resources for the different zones are presented in Table 14.19 to

Table 14.23 and for the overall Madsen project in Table 14.24. The Madsen indicated mineral resources at a 4.0 g/t gold cut-off are 5.785 million tonnes at an average gold grade of 8.86 g/t, for a total of 1.648 million ounces of gold. The Madsen inferred mineral resources at a 4.0 g/t gold cut-off are 0.587 million tonnes at an average gold grade of 9.42 g/t, for a total of 0.178 million ounces of gold. A grade-tonnage curve of the resource is presented in Figure 14-41.

It should be noted that 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 estimated will be converted into mineral reserves. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.

The CIM definitions were followed for the classification of indicated and inferred mineral resources. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there has been insufficient exploration to define these inferred mineral resources as an indicated mineral resource and it is uncertain if further exploration will result in upgrading them to an indicated mineral resource category. All figures in Figure 14-19 to 14.24 have been rounded to reflect the relative accuracy of the estimates. Mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent.

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Table 14.19: Mineral resources* – Austin – effective August 2, 2017

AUSTIN						
	INDICATED					
	HG1			**HG2**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	Tonnes	g/t	ouncesOunces	Tonnes	g/t	Ouncesounces
3.0	1,849,000	6.14	365,000	1,982,000	6.37	406,000
4.0	1,184,000	7.65	291,000	1,384,000	7.63	339,000
5.0	806,000	9.14	237,000	981,000	8.93	282,000
	HG3			**HG4**		
3.0	1,246,000	6.69	268,000	291,000	6.24	58,000
4.0	841,000	8.25	223,000	182,000	7.88	46,000
5.0	609,000	9.70	190,000	133,000	9.16	39,000
	LG			TOTAL		
3.0	-	-	-	5,368,000	6.36	1,097,000
4.0	-	-	-	3,591,000	7.79	900,000
5.0	-	-	-	2,529,000	9.19	748,000
	INFERRED					
	HG1			**HG2**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	Tonnes	g/t	Ouncesounces	Tonnes	g/t	Ouncesounces
3.0	18,000	7.64	4,000	64,000	5.90	12,000
4.0	11,000	10.16	4,000	38,000	7.55	9,000
5.0	10,000	10.86	4,000	28,000	8.71	8,000
	HG3			**HG4**		
3.0	42,000	10.93	15,000	82,000	6.61	17,000
4.0	34,000	12.81	14,000	53,000	8.26	14,000
5.0	27,000	14.78	13,000	41,000	9.37	12,000
	LG			**TOTAL**		
3.0	265,000	4.52	39,000	471,000	5.77	87,000
4.0	132,000	5.61	24,000	269,000	7.51	65,000
5.0	73,000	6.54	15,000	180,000	9.02	52,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

Table 14.20: Mineral resources* - South Austin – effective August 2, 2017

SOUTH AUSTIN									
	INDICATED								
	HG1			**HG2**			**HG3**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ouncesounces	tonnes	g/t	ouncesounces	tonnes	g/t	ouncesounces
3.0	175,000	6.33	36,000	1,221,000	7.41	291,000	131,000	8.70	37,000
4.0	118,000	7.72	29,000	887,000	8.89	254,000	102,000	10.13	33,000
5.0	87,000	8.88	25,000	671,000	10.31	222,000	85,000	11.31	31,000
	FW2			**FING**			**LG**		
3.0	60,000	7.54	15,000	136,000	8.09	35,000	-	-	-
4.0	47,000	8.67	13,000	110,000	9.18	33,000	-	-	-
5.0	36,000	9.87	12,000	86,000	10.48	29,000	-	-	-
	TOTAL								
3.0	1,723,000	7.46	413,000						
4.0	1,265,000	8.90	362,000						
5.0	966,000	10.27	319,000						
	INFERRED								
	HG1			**HG2**			**HG3**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	8,000	5.62	1,000	19,000	5.81	4,000	2,000	8.93	1,000
4.0	5,000	6.79	1,000	12,000	7.01	3,000	2,000	8.93	1,000
5.0	3,000	7.77	1,000	9,000	7.95	2,000	2,000	8.93	1,000
	FW2			**FING**			**LG**		
3.0	0	-	0	38,000	7.78	9,000	100,000	4.67	15,000
4.0	0	-	0	29,000	8.99	9,000	52,000	5.78	10,000
5.0	0	-	0	24,000	9.98	8,000	32,000	6.60	7,000
	TOTAL								
3.0	166,000	5.60	30,000						
4.0	100,000	6.99	23,000						
5.0	70,000	8.05	18,000						

**mineral resources' tonnage and ounces have been rounded to the nearest thousand*

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Table 14.21: Mineral resources* – McVeigh – effective August 2, 2017

MCVEIGH						
	INDICATED					
	HG1			HG2		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	537,000	5.93	102,000	233,000	5.93	45,000
4.0	327,000	7.51	79,000	163,000	6.99	37,000
5.0	220,000	9.00	64,000	111,000	8.16	29,000
	LG			TOTAL		
3.0	-	-	-	770,000	5.93	147,000
4.0	-	-	-	490,000	7.34	116,000
5.0	-	-	-	331,000	8.72	93,000
	INFERRED					
	HG1			HG2		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	136,000	4.58	20,000	11,000	5.83	2,000
4.0	56,000	6.02	11,000	7,000	7.53	2,000
5.0	28,000	7.55	7,000	5,000	8.54	1,000
	LG			TOTAL		
3.0	40,000	3.32	4,000	188,000	4.39	26,000
4.0	4,000	4.84	1,000	66,000	6.11	13,000
5.0	1,000	6.54	0	34,000	7.67	8,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

Table 14.22: Mineral Resources* – 8 Zone –effective August 2, 2017

8 ZONE						
	INDICATED					
	INDICATED			INFERRED		
	HG			HG		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	440,000	18.35	260,000	180,000	13.60	78,000
4.0	379,000	20.77	253,000	142,000	16.29	74,000
5.0	343,000	22.48	248,000	112,000	19.41	70,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

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Table 14.23: Mineral resources* – A3– effective August 2, 2017

A3						
	INDICATED					
	HG			**LG**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	73,000	8.31	20,000	-	-	-
4.0	61,000	9.29	18,000	-	-	-
5.0	50,000	10.37	17,000	-	-	-
	TOTAL					
3.0	73,000	8.31	20,000			
4.0	61,000	9.29	18,000			
5.0	50,000	10.37	17,000			
	INFERRED					
	HG			**LG**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	10,000	8.65	3,000	2,000	7.08	0
4.0	8,000	9.77	3,000	2,000	7.39	0
5.0	8,000	9.94	3,000	1,000	7.97	0
	TOTAL					
3.0	12,000	8.42	3,000			
4.0	10,000	9.39	3,000			
5.0	10,000	9.66	3,000			

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

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Table 14.24: Mineral resources* – effective August 2, 2017

MADSEN GOLD PROJECT						
	INDICATED					
	AUSTIN			SOUTH AUSTIN		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	5,368,000	6.36	1,097,000	1,723,000	7.46	413,000
4.0	3,591,000	7.79	900,000	1,265,000	8.90	362,000
5.0	2,529,000	9.19	748,000	966,000	10.27	319,000
	MCVEIGH			8 ZONE		
3.0	770,000	5.93	147,000	440,000	18.35	260,000
4.0	490,000	7.34	116,000	379,000	20.77	253,000
5.0	331,000	8.72	93,000	343,000	22.48	248,000
	A3			TOTAL		
3.0	73,000	8.31	20,000	8,374,000	7.19	1,936,000
4.0	61,000	9.29	18,000	5,785,000	8.86	1,648,000
5.0	50,000	10.37	17,000	4,218,000	10.50	1,423,000
	INFERRED					
	AUSTIN			SOUTH AUSTIN		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	471,000	5.77	87,000	166,000	5.60	30,000
4.0	269,000	7.51	65,000	100,000	6.99	23,000
5.0	180,000	9.02	52,000	70,000	8.05	18,000
	MCVEIGH			8 ZONE		
3.0	188,000	4.39	26,000	180,000	13.60	78,000
4.0	66,000	6.11	13,000	142,000	16.29	74,000
5.0	34,000	7.67	8,000	112,000	19.41	70,000
	A3			TOTAL		
3.0	12,000	8.42	3,000	1,017,000	6.90	225,000
4.0	10,000	9.39	3,000	587,000	9.42	178,000
5.0	10,000	9.66	3,000	406,000	11.62	152,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

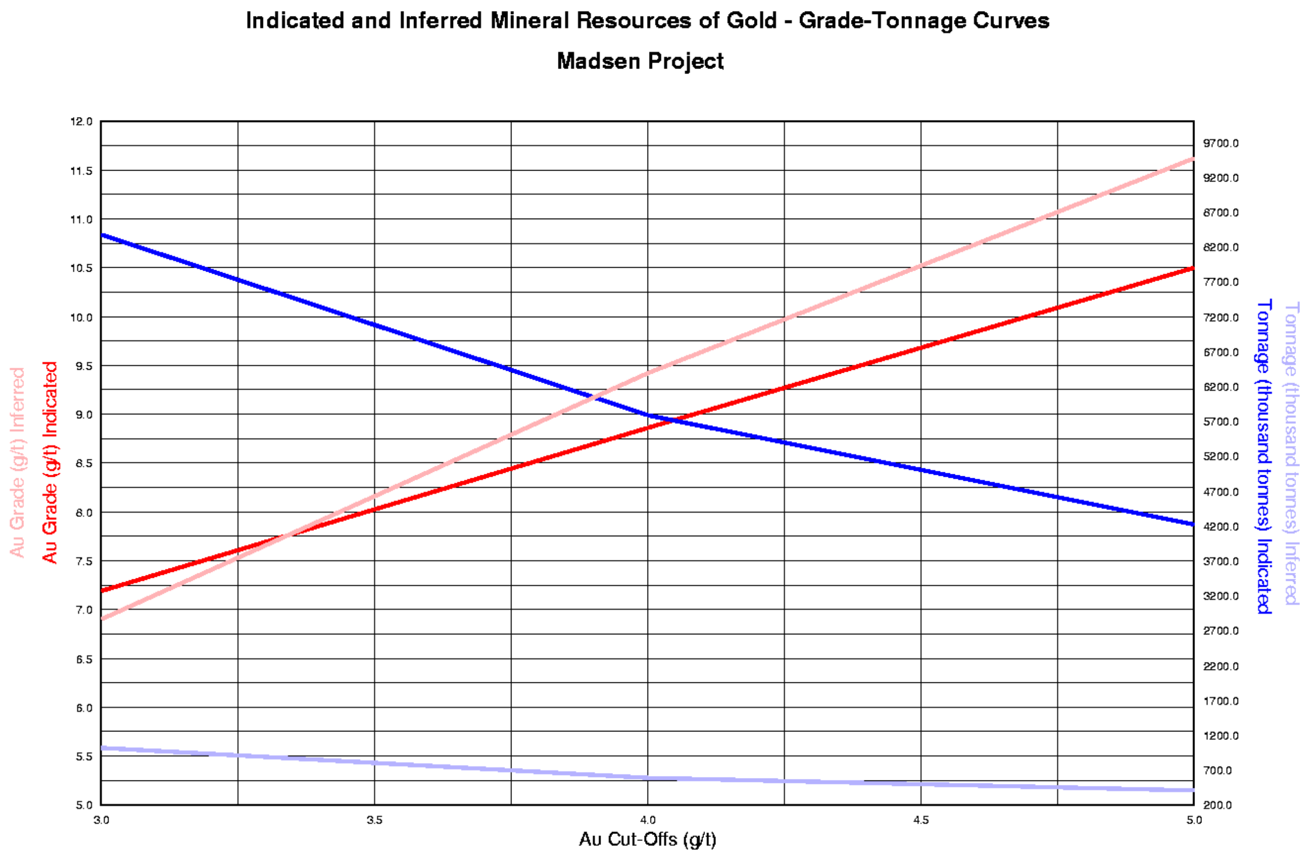

Figure 14-37: Gold Grade-Tonnage Curves of the Indicated and Inferred Mineral Resources Madsen Gold Project.

14.1.11 Comparison with the 2009 Mineral Resources

The current estimation of the mineral resources at the Madsen Gold Project was compared to the 2009 estimate in Table 14.25.

Table 14.25: Comparison of mineral resources from 2009 and 2017

Au Cut-Off g/t	Mineral Resources	Indicated			Inferred		
		Tonnage tonnes	Avg Au Grade g/t	Au Content ounces	Tonnage tonnes	Avg Au Grade g/t	Au Content ounces
3.0	August 2017	8,374,000	7.19	1,936,000	1,017,000	6.90	225,000
	December 2009	6,911,000	6.20	1,378,000	1,888,000	7.07	429,000
	Difference	21.2%	16.0%	40.5%	-46.1%	-2.4%	-47.6%
4.0	August 2017	5,785,000	8.86	1,648,000	587,000	9.42	178,000
	December 2009	4,540,000	7.63	1,114,000	1,103,000	9.64	342,000
	Difference	27.4%	16.1%	47.9%	-46.8%	-2.3%	-48.0%
5.0	August 2017	4,218,000	10.50	1,423,000	406,000	11.62	152,000
	December 2009	3,236,000	8.92	928,000	788,000	11.72	297,000
	Difference	30.3%	17.7%	53.3%	-48.4%	-0.9%	-48.8%

From Table 14.25, an increase of the indicated and decrease of the inferred mineral resources are observed for the current estimate. The 2017 indicated mineral resources show increases of the tonnage, average gold grade, and metal content, while the 2017 inferred mineral resources show decreases of the tonnage, average gold grade, and metal content, when compared to the 2009 mineral resources. These differences are believed to mainly stem from the changes brought in the modeling approach of the geologic model. In the current estimate, the high-grade zones were modeled with the objective to represent more accurately the intricacies of the higher-grade areas. In the 2009 estimate, the high-grade zones were defined as broader zones including a greater proportion of lower grades than in the current geology model.

14.1.12 Mineral Resources in Stopes

The mineral resources within the original stopes and within the stopes with a 15ft geotechnical buffer were computed for comparison with the historical production from 1938 to 1999. Results are presented in Tables 14.26 and 14.27 for the original stopes and 15ft buffer stopes, respectively. The resources inside the other underground excavations were also added to that of the stopes in these tables. All gold grades within the underground voids are reported at a 0.0 g/t Au cut-off.

As seen in Table 14.26, the tonnages within the underground voids from the current mineral resource estimate and the historical production are very similar. However, the gold grades differ, with the past production results showing a higher average grade and metal content.

Table 14.26: Comparison of mineral resources within original stopes with historical production

	Mineral Resources Inside Original Stopes and Other Excavations						
Zones	Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces		Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces
Austin	4,167,437	5.25	702,846	HG	2,787,875	7.50	672,242
				LG	1,379,562	0.69	30,604
South Austin	1,726,907	7.13	395,663	HG	1,039,421	11.39	380,633
				LG	687,486	0.68	15,030
McVeigh	198,404	3.57	22,785	HG	128,124	5.29	21,791
				LG	70,280	0.44	994
8 Zone	86,324	18.76	52,066	HG	86,324	18.76	52,066
All Stopes	6,179,072	5.91	1,173,360	HG	4,041,744	8.67	1,126,732
				LG	2,137,328	0.68	46,628
Drifts	1,438,543	1.46	67,394				
Raises	3,026	0.43	41				
Ramp	95,041	0.52	1,579				
Shaft	106,158	0.02	84				
All UG Voids	7,821,840	4.94	1,242,458				
Historic Production 1938-1999	7,872,679	9.69	2,452,388		7,872,679	9.69	2,452,388

Table 14.27: Comparison of mineral resources within 15ft buffer stopes with historical production

	Mineral Resources Inside 15ft Buffer Stopes and Other Excavations						
Zones	Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces		Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces
Austin	13,488,257	3.51	1,520,350	HG	6,769,472	6.39	1,390,742
				LG	6,718,785	0.60	129,608
South Austin	5,745,157	4.28	790,727	HG	2,461,854	9.27	733,724
				LG	3,283,303	0.54	57,003
McVeigh	927,274	2.43	72,307	HG	444,082	4.64	66,248
				LG	483,192	0.39	6,059
8 Zone	86,324	18.76	52,066	HG	86,324	18.76	52,066
All Stopes	20,247,012	3.74	2,435,450	HG	9,761,732	7.15	2,242,780
				LG	10,485,280	0.57	192,670
Drifts	1,438,543	1.46	67,394				
Raises	3,026	0.43	41				
Ramp	95,041	0.52	1,579				
Shaft	106,158	0.02	84				
All UG Voids	21,889,780	3.56	2,504,548				
Historic Production 1938-1999	7,872,679	9.69	2,452,388				

The mineral resources within the stopes with a 15ft geotechnical buffer were presented in Table 14.27 to quantify the impact of utilizing the buffered stopes for the final statement of the mineral resources. It is uncertain at this time if a portion or any of this material could potentially be added to the current mineral resources.

14.1.13 Discussion and Recommendations

The estimation of the mineral resources in an environment with a long and extensive mining history is a challenging assignment. It is believed that all reasonable efforts were carried out by SRK in 2009 and more recently by Pure Gold to gather all of the information available to a quality standard acceptable for the estimation of a mineral resource.

The uncertainty associated with the historical drilling was addressed by Pure Gold's recent drilling, where the overall grades were confirmed, and modern data was gathered to allow for the construction of a more robust geological model. Comparisons of the statistics at McVeigh with only the historical drill holes versus only the Pure Gold drill holes show similar results, providing additional confidence to the historic data.

A comparison of the mineral resources within the mined stopes and the historical production represents a valuable assessment of the estimation results. It was observed that the tonnage of all the underground excavations in the model (stopes, shaft, drifts, raises, and ramp) matches very well the tonnage of the historical production. However, in this comparison, it was also noted that the gold grades of the estimates and the past production are quite different, with the estimates being of much lower grade. One plausible explanation for this difference might come from the fact that the stope outlines were derived from more information than that provided by the drill holes. Examination of original paper sections and level plans indicate that channel, chip, and face samples were utilized to define the stope shapes in addition to the drill holes. In many cases, areas outside the currently modeled high-grade zones were made part of the stopes based on channel/chip/face

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samples results indicating high-grade gold mineralization in these areas without any drill holes. In the current estimate, these areas would be identified as part of the low-grade zone, which could explain the lower resulting gold grade observed from the current estimate within the underground excavations. In order to assess the impact of this observation, it is recommended that a subset area be selected where all channel/chip/face sample data are available on the historic paper sections and plans. Following the digitization of this data and adjustment to the geologic model, a new grade estimate with the channel/chip/face samples and the drill hole data would be performed for this area. A comparison of this estimate with and without the channel/chip/face samples would provide a better assessment of the current observation. It should be noted that the tonnage and average gold grade calculated from the current estimate within the underground excavations matches that from the 2009 SRK estimate.

The statistics on gold grades within the high-grade zones indicated heterogeneous populations with higher coefficients of variability. Although an estimation technique, such as indicator kriging, could be recommended to provide more restrictive constraints to the higher grade portion, the validation tests on the current grade estimates show satisfying results without any overestimation of the higher-grade fraction. It is thus believed that the usage of ordinary kriging on capped gold grades provides satisfactory results in this case.

The large abundance of drill hole gold assays on a densely spaced grid within the resource area has allowed for well-defined variograms. This has brought additional confidence in the modeling of the experimental variograms.

The validation tests have indicated that in general the estimates have levels of smoothing closer to the upper limit of acceptability. For such, it is recommended that a reduction of the maximum number of samples, used in the grade estimation process, be investigated in order to decrease the level of smoothing.

The modelling of the high-grade zones (HG), with the distribution and dimensions of the 3-D shapes more closely approximating the historically mined stopes, seems to be the main source of the differences observed with the 2009 mineral resource estimate. The 2009 estimate used much broader dimensions for the high-grade domains and was therefore vulnerable to more smoothing of the grade estimates. In a high-grade deposit such as Madsen, over-smoothing can result in excessive dilution in the grade estimates, and thereby reduce the amount of material above a cut-off grade. Such a contrast in modelling approach could account for the differences observed between the two estimates.

In the 2009 estimation of the mineral resource, the effect of using the assays within the dykes with those outside dykes during the grade interpolation process was compared to using only the assays outside dykes. Because results showed no significant differences, it was chosen in the current study to use all assays in and out of dykes for grade estimation, as in the 2009 study.

Similarly, to the 2009 resource estimate, there were no estimates categorized in the measured class. This is to account, in part, for some uncertainty associated with the historical data, but also to acknowledge the differences observed between the estimated grade in the stopes and the reported production. It is likely that Madsen, as with many other high-grade gold mines of this

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type, will require more detailed information such as underground development in mineralized zones, combined with closely-spaced chip sampling, to achieve a “Measured” level of definition.

Overall, it is believed that the current estimation is a realistic representation of the remaining mineral resources at the Madsen project, based on the current geologic understanding and available information.

14.2 Madsen Satellite Deposits (Fork and Russet South)

14.2.1 Drill Hole Data

This section describes the mineral resource estimates for the Fork and Russet South gold deposits, which have not been considered in the current PEA. The drill hole databases were provided by Pure Gold with cut-off dates of October 20, 2017 for the Fork and Russet South deposits. All collar coordinates are in a UTM projection. The content of the drill hole databases for each area is summarized in Table 14.28.

Table 14.28: Drill hole summary – Satellite Deposits

Deposit	Number of Holes	Metres	Number of Assays
Fork	117	44,086.9	19,265
Russet South	123	32,803.8	16,500

Statistics on drill hole spacing are presented in Table 14.29 for each satellite deposit within the mineralized domains. The location of the drill holes in both deposits is shown in Figure 14.38 (note that the first digit of the northing coordinates was truncated in this Figure).

Table 14.29: Drill hole spacing statistics – Satellite Deposits

Deposit	Mean (m)	Median (m)
Fork	27.0	23.3
Russet South	24.8	21.3

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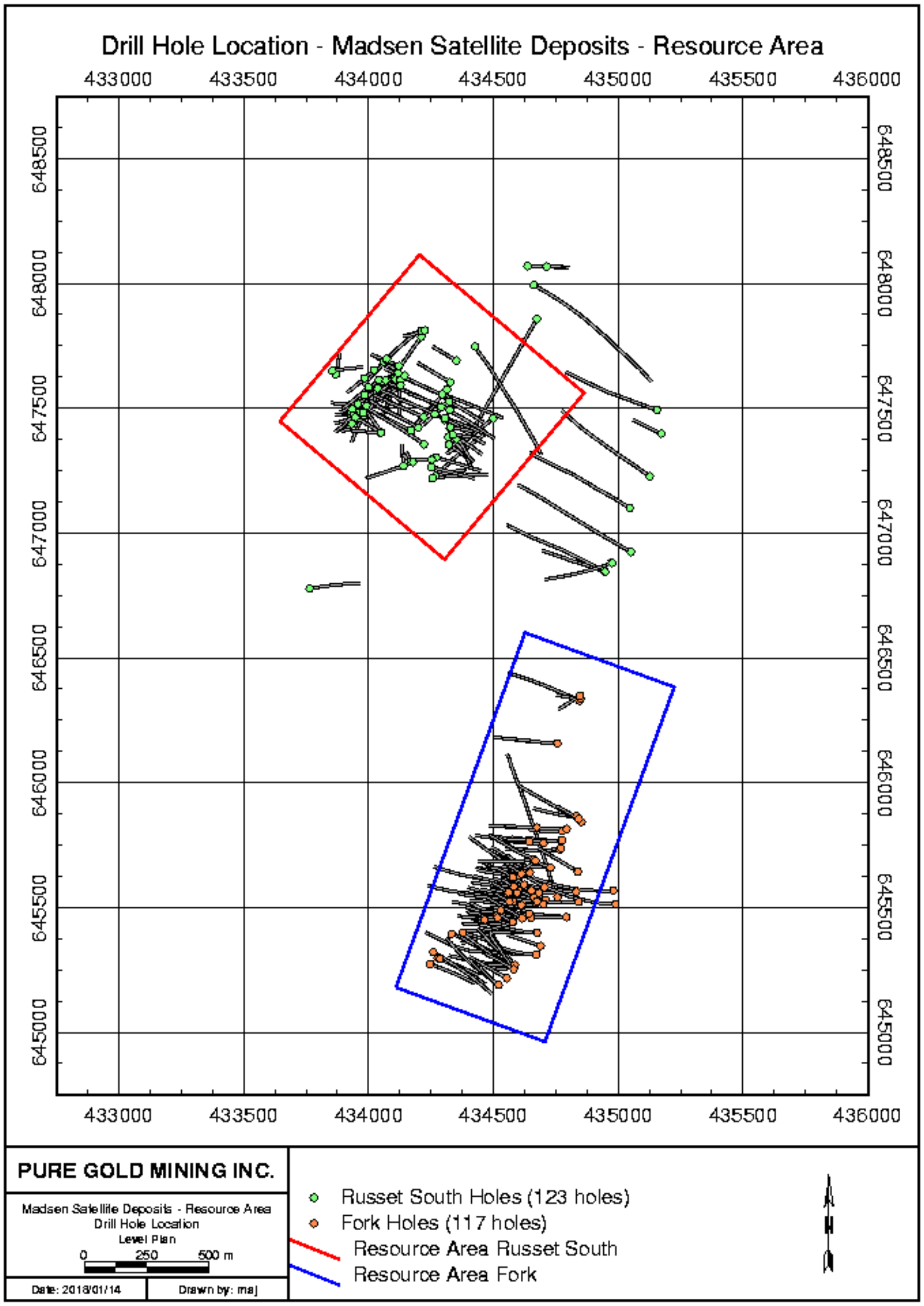

Figure 14-38: Drill hole location – Fork and Russet South deposits.

14.2.2 Geologic Modelling

The domains modelled include the mineralized zones for the Fork and Russet South satellite deposits.

For the Fork deposit, the geologic model is comprised of three domains: the hanging wall domain, the footwall domain, and the north-south domain. The hanging wall and footwall domains trend northeast and dip southeast and are spatially linked to discrete stratigraphic horizons. In the hanging wall domain, mineralization is predominantly localized in and around iron formation and ultramafic units; whereas, the footwall domain is hosted in basalt lenses within the deeper Russet Lake ultramafic body. The north-south domain is more steeply-dipping than the other two domains and transects the stratigraphy between them. It encloses a strongly silicified corridor that contains most of the higher grade intercepts in the deposit and is interpreted to represent a primary mineralizing structure. The wireframes of the three domains are displayed in Figure 14.39.

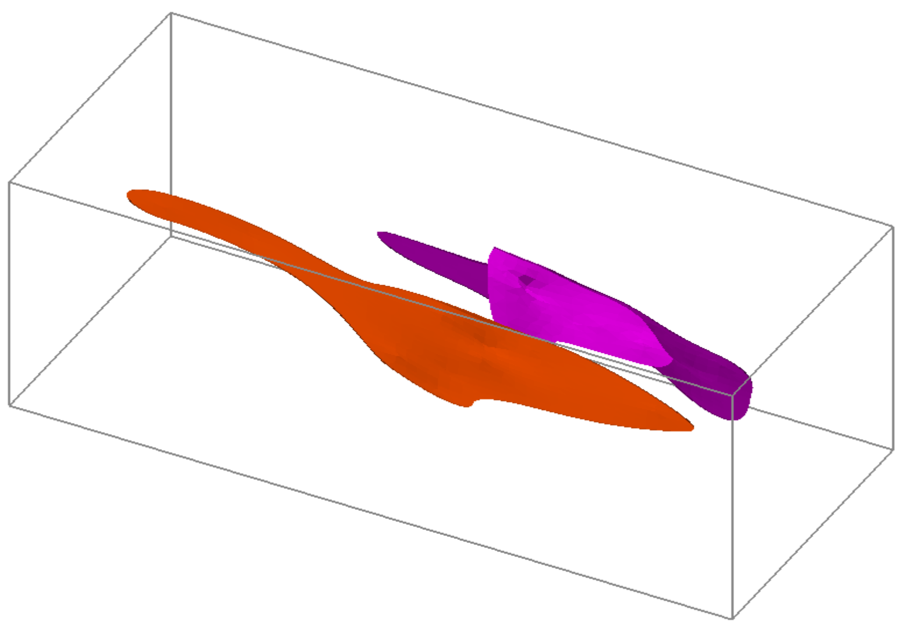

Figure 14-39: Geologic Model of the Fork Deposit: Hanging Wall, Footwall, and North-South Domains. Viewed to the Northeast.

The geologic model of the Russet South deposit is comprised of eleven domains that occupy the hinge zone of a broad, open F_2 fold defined by iron formation and ultramafic units along with their enclosing volcanic stratigraphy. The deposit is separated into western and eastern areas, as seen in Figure 14.40. The western area is made up of seven sub-parallel domains with a northeast trend and shallow dip of approximately -40° to the southeast, sub-parallel to the plunging hinge line of the broad F_2 fold. The eastern area is made up of four domains, where three of the domains are northeast-trending and dip to the southeast, with the other domain oriented parallel to the northwest-trending, steeply-dipping axial plane of the F_2 fold. The latter domain corresponds to a discrete quartz vein that outcrops over a 150 metre strike length.

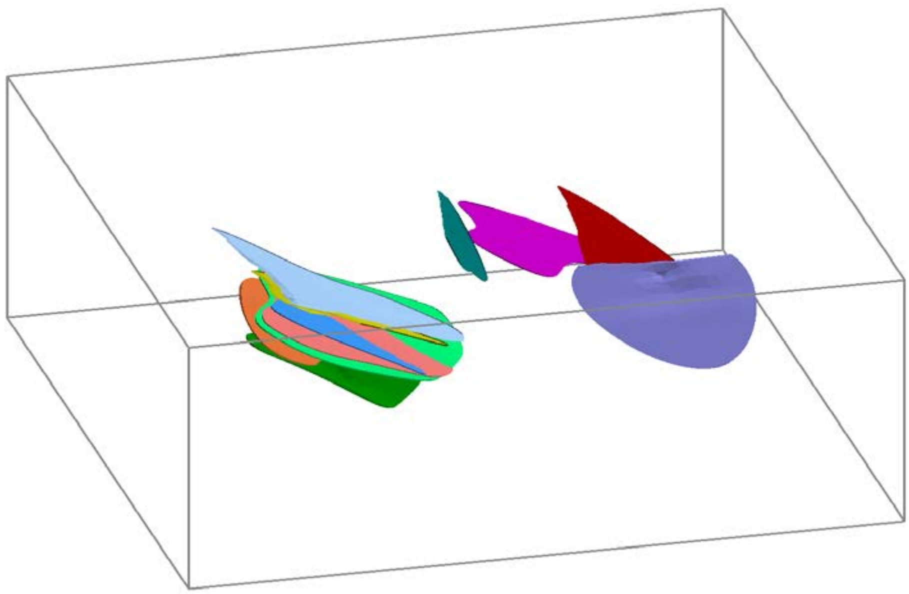

Figure 14-40: Geologic Model of the Russet South Deposit: 7 domains in the western area, 4 domains in the eastern area. Viewed to the Northeast.

As for the Madsen Main deposit, the three-dimensional modelling of the satellite deposits was performed using Leapfrog© software; specifically, Leapfrog's Vein Modelling Tool. The domains were wireframed based on mineralized composites with a cut-off grade of 3 g/t Au. These composites were grouped according to their three dimensional position relative to each other and their surrounding geological context. While the mineralization in both deposits tends to occur in broad zones of millimetre- to centimetre- scale veining and disseminations, the domains attempted to restrict the domains to narrower zones of higher grade material, where the continuity is more easily recognized.

From the geologic models for each satellite deposit, a set of rock codes was defined as presented in Table 14.30.

Table 14.30: Geologic domain codes for the Madsen satellite deposits

Deposit	Domain Codes	Volume m^3	Domain Codes	Volume m^3
Fork	1- footwall	917,839		
	2– hanging wall	657,768		
	3– north-south	323,582		
Russet South	1- domain 1 west	93,271	7- domain 7 east	246,369
	2– domain 2 west	201,170	8- domain 8 east	161,041
	3– domain 3 east	140,739	9- domain 9 east	33,455
	4– domain 4 west	93,043	10- domain 10 west	100,497
	5– domain 5 west	70,426	11- domain 11 west	38,777
	6– domain 6 west	165,630		

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The topographic surface for the Madsen project area was utilized to limit the grade estimates. It was obtained by a Lidar survey down-sampled to a 5 m resolution.

14.2.3 Compositing

Statistics were computed on the original sample lengths for each of the satellite deposits.

For the Fork deposit, the most common sampling length was noted to be 1.52m (5 feet) with 12% of the assays sampled at this interval. The original samples were thus composited to regular 1.52m lengths, providing a satisfactory ratio of 1:2 with the block height (3m), as well as preserving the intrinsic variability of the gold assay populations.

At Russet South, the most common sampling length was found to be 2.0m with 33% of the data sampled on this interval. Due to the low ratio of composite length to block height of 1:1.5, it was decided to composite the original samples to 1.0m regular intervals. This would provide a more acceptable ratio of composite length to block height (1:3), while still preserving the gold population's variability.

The compositing process consisted in starting the compositing at the collar of each hole with continuous composite intervals. At the contact with a different unit from the geology model, a last interval was composited, while a new set of regular composite lengths is generated within the other units. A summary of statistics on the composites at Fork and Russet South is presented in Table 14.31.

Table 14.31: Drill hole composites summary at Fork and Russet South.

Deposit	Domain	# of Holes	# of Composites	%	# of Meters	%	Average Au Grade g/t
Fork	mineralization	117	735	2.5	958.1	2.2	1.44
	total	117	29,249	100.0	44,086.9	100.0	0.07
Russet South	mineralization	81	1,329	4.0	1,191.3	3.6	1.58
	total	123	33,137	100.0	32,803.8	100.0	0.05

14.2.4 Exploratory Data Analysis (EDA)

A set of various statistical applications was utilized to provide a better understanding of the gold grade populations within the various mineralized zones.

14.2.4.1 Univariate Statistics

Basic statistics were performed on the gold grades of the Fork and Russet South composites. Histograms and probability plots indicated that the gold grade distributions resemble positively skewed lognormal populations. Basic statistics results were also obtained from boxplots for each mineralized domain modeled from each of the three deposits.

At Fork, statistical results show heterogeneous populations with high coefficients of variation (CV), varying from 3.2 to 4.3. Similar results are observed at Russet South with CVs of 4.4 and 4.6 for the western and eastern areas, respectively. The higher variability observed for the mineralized domains overall appear to be derived by high grade outliers.

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14.2.4.2 Capping of High-Grade Outliers

It is common practice to statistically examine the higher grades within a population and to trim them to a lower grade value based on the results from specific statistical utilities. This procedure is performed on high-grade values that are considered outliers and that cannot be related to any geologic feature. In the case at Madsen, the higher gold grades were examined with three different tools: the probability plot, decile analysis, and cutting statistics. The usage of various investigating methods allows for a selection of the capping threshold in a more objective and justified manner. The resulting compilation of the capping thresholds is listed in Table 14.32.

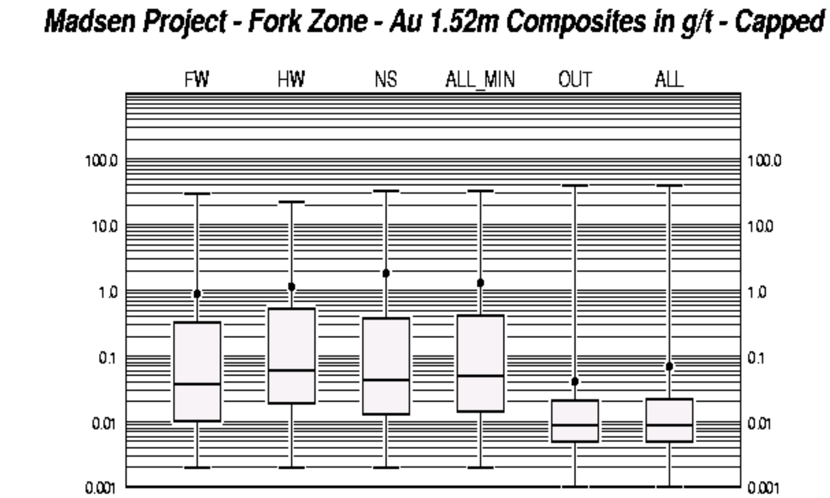
Table 14.32: List of capping thresholds of higher gold grade outliers

Domain	Units	Capping Threshold g/t	% Metal Affected	Number of Comps Capped
Fork	1- footwall	30.0	14	1
	2– hanging wall	22.0	12	2
	3– north-south	32.0	6	3
Russet	1- domain 1 west	30.0	10	3
	2– domain 2 west	15.0	22	1
	3– domain 3 east	12.0	14	2
	4– domain 4 west	20.0	64	2
	5– domain 5 west	15.0	30	1
	6– domain 6 west	30.0	20	4
	7- domain 7 east	15.0	27	1
	8- domain 8 east	9.0	12	3
	9- domain 9 east	0.4	84	1
	10- domain 10 west	15.0	14	2
	11- domain 11 west	12.0	50	2

As seen in Table 14.32, the capping analysis showed that few high-grade outliers carry a significant portion of the metal content in some of the mineralized units.

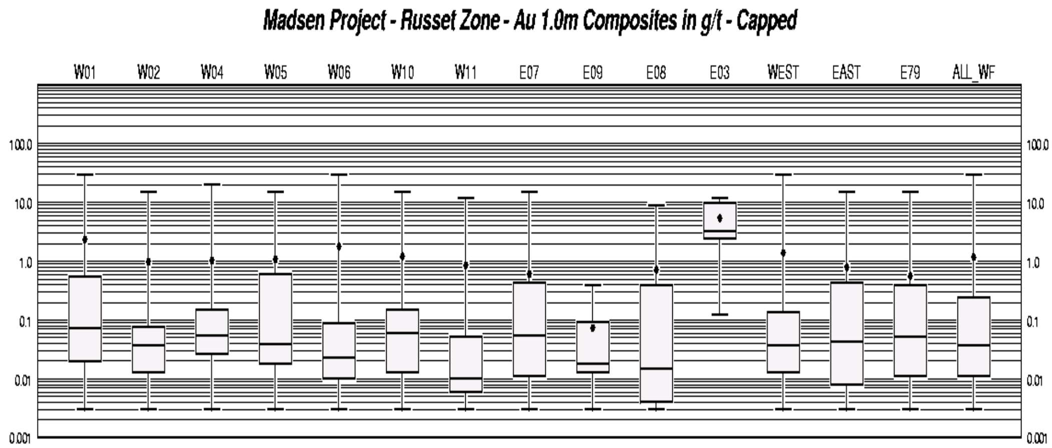
Basic statistics were re-computed with the gold grades capped to the thresholds listed in Table 14.32. Boxplots of Figure 14-41 and 14.42 display the basic statistics resulting from the capping of the higher gold grade outliers. It can be observed from those Figures that the coefficients of variation are in general below or close to 3.0 for the different gold grade populations. However, a few units display a coefficient of variation greater than 3.0, as seen for the footwall domain at Fork, and domains 4 and 6 at Russet South.

The effect of the capping of higher gold grade outliers has reduced the overall mean gold grade by 10.2% at Fork, and by 25.8% at Russet South.



	FW	HW	NS	ALL_MIN	OUT	ALL	
Number of data	188	318	229	735	28514	29249	Number of data
Mean	0.88	1.145	1.804	1.288	0.041	0.069	Mean
Std. Dev.	3.088	2.94	5.169	3.847	0.338	0.687	Std. Dev.
Coef. of Var.	3.511	2.569	2.866	2.988	8.221	10.01	Coef. of Var.
Maximum	30.0	22.0	32.0	32.0	39.699	39.699	Maximum
Upper quartile	0.33	0.527	0.383	0.415	0.021	0.022	Upper quartile
Median	0.037	0.061	0.043	0.049	0.009	0.009	Median
Lower quartile	0.01	0.019	0.013	0.014	0.005	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.001	0.001	Minimum
Number of holes	52	104	53	209	117	326	Number of holes

Figure 14-41: Boxplots of capped gold composites - Fork deposit.



	W01	W02	W04	W05	W06	W10	W11	E07	E09	E08	E03	WEST	EAST	E79	ALL_WF	
Number of data	103	166	114	70	211	143	64	269	31	137	21	871	458	300	1329	Number of data
Mean	2.36	0.986	1.037	1.087	1.787	1.206	0.86	0.61	0.074	0.712	5.425	1.392	0.796	0.561	1.172	Mean
Std. Dev.	5.834	2.687	3.448	2.913	5.878	3.306	2.618	1.727	0.105	1.884	4.14	4.333	2.102	1.654	3.681	Std. Dev.
Coef. of Var.	2.472	2.726	3.325	2.679	3.288	2.742	3.043	2.832	1.426	2.647	0.763	3.112	2.64	2.948	3.141	Coef. of Var.
Maximum	30.0	15.0	20.0	15.0	30.0	15.0	12.0	15.0	0.4	9.0	12.0	30.0	15.0	15.0	30.0	Maximum
Upper quartile	0.561	0.077	0.147	0.617	0.089	0.153	0.053	0.429	0.091	0.4	9.752	0.136	0.433	0.396	0.24	Upper quartile
Median	0.073	0.037	0.056	0.04	0.023	0.059	0.01	0.054	0.018	0.015	3.302	0.038	0.043	0.053	0.038	Median
Lower quartile	0.02	0.013	0.027	0.018	0.01	0.013	0.006	0.011	0.013	0.004	2.418	0.013	0.008	0.011	0.011	Lower quartile
Minimum	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.127	0.003	0.003	0.003	0.003	Minimum
Number of holes	32	56	24	25	54	45	25	8	10	10	3	261	31	18	292	Number of holes

Figure 14-42: ***Boxplots of capped gold composites - Russet South deposit*.**

14.2.4.3 Declustering

In general, there is a tendency to drill more holes in higher grade areas than in lower grade areas when delimiting a potential ore body. As a result, the higher grade portion of a deposit will be overly represented and would translate into a bias towards the higher grades when calculating statistical parameters of the population. Thus, a declustering method is utilized to generate a more representative set of statistical results within the zone of interest. In this case, a polygonal declustering technique was applied to the composites of the mineralized zones of Fork, Russet, and Treasure Box.

Comparisons of average gold capped and declustered grades with the capped and un-declustered gold averages show some clustering for all three deposits with higher grades located in less densely drilled areas. As a result, the average gold grades of the declustered and capped composites increased by 47.8% at Fork, and 46.3% at Russet South.

The average grade from the declustered statistics provides an excellent comparison with the average grade of the interpolated blocks, as a way to assess any overall bias of the estimates.

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14.2.5 Variography

A variographic analysis was carried out on the gold grade composites within the different mineralized units at Fork and Russet South. The objective of this analysis was to spatially establish the preferred directions of gold grade continuity. In turn, the variograms modeled along those directions would be later utilized to select and weigh the composites during the block grade interpolation process. For this exercise, all experimental variograms were of the type relative lag pairwise, which is considered robust for the assessment of gold grade continuity.

Due to the relatively low number of available composites in some of the mineralized units, it was unfeasible to develop conclusive variograms. In general, units with more than 300 composites, allowed for more definite variogram models.

The directions of gold grade continuity are in general agreement with the orientation of the mineralized zones, with best directions of continuity trending along strike and dip directions.

At Fork, a sufficient number of composites permitted for the definition of a variogram model for each of the three domains, with a better outcome for the hanging wall domain. Parameters from the variogram models are shown in Table 14.33.

Table 14.33: ***Modeled variogram parameters for gold composites at Fork***

Parameters	1 – footwall domain			2 – hanging wall domain			3 – north-south domain		
	Principal	Minor	Vertical	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	15°	105°	105°	30°	120°	120°	20°	110°	110°
Dip**	5°	-70°	20°	-5°	-60°	30°	-5°	-75°	15°
Nugget Effect C_0	0.096			0.250			0.222		
1st Structure C_1	0.973			0.931			0.592		
2nd Structure C_2	0.930			0.957			1.366		
1st Range A_1	38.1m	48.8m	2.1m	17.8m	14.6m	6.0m	60.9m	51.2m	8.2m
2nd Range A_2	48.8m	53.1m	9.2m	57.6m	39.4m	11.4m	65.2m	51.2m	13.5m

**positive clockwise from north*
***negative below horizontal*

At Russet South, the variographic analysis was conducted on domains grouped by west (domains 1,2,4,5,6,10,11) and east (domains 7,9) areas to allow for the development of a variogram model. No variographic analysis was carried out on domains 3 and 8. The variogram model parameters for the west and east areas are presented in Table 14.34.

Table 14.34: Modeled variogram parameters for gold composites at Russet South

Parameters	1 – west: domains 1,2,4,5,6,10,11			2 – east: domains 7,9		
	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	30°	120°	120°	40°	130°	190°
Dip**	0°	-40°	50°	5°	-50°	20°
Nugget Effect C_0	0.164			0.106		
1st Structure C_1	1.208			0.992		
2nd Structure C_2	0.664			1.038		
1st Range A_1	10.3m	22.1m	8.1m	27.8m	19.4m	9.5m
2nd Range A_2	50.0m	56.5m	30.7m	34.8m	41.8m	23.6m

**positive clockwise from north*
***negative below horizontal*

14.2.6 Gold Grade Estimation

The estimation of gold grades into a block model was carried out with the ordinary kriging technique for domains where variogram models were defined, and with the inverse distance squared technique for the other domains with less composites available. The estimation strategy and parameters were tailored to account for the various geometrical, geological, and geostatistical characteristics previously identified. A separate block model of gold grade estimates was assigned to each of the satellite zones with a total of 2 block models: Fork and Russet South. Each block model has a specific grid definition, as presented in Table 14.35. It should be noted that the origin of the block model corresponds to the lower left corner, the point of origin being the exterior edges of the first block. The same block size of 3 m (easting) x 3 m (northing) x 3 m (elevation) was selected for the 2 satellite deposits to better reflect the geometrical configuration and anticipated underground production rate. The block models for Fork and Russet South were rotated at angles of 20° clockwise and 40° clockwise, respectively.

Table 14.35: Block grid definitions

Coordinates	Origin m	Rotation (azimuth of X axis)	Distance m	Block Size m	Number of Blocks
Fork					
Easting (X)	434,110.0	110°	636.0	3.0	212
Northing (Y)	5,645,180.0		1,512.0	3.0	504
Elevation(Z)	-210.0		630.0	3.0	210
Number of Blocks		22,438,080			
Russet South					
Easting (X)	433,645.0	130°	861.0	3.0	287
Northing (Y)	5,647,448.0		870.0	3.0	290
Elevation(Z)	20.0		420.0	3.0	140
Number of Blocks		11,652,200			

The respective databases of capped gold grade composites were utilized as input for the grade interpolation process at Fork and Russet South.

The size and orientation of the search ellipsoids for the estimation process was based on the variogram parameters modeled for gold. A minimum of 2 samples and maximum of 12 samples were selected for the block grade calculations. Hard boundaries were assigned in the estimation of each unit. A summary of the estimation parameters is presented in Table 14.36.

For certain domains with few composites and more isolated high grade intercepts, a restrictive search for high yielding composites was utilized to constrain their extrapolation during the estimation process. A summary of the constraints applied in such domains is presented in Table 14.37.

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Table 14.36: Estimation parameters for gold

Estimation Parameters – Gold Grade									
Rock Code	method	min # of samples	max # of samples	search ellipsoid – long axis - azimuth/dip	search ellipsoid – long axis - size	search ellipsoid – short axis - azimuth/dip	search ellipsoid – short axis - size	search ellipsoid – vertical axis - azimuth/dip	search ellipsoid – vertical axis - size
Fork									
1	OK	2	12	15°/5°	49.0m	105°/-70°	53.0m	105°/20°	10.0m
2	OK	2	12	30°/-5°	58.0m	120°/-60°	39.0m	120°/30°	11.0m
3	OK	2	12	20°/-5°	65.0m	110°/-75°	51.0m	110°/15°	14.0m
Russet South									
1	OK	2	12	30°/0°	50.0m	120°/-40°	57.0m	120°/50°	31.0m
2	OK	2	12	30°/0°	50.0m	120°/-40°	57.0m	120°/50°	31.0m
3	ID2	2	12	125°/0°	35.0m	215°/-67°	42.0m	215°/23°	24.0m
4	OK	2	12	30°/0°	50.0m	120°/-40°	57.0m	120°/50°	31.0m
5	OK	2	12	30°/0°	50.0m	120°/-40°	57.0m	120°/50°	31.0m
6	OK	2	12	30°/0°	50.0m	120°/-40°	57.0m	120°/50°	31.0m
7	OK	2	12	40°/5°	35.0m	130°/-50°	42.0m	130°/40°	24.0m
8	ID2	2	12	7°/0°	35.0m	97°/-46°	42.0m	97°/44°	24.0m
9	OK	2	12	40°/5°	35.0m	130°/-50°	42.0m	130°/40°	24.0m
10	OK	2	12	30°/0°	50.0m	120°/-40°	57.0m	120°/50°	31.0m
11	OK	2	12	30°/0°	50.0m	120°/-40°	57.0m	120°/50°	31.0m

Table 14.37: ***Restrictive search for high yield gold composites***

Rock Code	Au cut-off g/t	Restrictive search distance m		
		principal	minor	vertical
Fork				
1- footwall	≥ 20.0	20.0	20.0	20.0
Russet South				
3- domain 3	≥ 3.0	40.0	40.0	40.0
5- domain 5	≥ 3.0	50.0	50.0	50.0
6- domain 6	≥ 10.0	50.0	50.0	50.0
7- domain 7	≥ 3.0	40.0	40.0	40.0
8- domain 8	≥ 5.0	40.0	40.0	40.0
9- domain 9	≥ 10.0	40.0	40.0	40.0

The grade estimation process consisted of a three-pass approach with the parameters of the first pass as presented in Table 14.36. The estimation parameters of the second and third passes are the same with the exception of an enlarged search ellipsoid by 1.5 times and 3 times the dimensions from the first pass, respectively. In this case, priority was given to estimates from the first pass, followed by estimates from the second pass for un-estimated blocks from the first pass, and finally the estimates of the third pass for un-estimated blocks from the first and second passes. Only blocks within the mineralized wireframes were estimated.

14.2.7 Validation of Grade Estimates

Validation tests were carried out on the estimates to examine the possible presence of a bias and to quantify the level of smoothing/variability.

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14.2.7.1 Visual Inspection

A visual inspection of the block estimates with the drill hole grades on plans and cross-sections was performed as a first check of the estimates. Observations from stepping through the estimates along the different planes indicated that there was good agreement between the drill hole grades and the estimates. The orientations of the estimated grades were also as expected according to the projection angles defined by the search ellipsoid.

14.2.7.2 Global Bias Test

The comparison of the average gold grades from the declustered composites and the estimated block grades examines the possibility of a global bias of the estimates. As a guideline, a difference between the average gold grades of more than ± 10% would indicate a significant over- or under-estimation of the block grades and the possible presence of a bias

Results of the average gold grade comparison are presented in Table 14.38 for the different mineralized zones at Fork and Russet South.

Table 14.38: Average gold grade comparison – polygonal-declustered composites with block estimates

Statistics	Declustered Composites	Block Estimates
Fork		
Average Gold Grade g/t	1.88	1.99
Difference	5.9%	
Russet South		
Average Gold Grade g/t	1.72	1.64
Difference	-4.7%	

As seen in Table 14.38, the average gold grades between the declustered composites and the block estimates are within the acceptable limits of the tolerance for the Fork and Russet South deposits. No global bias is thus present in the gold grade estimates.

14.2.7.3 Local Bias Test

A comparison of the grade from composites within a block with the estimated grade of that block provides an assessment of the estimation process close to measured data. Pairing of these grades on a scatterplot gives a statistical valuation of the estimates. The estimated block grades should be similar to the composited grades within the block, without being exactly the same value. Thus, a high correlation coefficient will indicate satisfactory results in the interpolation process, while a medium to low correlation coefficient will be indicative of larger differences in the estimates and would require a further review of the interpolation process. Results from the pairing of composited and estimated grades within blocks pierced by a drill hole are presented in Table 14.39 for the high-grade gold zones at Madsen.

As seen in Table 14.39 for gold, the block grade estimates are very similar to the composite grades within blocks pierced by a drill hole, with high correlation coefficients, indicating satisfactory results from the estimation process.

Table 14.39: Gold grade comparison for blocks pierced by a drill hole – paired composite grades with block grade estimates

Data	Average Gold Grade g/t	Correlation Coefficient
Fork		
Composites	1.44	0.885
Block Estimates	1.43	
Russet		
Composites	1.33	0.924
Block Estimates	1.19	

14.2.7.4 Grade Profile Reproducibility

The comparison of the grade profiles of the declustered composites with that of the estimates allows for a visual verification of an over- or under-estimation of the block estimates at the global and local scales. A qualitative assessment of the smoothing/variability of the estimates can also be observed from the plots. The output consists of three graphs displaying the average grade according to each of the coordinate axes (east, north, elevation). The ideal result is a grade profile from the estimates that follows that of the declustered composites along the three coordinate axes, in a way that the estimates have lower high-grade peaks than the composites, and higher low-grade peaks than the composites. A smoother grade profile for the estimates, from low to high grade areas, is also anticipated in order to reflect that these grades represent larger volumes than the composites.

Gold grade profiles are presented in Figure 14-43 and 14.44 for the mineralized zones at Fork and Russet South, respectively.

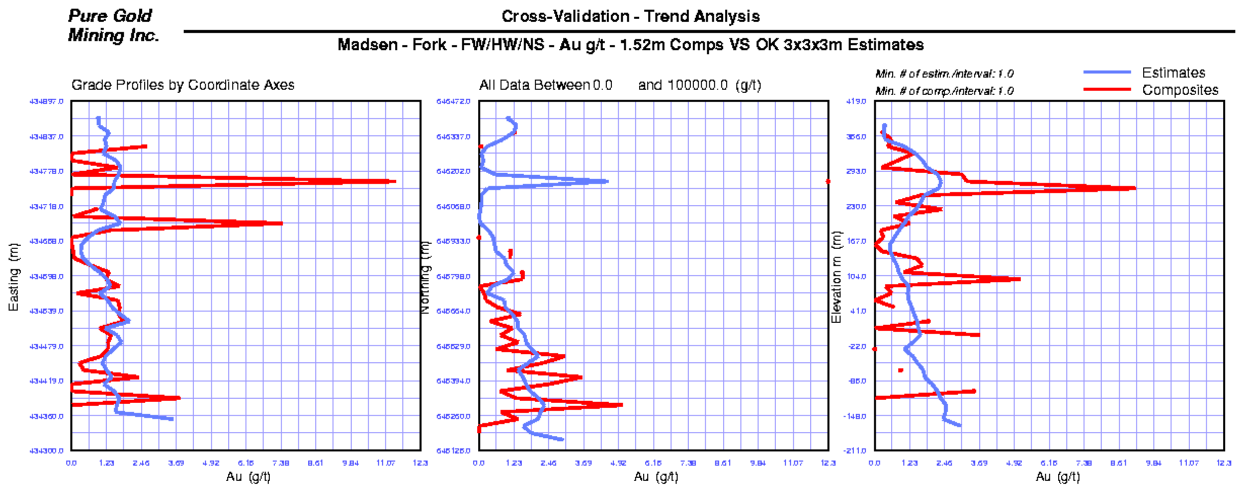

Figure 14-43: Gold Grade Profiles of Declustered Composites and Block Estimates – Mineralized Zones at Fork

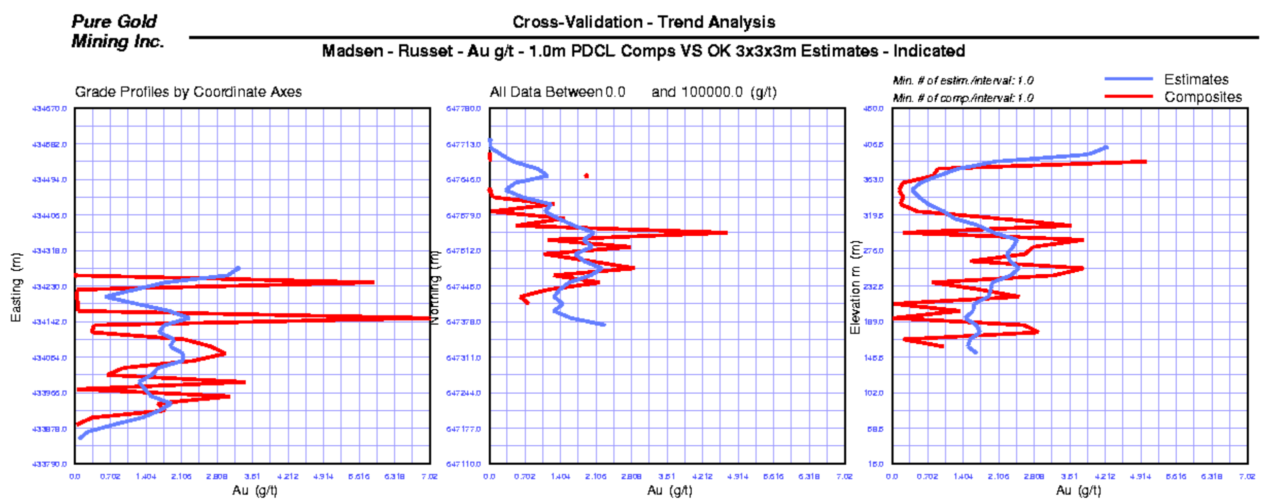

Figure 14-44: Gold Grade Profiles of Declustered Composites and Block Estimates – Mineralized Zones at Russet South

From the plots of Figure 14-43 and 14.44, it can be seen that the grade profiles of the declustered composites are well reproduced by those of the block estimates and consequently that no global or local bias is observed. As anticipated, some smoothing of the block estimates can be seen in the profiles, where estimated grades are higher in lower grade areas and lower in higher grade areas.

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14.2.8 Resource Classification

The mineral resource was classified as indicated and inferred based on the variogram ranges of the second structures. The average distance of samples from the block center was utilized as the classification criterion. The classification distances for each mineralized zone are provided in Table 14.40.

Table 14.40: Classification distances

Mineralized Zone	Indicated	Inferred
Fork	≤ 30.0m	>30.0m
Russet South	≤ 40.0m	>40.0m

Mineralized domains with few available composites were classified as inferred only. This was the case for domains 3, 7, 8, and 9 at Russet South. There were no resources classified as measured at Fork and Russet South mainly due to the wider drill spacing and the limited amount of drill hole data available in some of the mineralized domains.

14.2.9 Editing of the Block Model

The block models of gold grade estimates for the satellite deposits were edited to the topographic surface. The percentage of block below the topographic surface was stored in a variable and utilized in the tonnage calculation of each block. The topography variable was utilized to affect the specific gravity in the calculation of the block tonnage: sg x (below topo percentage) / 100.0. No previous mining has taken place at Fork or Russet South.

14.2.10 Mineral Resource Calculation

The mineral resource was calculated for 3 m (X) x 3 m (Y) x 3 m (Z) blocks with a constant specific gravity (SG) value of 2.84 for all three satellite deposits.

For the mineral resource's tonnage calculation, the fraction of each block within the mineralized zones and the block fraction below the topography surface were accounted for in the tonnage and grade calculations.

The indicated and inferred mineral resources for the Fork and Russet deposits are presented in Table 14.41 and 14.42. At Fork, the indicated mineral resources at a 4.0 g/t gold cut-off are 194,000 tonnes at an average gold grade of 6.47 g/t, for a total of 40,000 ounces of gold, while the inferred mineral resources at a 4.0 g/t gold cut-off are 255,000 tonnes at an average gold grade of 5.76 g/t, for a total of 47,000 ounces of gold. At Russet South, the indicated mineral resources at a 4.0 g/t gold cut-off are 259,000 tonnes at an average gold grade of 6.70 g/t, for a total of 56,000 ounces of gold, while the inferred mineral resources at a 4.0 g/t gold cut-off are 322,000 tonnes at an average gold grade of 6.82 g/t, for a total of 71,000 ounces of gold.

The mineral resources of the Madsen Main and Madsen Satellite deposits are presented in Table 14.43 at 4.0 g/t gold cut-off.

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It should be noted that 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 estimated will be converted into mineral reserves. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.

The CIM definitions were followed for the classification of indicated and inferred mineral resources. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there has been insufficient exploration to define these inferred mineral resources as an indicated mineral resource and it is uncertain if further exploration will result in upgrading them to an indicated mineral resource category. All figures in Table 14.41 to 14.43 have been rounded to reflect the relative accuracy of the estimates. Mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent.

Table 14.41: Mineral Resources* by Au Cut-off Grades - Effective December 14, 2017 – Fork Deposit

Au Cut-Off Grade g/t	Indicated			Inferred		
	Tonnage tonnes	Au Grade g/t	Au Content ounces	Tonnage tonnes	Au Grade g/t	Au Content ounces
1.0	457,000	4.02	59,000	1,362,000	2.81	123,000
2.0	332,000	5.00	53,000	777,000	3.79	95,000
3.0	258,000	5.72	48,000	471,000	4.69	71,000
4.0	194,000	6.47	40,000	255,000	5.76	47,000
5.0	134,000	7.36	32,000	138,000	6.88	31,000
6.0	78,000	8.73	22,000	58,000	9.00	17,000

*mineral resources' tonnage and ounces have been rounded to the nearest thousand

Table 14.42: Mineral Resources* by Au Cut-off Grades - Effective December 14, 2017 – Russet South Deposit

Au Cut-Off Grade g/t	Indicated			Inferred		
	Tonnage tonnes	Au Grade g/t	Au Content ounces	Tonnage tonnes	Au Grade g/t	Au Content ounces
1.0	694,000	3.89	87,000	807,000	4.16	108,000
2.0	492,000	4.89	77,000	646,000	4.83	100,000
3.0	355,000	5.84	67,000	422,000	6.01	82,000
4.0	**259,000**	**6.70**	**56,000**	**322,000**	**6.82**	**71,000**
5.0	183,000	7.64	45,000	260,000	7.37	61,000
6.0	135,000	8.41	37,000	179,000	8.20	47,000

*mineral resources' tonnage and ounces have been rounded to the nearest thousand

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Table 14.43: Mineral Resources* at a 4.0 g/t Au Cut-off Grades - Effective December 14, 2017 – Madsen, Fork, and Russet South Deposits

Deposit	Indicated			Inferred		
	Tonnage tonnes	Au Grade g/t	Au Content ounces	Tonnage tonnes	Au Grade g/t	Au Content ounces
Madsen	5,785,000	8.86	1,648,000	587,000	9.42	178,000
Fork	194,000	6.47	40,000	255,000	5.76	47,000
Russet South	**259,000**	**6.70**	**56,000**	**322,000**	**6.82**	**71,000**

*mineral resources' tonnage and ounces have been rounded to the nearest thousand

14.2.11 Discussion and Recommendations

The validation of the gold grade estimates at Fork and Russet South has shown satisfactory results with no global or local biases. The relatively heterogeneous nature of the gold mineralization from these two satellite deposits showed higher gold grades in drilled areas of lesser density. This particular situation was dealt with by utilizing a restrictive search for high yield assays in order to limit the over-generation of high-grade block estimates in these regions.

Although the drill hole spacing is adequate on average, the thinness of the mineralized zones does not allow for many intercepts from a single drill hole. Therefore, few samples are available for the assessment of gold grade continuity for each individual vein. In this study, the vein samples were grouped to provide a larger number of samples and allow for a variographic analysis. For such, both deposits would benefit from additional drill holes, especially in areas of isolated higher grades.

Overall, it is believed that the estimation of the mineral resources at Fork and Russet South are realistic representations, based on the current geologic understanding and available information.

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15. Mineral Reserve Estimate

This section is not applicable to this report.

16. Mining Methods

16.1 Introduction

The Madsen Portal provides underground access to the ramp decline and the upper 150 m of mine workings. Ramp access from the Madsen Portal is the focus of this Preliminary Economic Assessment. The existing portal is approximately one kilometre from the existing mill, and currently provides ramp access to the top 150 vertical metres of the mine workings. The PEA mine plan includes further development of the ramp to access the 24 levels of the mine and below the existing shaft. The mine design and planning for the PEA is based on resource models provided by Ginto Consulting Inc. called; **mad_bm_export_aus_jun10_2017** (Austin), **mad_bm_export_sa_jun12_2017** (South Austin), **mad_bm_export_mv_jun8_2017** (McVeigh) and **mad_bm_export_z8_jun8_2017** (8 Zone).

The mine plan and designs are based on both indicated and inferred material. The majority (93%) of the Potentially Mineable Resource (PMR) is indicated with the remainder of the material being in the inferred category. The PMR does not consider satellite deposit resources. The newly estimated Russet South and Fork deposit mineral resources lie outside of the footprint of the PEA mine plan and economic evaluation.

Table 16.1: Mineral Resource (Mine Diluted) Included in PEA Mine Plan*

Resource Classification	Tonnes	Au (g/t)	Recovered ounces
Indicated	2,391,512	11.56	826,977
Inferred	187,407	14.98	84,520
Total dilution	415,598		

**Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Initial disclosure of mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent. For the purpose of the PEA, mine diluted mineral resources are reported with a variable cut-off grade dependent on individual stoping areas, a US$1,275 per troy ounce gold, and gold metallurgical recoveries of 92 percent.*

The underground resources comprise of five main deposits - McVeigh, A3, Austin, South Austin and 8 Zone. The plan would be to use the existing ramp from the Madsen portal to access the existing levels below. The Madsen ramp would be extended from its current location down to below the current shaft bottom. The existing levels below Level 3 were developed from the existing shaft during historical production. It is not envisioned within this study to use the existing shaft or hoist for any extraction of rock or movement of personnel and material. The shaft would be used for ventilation and as a second means of egress from the mine. The shaft manway would require inspection and possible rehabilitation. Recent testing of the water level in the shaft suggests that the water level may be between Level 4 and Level 5.

16.2 Underground Development

The Madsen Gold Project has an existing ramp with a dimension of 3.8 m high by x 4.0 m wide. It extends close to Level 3 and is approximately 1,080 m in length. The new ramp starting from below Level 2 is planned to be 4.5 m high by 4.0 m wide to provide additional room for equipment, services and ventilation. An additional 17,100 m of new ramp excavation would be required to reach the lowermost defined portions of the deposits.

16.2.1 Geotechnical and Ground Support

Historically, mining in the upper levels has proven to be in competent ground. Inspection by Nordmin of core that was drilled in the McVeigh, Austin, and South Austin deposits in 2017 confirmed that the ground is competent.

The portal has been opened and a field investigation of the rock quality conducted. Based on this investigation and the examination of drill core, it is assumed for this report that all openings would be supported with 2.4 m long resin rebar and 1.5 m by 3.35 m galvanized screen placed on the back and shoulders. The support pattern for both options would be a 1.2 m by 1.2 m diamond shape pattern along the back-end walls.

Figure 16-1 shows the underground development design.

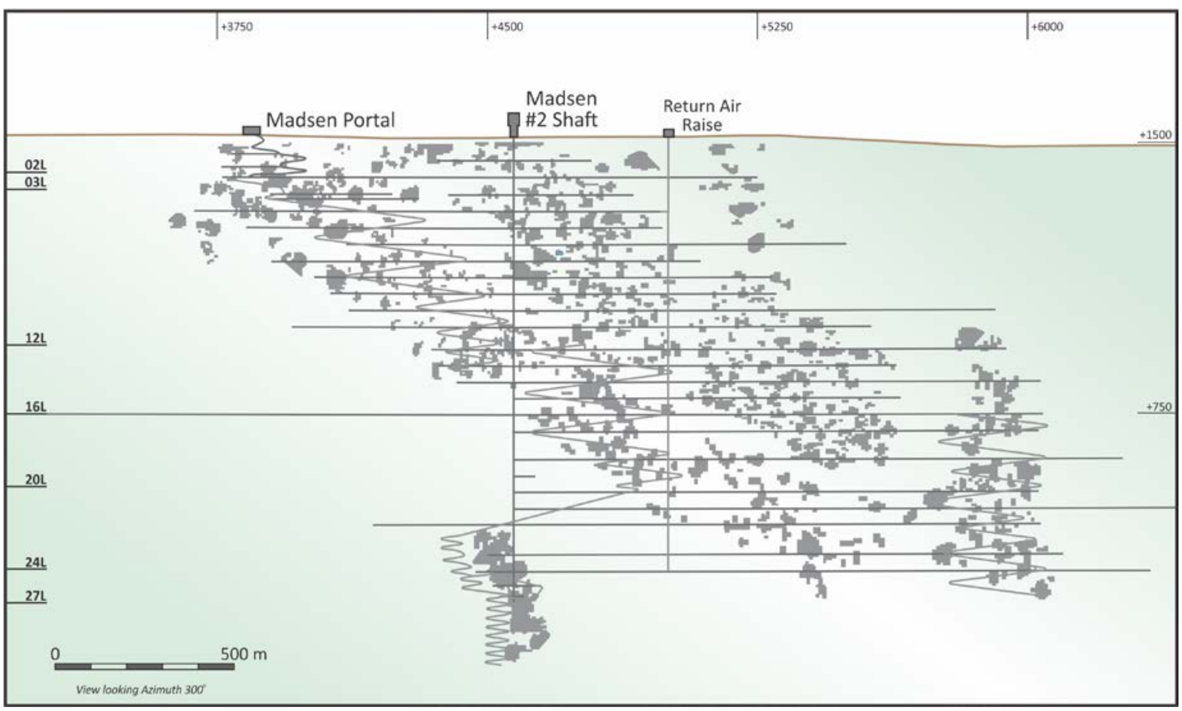

Figure 16-1: Mine Layout with Existing Ramp, Shaft and Level Development, Proposed Stopes and New Development

16.2.2 Pre-Production Activities

The primary development emphasis would be to extend the existing ramp down to just above 3 Level to setup and excavate bulk sample development. Lower priority tasks such as early production development would be completed later in the pre-production phase. The main ramp will continue past the bulk sample area concurrent to the bulk sample mining.

16.2.3 Ramp Excavation

The ramp would be excavated using typical mechanized drifting methods. The proposed ramp would be excavated on the footwall side of the mineralized zones at a size of 4.5 m high by 4.0 m wide, and a grade of minus 15%. Wherever possible, existing development would be used as remucks and collection sumps for the ramp. The remucks would range from 140 to 180 m apart in distance from the advancing face with sumps being approximately 300 m apart. The ramp would be supported using standard support, as mentioned in section 16.1.2.

16.2.4 Level Development

A total of 9,551 m of level access and bypass drift development is anticipated for the life of the mine. In addition to the new development, 9,781 m of slashing will be required. All access development has been designed to be 4.0 m by 4.0 m and would be developed using single boom jumbos and 2.7 m^3 LHD equipment. All waste development rock would be stored underground where possible or hauled to surface for future backfill material.

Table 16.2: Mine Development

Description	Metres
Ramp	17,164
Slash	9,781
Level Access	1,748
Bypass Drifts	7,803
Ventilation Access	1,403
Ventilation Raise	1,232
Total	**39,132**

16.2.5 Rock Handling

PMR extracted from the stopes above 16 Level would be transported by LHD to a truck loading area where 20 tonne underground diesel haul trucks would be loaded by LHD and hauled directly to surface where it would be stockpiled and trucked as feed for the existing mill. PMR extracted from the stopes below 16 Level would be transported by a battery powered LHD to a truck loading area where 20 tonne battery powered haul trucks would transport the PMR up to 14 Level where it would then be dumped into a surge bin. Diesel haul trucks would then pull from the bottom of the bin on 16 Level and transport the PMR to the surface stockpile.

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During initial development, waste rock would be stored underground or hauled up the ramp to surface. During production, trucks may dump waste rock directly into mined out stopes via a push plate system (ejector box) and placed as part of the backfill.

16.3 Underground Mine Infrastructure

16.3.1 Maintenance Shop / Wash Bay

A maintenance shop used to repair mobile equipment and perform preventative maintenance will be located on surface. Allowances have been made to utilize an existing excavation underground for tire changes and washing equipment. It is envisioned that this shop bay will be installed on Level 16 of the mine.

16.3.2 Refuge Stations

Portable self-contained refuge stations would be dispersed throughout the mine near the main and current work areas. The refuge stations are designed to withstand fire, extreme heat and prevent gas from entering the unit. They are equipped with potable water, a telephone line, lighting, compressed/fresh air, rations and clay to seal any cracks in openings to further prevent gases from entering. Using portable units decreases the amount of development required as they can be put in previously used headings.

16.3.3 Explosives and Detonator Storage

Explosives would be stored underground in permanent magazines, that are constructed in adherence to local requirements. Detonator supplies will be stored in a separate magazine a mandated distance away from the explosives. The explosives magazines would be located on Level 8, Level 16, and Level 24.

16.3.4 Materials Storage

Designated storage areas, specifically for storing consumable mining supplies such as timber, pipe, fittings and rock bolts, will be constructed using existing excavations on Level 8, Level 16 and Level 24. They would be designed to accommodate a piece of mobile equipment to drive in and pick up material.

16.3.5 Latrines

Non-permanent toilet units would be located in appropriate active working areas and in close proximity to each refuge station. They would be of portable design and the catchment containers would be checked daily and exchanged as required. The used catchment containers would be transported to the sewage treatment area where they would be dumped and cleaned before they are returned into service.

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16.4 Underground Mine Services

16.4.1 Mine Dewatering

Water collection sumps would be excavated on every level as the main ramp is excavated. They will be strategically located to collect water from the mining operations on that level while preventing such water from entering the ramp. Water from the level sumps would be pumped or drained using drill holes to the main collection sumps which would be located on Levels 6, 12 and 24. Once at the main sump, water would be pumped to surface through 102mm schedule 40 steel pipe where it would be re-used for underground process water or sent to the tailings pond.

16.4.2 Process Water

Water used for underground operations will be drawn from the nearby Process Water Pond. The underground mine would require approximately 70 million litres of service water per year to be used for drilling, dust suppression etc. Process water will be transported down the ramp using 102 mm diameter steel piping. This would feed the main distribution lines on the levels, which would send water to the stope access crosscuts. Water pressures and volumes would be controlled by pressure reducing valves as required.

16.4.3 Compressed Air

Compressed air would be required for some underground tasks such as operating pneumatic tools, operating water pumps and cleaning drill holes. As such, a permanent compressor and a backup compressor will be installed on surface near the Madsen portal. New 102 mm diameter piping will be installed in the ramp as development and drift rehabilitation progresses. The two compressed air systems will provide air at 0.71 m^3/s (1,500 cfm) and 7.58 bar (110 psi) to the underground workings.

16.4.4 Electrical Power

Electrical grid power for the underground operations will be provided by Hydro One via a transformer on surface. The site is currently serviced by 44 kV power.

Electrical cable would be installed in the ramps as they advance and substations would be installed where required as the power losses become too great. Junction boxes would be used to distribute the power to working areas as needed.

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16.5 Ventilation

The ventilation to support the proposed mining equipment fleet would require air volumes of approximately 130 m^3/s (275,000 cfm). The ventilation system would be a push-pull system utilizing the existing Madsen shaft and the ramp as fresh air, and the ventilation raises within the mine workings as exhaust. The proposed underground ventilation system has been designed to dilute gases that are created during mining operations. The emergency stench gas system would be installed at the main fresh air fans at the shaft on surface, and at the start of the compressed air system. The data above were entered into an excel worksheet where the Ontario standard table (Table 16.3) was applied as parameters of where air is anticipated to flow in the mine and the volume required.

Table 16.3: Ventilation Standards in Ontario for an Underground Mine

Description	Unit	Value
Ventilation air requirements per kW	m^3/s	0.06
Ventilation air requirements per kW	cfm	127.13
Ventilation air requirements per hp	m^3/s	0.05
Ventilation air requirements per hp	cfm	100.00
Minimum air velocity (haulage)	m/s	0.25
Maximum air velocity (haulage)	m/s	6.00
Maximum air velocity (Ventilation shaft)	m/s	12.00
Maximum air velocity (Hoisting shaft)	m/s	8.00

Regulation 854 *"Regulations for Mines and Mining Plants"* does not specify the volume of air required when using electrical mobile equipment in underground mines in Ontario.

In the absence of rules, Regulation 853 *"Control of Exposure to Biological or Chemical Agents"* is required to be used in combination with *"GMSG Recommended Practices for Battery Electric Vehicles in Underground Mining"* from the Global Mining Standards and Guidelines Group.

Table 16.4 lists the equipment required, rated horsepower and utilization to calculate the flow in cubic feet per minute required for the peak time in the mine. The losses were estimated to be 50% of the total flow when ventilation is flowing through the various areas.

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Table 16.4: Madsen Gold Project Ventilation Requirements

Equipment Detail	Units	Qty	HP	kW	Utilization	Total HP	Total kW	m^3/s	cfm Required
Jumbo (2 boom)	ea.	2	99	74	10%	20	15	0.89	1,877
Diamond Drill	ea.	1	74	55	20%	15	11	0.66	1,403
Scoop 2.7m³ (3.5 yd.) Diesel	ea.	4	183	136	50%	366	272	4.09	36,600
Scoop 2.7 m³(3.5yd) Battery (0.5m/s)	ea.	4						8.00	16,951
Construction Scoop 1.53m³ (2 yd.)	ea.	1	96	72	50%	48	36	2.15	4,551
Truck 20t Diesel	ea.	3	300	224	70%	630	470	28.19	59,726
Truck 20t Battery (0.5m/s)	ea.	3						8.00	16,951
Grader	ea.	1	100	75	30%	30	22	1.34	2,844
Service Geology	ea.	1	128	95	30%	38	29	1.72	3,640
Personnel Carrier	ea.	2	150	112	50%	180	134	8.05	17,065
Mech. and Elect. Carrier	ea.	2	128	95	25%	64	48	2.86	6,067
Scissor Lift	ea.	3	150	112	25%	128	95	5.70	12,087
Supervisor/Engineering Vehicle	ea.	3	128	95	20%	77	57	3.44	7,281
Mech./Elect. Vehicle	ea.	2	128	95	25%	64	48	1.43	6,068
Total						**1,660**	**1,237**	**77**	**193,000**
Losses (Shaft / Level)	%	50						38	82,000
Total Ventilation Requirements								**115**	**275,000**

Note: Calculation of air volume required for the electrical equipment is based on air velocity of 0.5m/s.

There would be a staged approach to accomplish the objective of providing air to the active mining zones. The philosophy is to have the mine development done as quickly as possible to open all potential zones. This would allow flexibility in the potential mining horizons and reduce risk if challenges occur within a particular stoping area.

16.5.1 Stage 1

Stage 1 (Pre-production period), 1 x 900 hp fans would be set-up at the existing portal. This is a permanent set-up to allow the development of the ramp to Level 8 and the slashing of all the levels where future production is expected. This ventilation system will be installed with mine propane heating system and underground emergency response system.

Once on Level 8, slashing and development of the level will take place to access the location of the exhaust raise (R.B. #1). The raise bore machine will be installed and a 5.5 metre diameter exhaust raise will be excavated.

Bulkheads, doors, and ventilation regulators will be installed on each level to control air that could escape through the shaft. During stage 1, the shaft is exhausting until the ramp has reached Level 12 and the rehabilitation of the escape way compartment inside the shaft is complete.

While this is taking place, the fresh air fans would be installed over the shaft compartments but not put in service until the mine development has reached Level 12, see stage 2.

The Stage 1 ventilation system has been configured to provide air to the first 385 vertical meters of the mine (Level 8 and up) and provide air to the bottom of the West Ramp Zone by sending fresh air through 91.4 cm flexible vent ducting.

Figure 16-2 shows Stage 1 ventilation without losses.

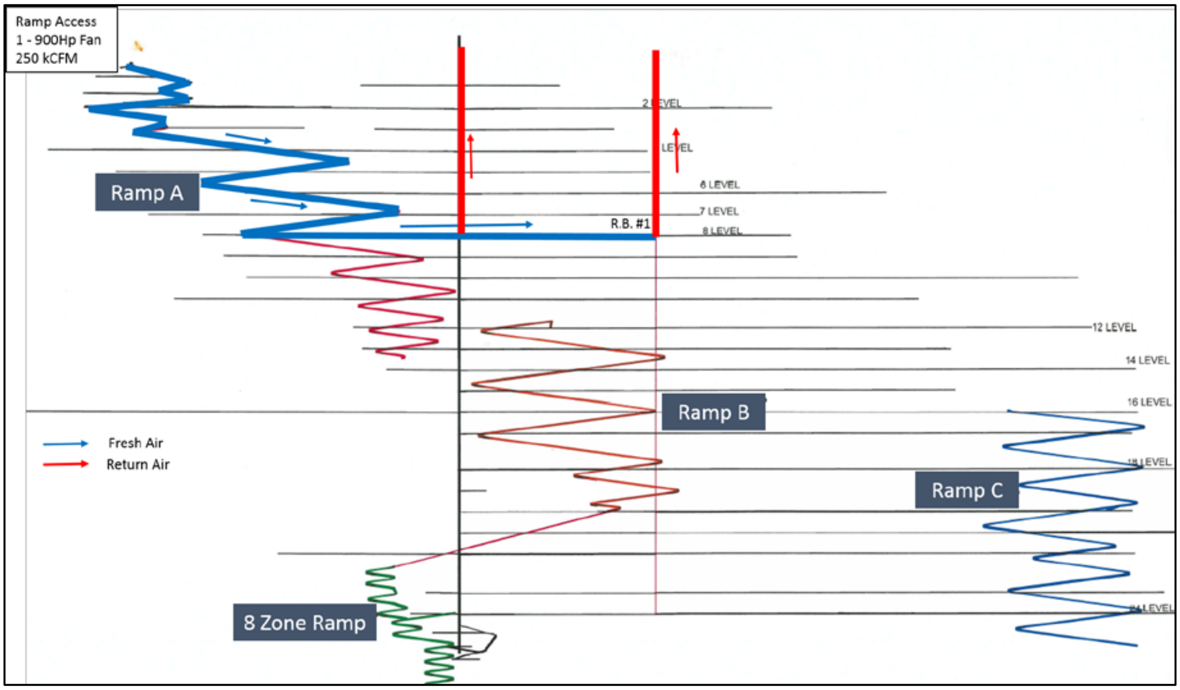

Figure 16-2: Stage 1 Ventilation

16.5.2 Stage 2

In Stage 2, the installation of and commissioning of two 1,500 hp fans on top of the shaft will be completed and running to provide air to Level 12 and to allow for the development of the ramp down to Level 16. This ventilation system would be installed with a direct fire propane heating system and underground emergency response system.

Bulkheads, doors, and ventilation regulators would be installed on each level to control air that could escape through old openings.

Once on Level 16, slashing and development of the level will take place to access the location of the exhaust raise (R.B. #2). The raise bore machine would be installed and a 5.5 metre diameter exhaust raise can be excavated up to Level 8.

During the raise excavation, the installation and commissioning of two 600 hp fans on top of the exhaust raise would be completed.

Figure 16-3 shows Stage 2 ventilation without losses.

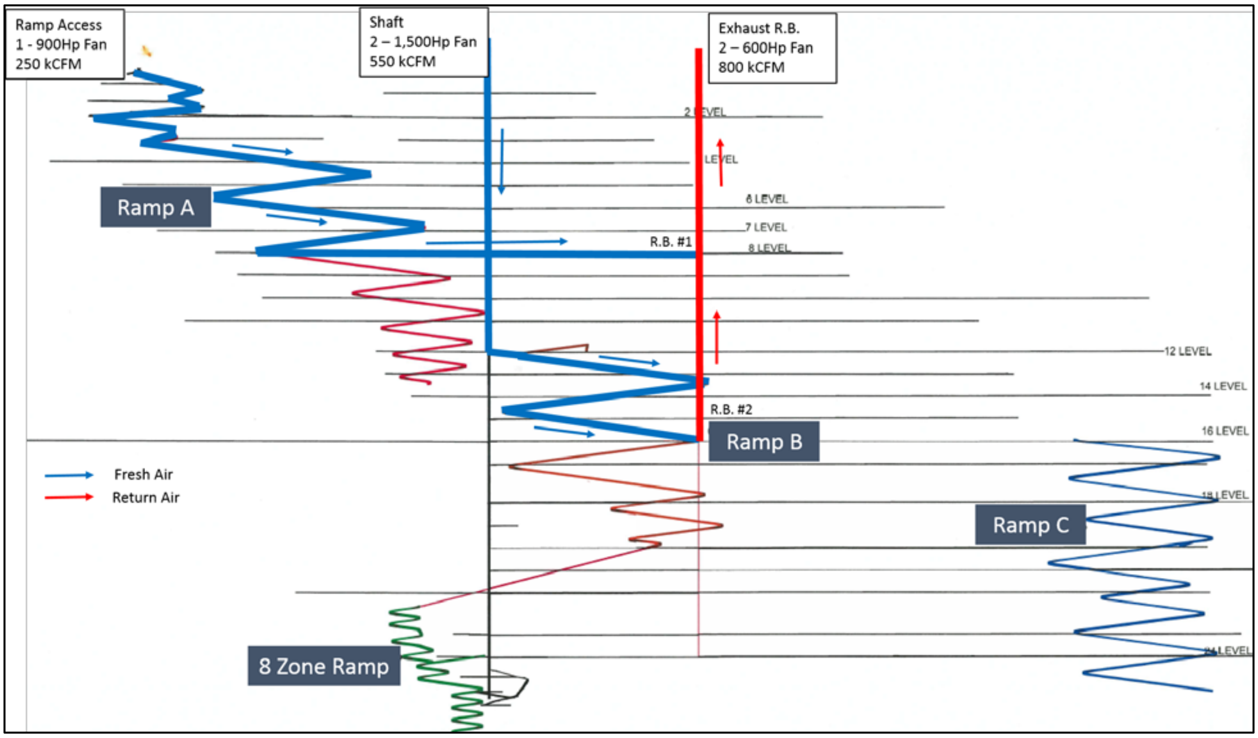

Figure 16-3: Stage 2 Ventilation

16.5.3 Stage 3

Stage 3 would commence once the development and slashing are completed to Level 16 and the exhaust system is in place and operational.

At this time, the development of the mine will progress via a ramp to Zone 8 down to Level 24. Once on Level 24, slashing and development of the level will take place to access the location of the exhaust raise (R.B. #3). The raise bore machine would be installed and a 5.5 metre diameter exhaust raise would be excavated up to Level 16.

Concurrently, Level 16 would be excavated and Ramp C excavated down to Level 24. Once on Level 24, slashing and development of the level will take place to access the location of the exhaust raise (R.B. #3).

Figure 16-4 shows Stage 3 ventilation without losses.

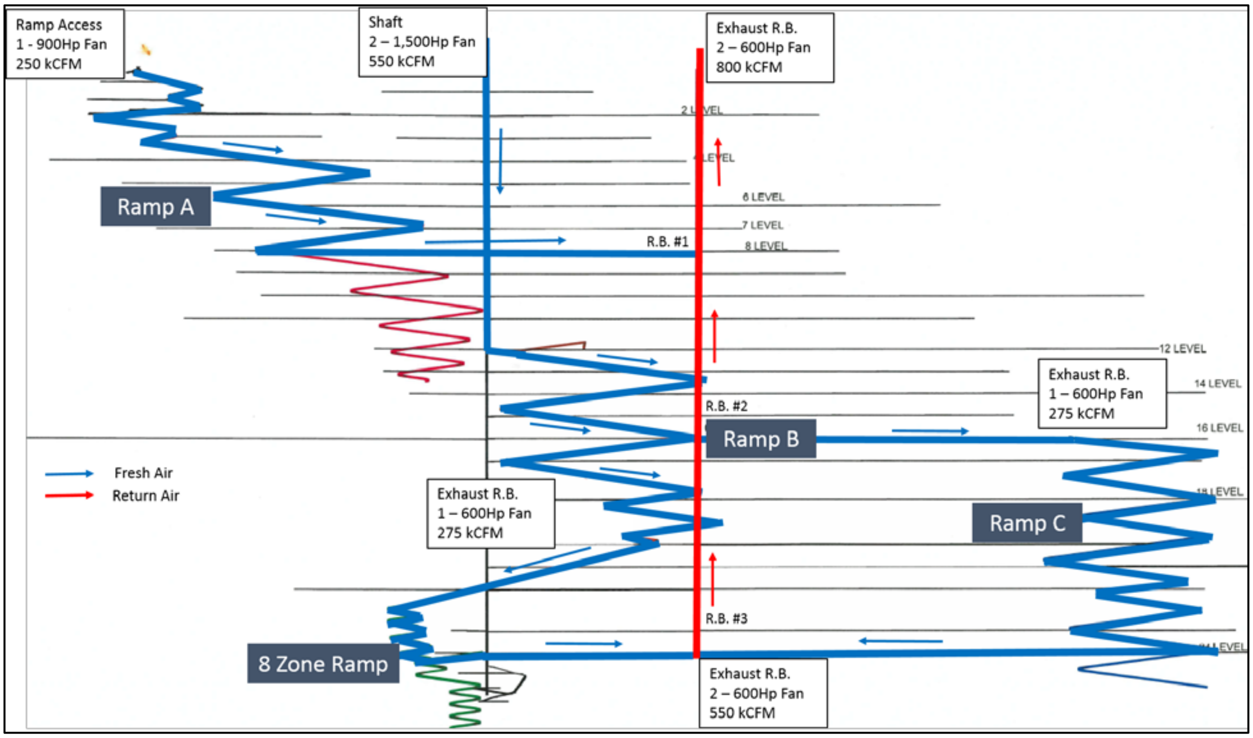

Figure 16-4: Stage 3 Ventilation

16.6 Mining Method Selection

When selecting mining methods, the relevant characteristics of the Madsen Gold Project including the potential mineralized zone width and the level of variability in Au grade distribution were taken into account. Potentially mineralized zones typically dip at 70°. Strike direction is uniform with some modest undulations on a stope mining scale.

On a small scale, the mineralized zone may be highly variable in width and geotechnical properties, although mining grades are variable across the mineralized zone on a large scale.

There is a high level of variability in gold grade distribution within the Madsen Gold Project. Mining production design particularly focused on the potentially mineable portions of the McVeigh, Austin, and South Austin Deposits.

The predominant mining method planned is cut & fill with some limited applications for shrinkage stoping. These options were chosen based on potential mineralization size, geometry of the mineralization and confidence level of the database.

16.6.1 Mineable Stope Shapes

Using the software Mineable Stope Optimizer (MSO), as an add-on to Datamine Studio UG software, economical (cut-off grade) and geometric (minimum mining width and overall shape dimensions) inputs were used to create potentially mineable shapes.

16.6.2 Overall Stope Geometry

Based on operational considerations, a minimum mining width of 2 meters was used as an input parameter for all potential mineable zones when creating MSO shapes. The wire frame height parameters varied from 5 m to 9 m and length varies from 6 m to 9 m depending upon the zone geometry.

16.6.3 Cut & Fill Mining

One of the proposed mining methods for this report is conventional cut and fill. This mining method removes the PMR by excavating horizontal slices of the mining area at a minimum width of 2 metres. Cut and fill mining is typically used in steeply dipping zones with moderate ground conditions. The potential mineable areas are accessed by raises with manways and a material slide with tugger hoist. The mining will be done by hand-held drills and the mucking will be performed by slushers. The PMR would be scraped into “mill holes” where each raise would then access the main haulage area. At the bottom of the raise, the PMR would then be mucked by LHD, loaded into trucks, and sent to surface for processing.

Cut and fill mining is a versatile mining method that allows the operator the ability to mine select pockets of mineralization and adapt to a variety of ground conditions while keeping control of grade for small vein zones. Once completed, the entire lift would be back filled. Figure 16-5 shows a typical access drift to the cut and fill drive.

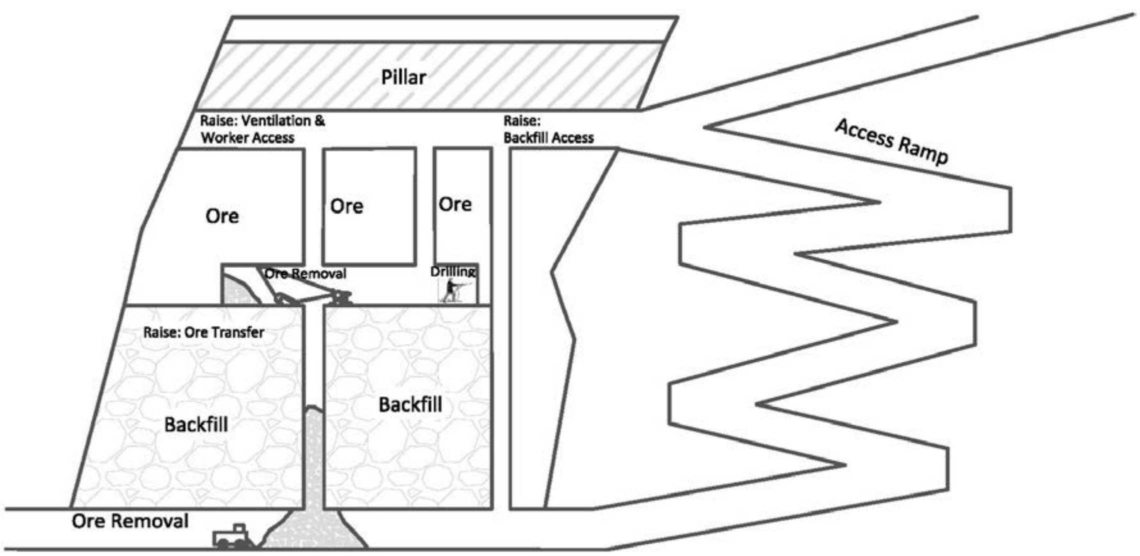

Figure 16-5: Typical Cut & Fill Section

Cut and Fill mining would be done from many horizons within the mine. Access drives into the cut and fill drift would be centrally located to allow for two mining faces in the cut and fill drift, one in each direction. A third horizon could be prepared to secure production if necessary.

Cut and fill dilution is expected to be approximately 10%. Selective mining and shotcrete pillar support would help control drift dilution if the span is greater than 5 m. Recovery of (diluted) PMR tonnes varies from 70% to 95% with cut and fill mining dependent on the mining area.

There is potential to use mechanized cut & fill mining as an option for areas of the mine that are continuous and wide enough to allow for the mechanized equipment.

16.6.4 Shrinkage Mining

There are potentially mineable shapes that are conducive to Shrinkage Mining methods. These potentially mineable shapes are independent of each other. They would all be captive shapes and require a longer period of production preparation before any PMR is realized. The estimated time per stope before consistent production is achieved is approximately 18 days.

Shrinkage dilution is expected to be approximately 10%. Stopes could extend 30m vertically above the existing level. These stopes are typically 3.0m to 5.0m wide and could extend to a length of 15 meters. Recovery of (diluted) PMR tonnes varies from 70% to 95% with shrinkage mining dependent on the mining area. In these areas, shrinkage mining is economic due to the cost of a footwall ramp or access drift being eliminated to reach the top sill. In addition, backfill is not anticipated due to the stope being captive and away from other potential mineable areas.

Mucking is undertaken after enough lifts have been mined. The broken material would be mucked out using 2.7m^3 LHD equipment. The broken material would be trammed to a nearby muck bay for loading into underground haul trucks (20 tonne). The muck would be removed in a manner that allows for a level working area in the stope (muck swell). After and/or during the mucking of each lift, additional support would be placed in the hanging wall and footwall of the stope.

Lifts and round lengths would be under geological control to follow the contact. A ground support program of 1.8m long resin rebar on a 1.2m by 1.2m pattern would help control dilution.

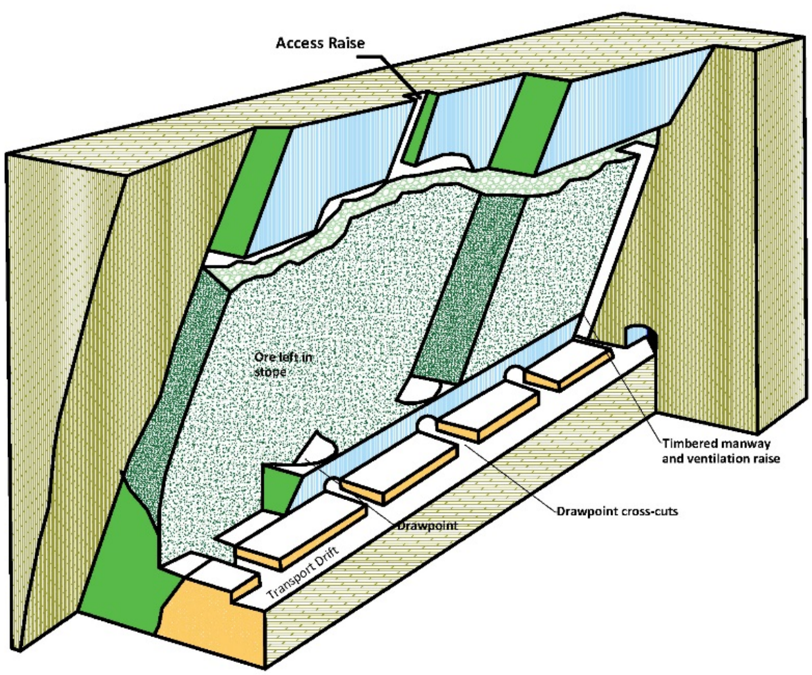

Figure 16-6: Shrinkage Mining Method

16.7 Backfill

16.7.1 Rock Fill

Waste rock would be used to fill stopes that are not in close proximity to other stopes or to fill the bottom portion of a cut and fill lift. The waste rock would be produced by development blasting and may be stored underground where practicable. Otherwise, the waste rock would be stored on surface and back hauled by trucks to the areas where the rock is needed.

16.7.2 Sandfill

Sandfill would be used primarily in cut & fill stopes. The process of creating sandfill involves mixing small size waste material (tailings) on surface with cement and pumped underground via a piping distribution system into mined out stoping areas. The sandfill would be used primarily in lower parts of the mine.

16.8 Mine Equipment

All mobile mining equipment would be provided and maintained by the contractor. The underground mining fleet required to support a nominal mining rate of 600 t/d is outlined in Table 16.5.

Table 16.5: Underground Equipment List

Equipment Detail	Units	Qty
Jumbo (2 boom)	ea.	2
Diamond Drill	ea.	1
Scoop 2.7m^3 (3.5 yd.) Diesel	ea.	4
Scoop 2.7 m^3(3.5yd) Battery (0.5m/s)	ea.	4
Construction Scoop 1.53m^3 (2 yd.)	ea.	1
Truck 20t Diesel	ea.	3
Truck 20t Battery (0.5m/s)	ea.	3
Grader	ea.	1
Service Geology	ea.	1
Personnel Carrier	ea.	2
Mech. and Elect. Carrier	ea.	2
Scissor Lift	ea.	3
Supervisor/Engineering Vehicle	ea.	3
Mech. / Elect. Vehicle	ea.	2
Total		**26**

16.9 Mine Personnel

The mine will operate on two shifts 365 days per year. All personnel except technical staff would be employees of the selected contractor. Diamond drilling is envisioned to be performed by a separate drilling contractor. Mining personnel requirements are summarized in Table 16.6.

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Table 16.6: Mine Personnel

Personnel	**#/day**	**#/night**	**Total**	**Schedule**
Administration	2	0	2	Dayshift 5/2
Project manager	1	0	1	Dayshift 5/2
Engineering - Geology	4	2	12	day/night shift 14/14
Clerk/buyer	1	0	2	dayshift 14/14
Safety & Training Coordinator - contractor	1	0	2	dayshift 14/14
Security	1	1	3	day/night shift 14/7
Captain - contractor	1	0	2	dayshift 14/14
Supervisor - contractor	1	1	3	day/night shift 28/14
Sub Total			**27**	
Service - General				
Construction - contractor	2	2	6	dayshift 28/14
Service personnel contractor	1	1	3	day/night shift 28/14
Sub Total			**9**	
U/G mechanical services and fixed equipment				
Master mechanic - contractor	1	0	2	dayshift 14/14
Mechanical - contractor	2	2	6	day/night shift 28/14
Machine doctor - contractor	1	0	1	dayshift 5/2
Sub Total			**9**	
U/G electrical services and fixed equipment				
Master electrician - contractor	1	0	2	dayshift 14/14
Electrician - contractor	1	1	3	day/night shift 28/14
Sub Total			**5**	
Underground Crews				
Dev Crew A - contractor				
Jumbo man	1	1	3	day/night shift 28/14
Miner	2	2	6	day/night shift 28/14
Mucker	1	1	3	day/night shift 28/14
Dev Crew B - (Dev. contractor)				
Jumbo man	1	1	3	day/night shift 28/14
Miner	2	2	6	day/night shift 28/14
Mucker	1	1	3	day/night shift 28/14
Truck Drivers	3	3	9	day/night shift 28/14
Dev Crew C - (Prod. contractor)				
Miner	2	2	6	day/night shift 28/14
Mucker	1	1	3	day/night shift 28/14
Sub Total			**42**	
Production Crew - contractor				
Stope Miners	4	4	12	day/night shift 28/14
Service Crew	2	2	4	day/night shift 14/14

Personnel	#/day	#/night	Total	Schedule
Muckers	4	4	12	day/night shift 28/14
Truck Drivers	3	3	9	day/night shift 28/14
Sub Total			**37**	
Other Crew - contractor				
Raise miners	2	2	6	day/night shift 28/14
Sub Total			**6**	
Total Mining			**135**	

16.10 Life of Mine Plan

For the purpose of the mine plan, a one-year pre-production period is assumed while the mill is being refurbished and commissioned.

In creating the schedule (using EPS®), it is assumed that the planned lateral development advance rates generally do not exceed 6 m single face per day and 15.6 m multiple face per day.

Nordmin prepared the LOM production schedule in EPS® (Refer to Table 16.7). Its purpose is to define the sequencing of each mining area, respecting the dependencies among them, and to schedule the tonnage and grade mined for the life-of-mine.

A nominal production rate of 600 t/d would be expected from the entire Madsen mine.

Table 16.7: Overall Production Schedule

Production Year	PMR Mined (tones)	Grade (g/t Au)	Gold Produced (Ounces)
-1	46,562	7.47	10,292
1	146,000	7.89	34,077
2	219,478	8.37	54,313
3	219,000	9.07	58,776
4	219,000	9.07	58,776
5	218,859	13.07	84,583
6	219,600	13.15	85,411
7	219,186	13.12	85,085
8	219,000	13.00	84,196
9	219,056	11.03	71,438
10	219,600	9.13	59,306
11	219,000	9.13	59,144
12	219,000	9.13	59,144
13	219,000	9.13	59,144
14	172,536	9.37	47,816
Total	**2,994,877**		**911,497**

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Mine development and production were scheduled using EPS® (Version 2.24.60.0R) Development and production locations and rates were input based on the anticipated ramp-up schedule and coordinated with bidding contractors.

Production would start in Year 1, focusing on closer and easier to access mining zones. Production would ramp up relatively quickly, allowing the processing of 600 tonnes per day.

16.10.1 Mine Development Schedule

Development designs and rates were entered into EPS®. Predecessors and successors were used to ensure that development was completed in a sequential manner. Table 16.8 shows typical development and advance rates. Figure 16-7 shows development schedule for the LOM.

Table 16.8: Development Rates

Single Heading	Rate
Ramp and lateral development	6.0 m/d
Slashing	10 m/d

	-1	1	2	3	4	5	6	7	8
Vent Raise	-	195	208	17	173	355	284	-	-
Slash	808	856	1,153	1,168	1,257	3,811	602	127	-
Vent Access	-	145	210	245	0	803	0	-	-
Bypass	882	1,059	1,675	1,171	1,411	788	817	-	-
Level Access	759	82	182	74	174	17	411	50	-
Ramp	2,190	2,190	1,634	2,190	2,041	485	2,388	2,114	1,934

Figure 16-7: Development Schedule

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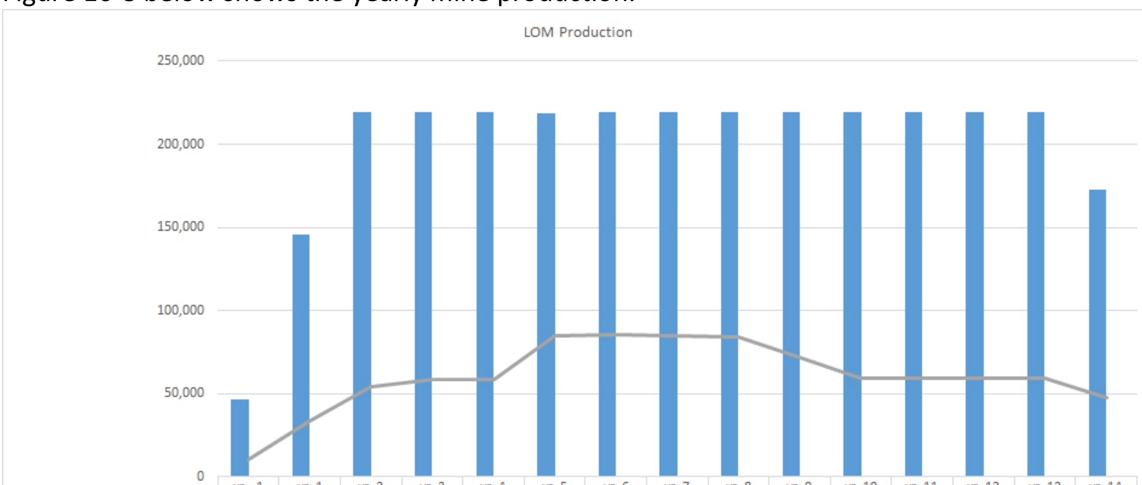
16.10.2 Mine Production Schedule

Mine production was scheduled together with the development using EPS®. The ramps were prioritized to ensure that required development was completed before a mining location was scheduled.

Production rates were ramped up to 600 tonnes per day during the second YEAR. A calendar of 365 days per year was applied, making the nominal annual production rate 219,000 tonnes per year.

Figure 16-8 below shows the yearly mine production.



	yr. -1	yr. 1	yr. 2	yr. 3	yr. 4	yr. 5	yr. 6	yr. 7	yr. 8	yr. 9	yr. 10	yr. 11	yr. 12	yr. 13	yr. 14
Ore Mined (tonnes)	46,562	146,000	219,478	219,000	219,000	218,859	219,600	219,186	219,000	219,056	219,600	219,000	219,000	219,000	172,536
Grade gpt Au	7.47	7.89	8.37	9.07	9.07	13.07	13.15	13.12	13.00	11.03	9.13	9.13	9.13	9.13	9.37
Gold Produced (Ounces)	10,292	34,077	54,313	58,776	58,776	84,583	85,411	85,085	84,196	71,438	59,306	59,144	59,144	59,144	47,816

Figure 16-8: LOM Production

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17. Recovery Methods

17.1 Conceptual Process Flowsheet Summary

PMR from the underground mining operations would be processed in an existing milling circuit that was previously in operation at the mine site in the late 1990's. The conceptual flowsheet for the mill process is presented in Figure 17-1.

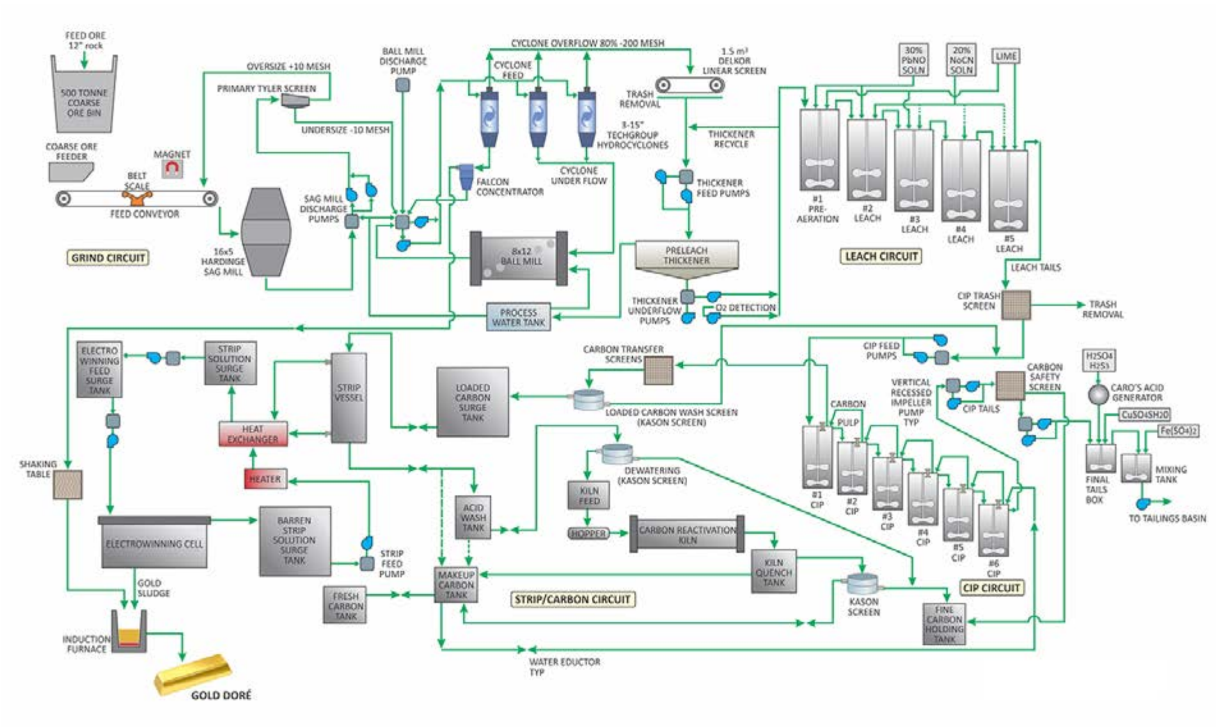

Figure 17-1: Mill Processing Flow Sheet

The PMR would be hauled from the Madsen portal to a portable crusher unit on the mill apron. The sized material would be delivered into a 600 tonne storage bin to be located on the mill apron. The PMR from the 600 tonne storage bin would be transported to the SAG mill via a SAG mill feed conveyor.

PMR, typically with a maximum size of 15 cm will be reduced in the grinding circuit that consists of a primary SAG mill followed by a secondary Ball mill. PMR will be reduced from the top size of 15 cm down to 80% passing 100 microns in the grinding circuit. Provision has also been made to recover any coarse free gold from the mill feed through inclusion of a single Falcon concentrator in the underflow stream of one of the hydrocylcones in the grinding circuit.

The ground feed is then pumped to a pre-leach thickener for water recovery prior to the cyanidation process. The cyclone overflow (ground feed) passes over a screen for wood and trash removal ahead of the gold recovery circuits. The slurry is thickened to about 50 percent solids in the pre-leach thickener and the water that is removed is recycled back into the grinding process. Thickened slurry is then pumped forward to the first tank in the cyanidation circuit.

The cyanidation circuit consists of a series of five agitated leach tanks with a residence time of about 10 hours per tank at a mill process rate of 600 tonnes per day. The first tank is a pre-aeration tank whereby air is injected into the tank to pacify any elements in the feed that are cyanide consuming species. The other four tanks are used to convert the gold from solid form into a gold derivative that exists in the solution phase of the slurry. Sodium Cyanide is used to facilitate the transformation while lime and lead nitrate are stage added into the leach tanks to facilitate the process.

The next step in the gold recovery process involves recovery of gold from the solution onto the surface of activated carbon particles. This step is completed in the CIP or Carbon in Pulp portion of the mill process. Slurry from the cyanidation tanks passes across a trash screen prior to being pumped to the CIP tanks. The CIP circuit consist of six agitated tanks with a residence time of about one hour for each tank at the anticipated mill feed rate. Gold is transported from the solution phase of the slurry onto the surface of activated carbon, contained in each of the CIP tanks. Carbon movement, in the CIP circuit, is counter flow to the slurry and so carbon is advanced from tank 6 to Tank 1 as opposed to the slurry, which moves from Tank 1 to Tank 6. Loaded carbon is removed from Tank #1 and is then advanced to the strip circuit for the next step in the gold recovery process. Slurry depleted of gold content, discharges from the last CIP tank (#6) and passes over a safety screen to capture any carbon that might escape from the CIP circuit. The CIP discharge is then pumped to the tailing storage area.

Gold would be recovered from the surface of the loaded carbon in the strip circuit. Loaded carbon is advanced from CIP into a 1 tonne strip vessel. Stripping is carried out under elevated temperature and pressure, on a batch basis, to remove gold from the surface of the carbon and bring it back into the solution phase. Loaded solution from the strip circuit is then advanced to the electrowinning circuit to recover the gold into a marketable form.

Gold is recovered, in the electrowinning cell, onto the surface of stainless steel wool cathodes using electrochemical principles. The gold would be washed from the surface of the steel wool into the bottom of the EW cell and is then recovered and dewatered and dried prior to being melted in the induction furnace.

Both the dried sludge from the electrowinning process and gravity product are melted at high temperature in the induction furnace to produce a high grade doré that can be sold directly for further upgrading to 99.9999 % gold. Gold bars produced site will contain gold with silver and other minor impurities.

17.2 Process Description

17.2.1 Material Handling

The PMR from the 600 tonne storage bin would be transported to the SAG mill via the SAG mill feed conveyor. The ore is discharged from the mine coarse ore bin using a coarse ore vibratory feeder which discharges the material onto the SAG mill feed conveyor. A weightometer is included on the SAG mill feed conveyor to measure the feed rate to the mill. Also included on the belt is a magnet to remove tramp steel from the mill feed and reduce the risk of damage to the feed conveyor.

17.2.2 Grinding and Thickening

Initial size reduction of the PMR is accomplished in a 4 m diameter by 1.5 m long semi-autogenous grinding (SAG) mill. The SAG mill is equipped with a 260 kW wound rotor induction motor. The SAG mill feed rate is 600 tonnes per day or 23 tonnes per hour. The SAG mill is a grate discharge mill with grate opening of about 1.3 cm. The SAG mill discharge is pumped across a 10 mesh sizing screen and any oversize reports back to the SAG mill. The – 10 mesh material reports to a pump box from which it is pumped to a set of 38 cm hydrocylcones. The cyclone underflow reports to a 2.4 m diameter by 3.6 m long overflow discharge ball mill equipped with a 340 kW motor. The ball mill discharge joins with the SAG mill undersize to feed the hydrocyclone bank. The cyclone overflow (final ground product at about 80% 100 microns sizing) is advanced to a 1.5 m^2 Delkor Linear Screen for trash (wood chip and plastic removal). The cyanidation feed is thickened to about 50 percent solids in the 15 m diameter pre-leach thickener. Thickener overflow water is reclaimed and re-used in the grinding circuit. Thickened slurry is pumped to the #1 leach tank (pre-aeration) tank at approximately 55 % solids.

A Falcon concentrator, treats the cyclone underflow from one of the 38 cm cyclones, to facilitate the recovery of any free coarse gold from the mill feed. The Falcon concentrate reports to a concentrate surge tank which is then transported via pump to the refinery area. A gravity concentration table is used to further upgrade the Falcon Concentrate prior to processing in the induction furnace to produce bullion bars. The gravity concentrator tailing is returned to the cyclone feed pump box so that any gold remaining will be recovered and not lost to tailings.

17.2.3 Cyanidation/Carbon-in-Pulp

The #1 Leach tank is used as a pre-aeration tank to facilitate the passivation of any cyanide consuming species in the PMR prior to the addition of cyanide. Thickened slurry, from the pre-leach thickener, is pumped to the pre-aeration tank at about 55% solids. Lead nitrate and air injection passivate cyanide consuming species contained in the PMR. Control of alkalinity to about pH 11 is facilitated by the addition of lime into the #1 cyanidation tank.

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At a processing rate of 600 tonnes per day the residence time in each of the five cyanidation tanks is about 10 hours per tank. Starting at the #2 leach tank, sodium cyanide is stage added to facilitate the dissolution of gold. In cyanidation, gold in solid form, is converted to a species that exists in the solution phase. This allows for the next step in the recovery process which involves recovering the gold from solution onto the surface of activated carbon. This process is accomplished in the CIP or Carbon-in Pulp portion of the process.

Leach Tailing passes over a carbon safety screen prior to being discharged into the #1 CIP tank. There are a total of six tanks in the CIP circuit with each tank having a slurry residence time of about one hour at the expected milling rate of 600 tonnes per day. Activated carbon is used to capture the gold from solution onto the surface of the activated carbon. Interstage screens in each of the CIP tanks allow for the carbon to remain captive while the slurry flows through the interstage screens by gravity. Carbon is advanced counter to the flow of the slurry and final exits from the # 1 CIP tank once fully loaded with gold. Slurry, depleted of gold, exits the # 6 CIP tank and reports across a carbon safety screen prior to being pumped to the tailing storage facility.

Loaded carbon is advanced from the #1 CIP tank to the carbon strip tank, the next step in the gold recovery process.

17.2.4 Elution/Carbon Regeneration

Loaded carbon, from the #1 CIP tank, is advanced to a one tonne carbon strip vessel to allow for the removal of gold from the surface of the carbon. The strip process is conducted on a batch basis with one tonne batches of loaded carbon being processed through the strip circuit every 24 hours. The strip process is conducted under elevated temperature and pressure. Loaded solution (the final product from stripping) is advanced to the gold room for gold recovery in the electrowinning cell.

Stripped or barren carbon is discharged from the strip vessel and is fed to a carbon re-activation kiln to burn off impurities from the surface of the carbon. The re-activation process restores the carbon activity prior to it being re-circulated back into the #6 CIP tank for re-use in the CIP process.

17.2.5 Electrowinning and Refinery

Gold is recovered from the loaded strip solution in an electrowinning cell equipped with stainless steel wool cathodes. Using electrochemical principles, the gold from solution is deposited on the surface of the stainless steel wool. Once the loaded solution has been passed through the cell the gold is washed off the steel wool and then dried prior to being processed in the induction furnace. Both gold from the gravity circuit and electrowinning cell are melted in the induction furnace to produce bullion bars that are then sent to an external refiner for further upgrading.

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17.2.6 Cyanide Destruction

At this juncture it has not been confirmed if cyanide destruction will be required on this project. The assumption for this PEA is that the tailings will be pumped to the existing tailing storage. Residual cyanide and metals will dissipate in the liquid phase, by natural degradation, to levels that will allow for discharge to environment without further treatment. This item requires further confirmation and has been noted as an item requiring further modelling and or testing in the next phase of work.

17.2.7 Tailing Management

The TMF at the Madsen Gold Property site has been in operation since the late 1930's and has gone through several modifications. In the 1950's, containment structures were constructed using tailings in order to retain the tailings solids and provide retention before liquid effluent was discharged to the receiving waters. In 1997, two rock fill tailings dams were constructed in order to create a distinct tailings pond and a polishing pond. Subsequent to the 1997 construction period, modifications have been made to the tailings pond and polishing pond containment structures in order to address stability and flood routing issues. The existing TMF was designed to withstand a 100-year rain or snow event. It is anticipated that the current available capacity in the tailings pond will need to be extended for the envisioned project. There are three different reported numbers for the existing capacity and allowances have been made based on the Trow 2008 & 2010 reports. A summary of the plan for the TMF is outlined in Section 18 of the report.

17.2.8 Reagents

A number of consumables are required for the mill process and they represent a significant portion of the milling operations costs.

Grinding steel is required to reduce the ROM feed to final product size in the grinding circuit. The SAG and ball mills will require 4 and 2 inch steel grinding balls, respectively. The grinding steel will be delivered in bulk by transport truck and will be stored in grinding steel storage bins on site. From the storage bins the steel will be delivered by overhead crane and bucket to the respective mills.

Mill liners are a consumable item in both the SAG mill and Ball mill. Mill liners will be delivered to site by bulk transport and will be stored in the mill and used as required.

Sodium Cyanide (NaCN) is the principle reagent used for dissolution of gold in the cyanidation leach circuit. The sodium cyanide will be delivered in 1 tonne tote bags and will be mixed in the cyanide reagent mixing area of the existing mill.

Lime is used to modify the pH in the cyanidation circuit and to maintain the pH at about 11 in the leach tanks. Lime will be delivered in bulk by transport truck and will be transported into the onsite lime storage silo. From the silo the lime will augured into the mill building into the lime slaking area.

Caustic is used in the pressure stripping process. It would be delivered to the site in drums and then mixed with water in a mix tank in the reagent mixing area. It would then be pumped to the barren strip solution tank on as required basis.

Lead Nitrate is used in the pre-aeration step of the cyanidation process. The main function of this reagent is to pacify components of the mill feed that are cyanide consuming and thus reduce the consumption of sodium cyanide. Lead nitrate would be delivered as a dry product, in drums, mixed with water to form a solution and then will be metered to the #1 leach tank.

Activated carbon is used to recover the gold from the solution phase in the CIP area. Activated carbon will be delivered to the mill in tote bags. The totes will be transported to the fresh carbon mix tank in the mill and the totes will be discharged into a hopper above the fresh carbon mix tank.

Hydrochloric acid is used to acid wash the carbon between carbon strips. It will be supplied in drums and will be pumped to the strip circuit from the acid storage tank located in the mill.

Reagent costs for the operation of the process facility are presented in Table 17.1:.

Table 17.1: Mill Consumable Costs (Mill Rate: 600t/day or 18,250 tonnes per month)

Consumable Name	Consumption	Units	Unit Cost $/unit	Monthly $	Annual $	$ t/milled
4" Balls	0.8	kg/t	1.5	22,000	263,000	1.20
2" Balls	0.6	kg/t	1.2	13,000	158,000	0.72
NaCN	1	kg/t	3.5	64,000	767,000	3.50
Lime	0.6	kg/t	0.2	2,000	26,000	0.12
Caustic	0.075	kg/t	0.55	1,000	9,000	0.04
Lead Nitrate	0.2	kg/t	2.5	9,000	110,000	0.50
Carbon	0.025	kg/t	2.5	1,000	14,000	0.06
Total				**112,000**	**1,345,000**	**6.14**

17.3 Utilities

Utilities required to operate the process plant include the following; power, process water, reclaim water and high and low pressure compressed air. There are no new utilities required beyond those already installed at the existing site. The existing mill has low pressure blowers for supplying air to the agitated cyanidation tanks. An air compressor is also available for suppling high pressure air for maintenance tools and instrumentation where required.

The electricity in the existing mill building is fed from the power grid in the area and all necessary electrical equipment is also installed. All electrical equipment will require testing for serviceability as a next step in the process. The capital estimate for the mill includes an allowance for replacement and repair of electrical gear as required.

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17.4 Design Criteria

Metallurgical testing has not been completed to establish the design criteria for this PEA study. The assumptions that have been made regarding reagent consumption and mill recovery have been derived from actual operating data from the plant. The existing mill was initially installed at the Dona Lake Mine in late 1989 – early 1990. It operated there for approximately five years before Claude Resources eventually purchased the mill and moved it from Pickle Lake to the Madsen site. The mill operated at the Madsen Mine from 1997 through 1999.

During the operating period noted, the mill was routinely able to achieve the 600 tonne throughput that has been assumed as the milling rate in this study. Mill recoveries ranged from 90 % to 94 % so it is possible with further work that the recovery level could be increased, but the 92 % assumed in this study was routinely achieved during operation. Ore from the McVeigh deposit made up a portion of the mill feed during the period noted. The fact that the relatively low recoveries achieved during the 1990s are attributable to fluctuations in tonnage of daily feed available and that the feed came from multiple deposits including the #1 Shaft area and the Buffalo deposit. This accounted for feed grades consistently lower than planned during this period. When consistent feed came from the McVeigh deposit the historical data shown results higher than 92% recoveries.

17.5 Operating Costs

The main components of the mill operating costs are as follows;

i. Power
ii. Consumables
iii. Manpower
iv. Supplies

The mill operating cost has been generated using the following assumptions;

i. The electricity consumption is based on an overall power consumption of 30.0 kWhr per tonne of ore milled. The assumed power cost is $0.10 per kWhr.
ii. Consumable costs are based on the reagent schedule which is presented in Table 17.1:.
iii. Manpower costs are estimated based on the manpower schedule which is shown in Table 17.2:.
iv. Overall Mill operating cost is shown in
v. Table 17.3: .

The overall mill operating cost is estimated at $28.27 per tonne including a 5% contingency.

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Table 17.2: Mill Manpower Costs, $13.78/tonne (total tonne 219,000)

	Number	Total $/yr.	Total $/mo.
Mill Administration			
Mill Superintendent	1	219,000	18,000
Maintenance Foreman	1	158,000	13,000
Electrical Foreman	0	-	-
Metallurgist / Supervisor	1	113,000	9,000
Assayer + Enviro Tech.	3	237,000	20,000
Clerk	1	61,000	5,000
Operations			
Lead Hand / Concentrator Operators	4	422,000	35,000
Crusher Operators / Loader	8	739,000	62,000
Leach/CIP Operator	4	369,000	31,000
Maintenance			
Millwrights	3	349,000	29,000
Electricians	3	349,000	29,000
Total	**29**	**3,017,000**	**251,000**

Table 17.3: Overall Mill Costs

Cost Center	$ Month	$ Year	$ t/milled
Reagents	112,000	1,345,000	6.14
Manpower	251,000	3,017,000	13.78
Power	55,000	657,000	3.00
Supplies*	73,000	876,000	4.00
Sub-Total	**491,000**	**5,895,000**	**26.92**
Contingency 5%	25,000	295,000	1.35
Total	**516,000**	**6,190,000**	**28.27**
Refining charge (selling cost) ($3.25/oz.)			

**The supply estimate includes costs for safety, operations and maintenance supplies and an allowance for assaying costs.*

17.6 Capital Costs

The existing mill has been shut down since 1999 so it is reasonable to assume that there will be costs associated with refurbishment and restart. Care was taken when shutting the mill down in 1999 which could reduce the amount of expense to get it operational again. All the equipment was drained and thoroughly cleaned during the decommission process.

The capital costs to get the mill operational again are presented in Table 17.4:. The estimated capital cost to bring the mill back on line again is approximately $11,000,000. This capital estimate is based on a combination of estimates done in an internal report by Nordmin Engineering in 2017. The 2300 Volt motors for the SAG and Ball mill drives would need to be replaced if the existing 2300 Volt site power supply and distribution is upgraded to 4160 Volts. The cost of this replacement has been included in the capital costs.

In the summary of the refurbishment plans, a contingency of 15% has been applied to each of the individual cost areas to allow for uncertainty in the estimating for each. A contingency of 15 % has also been applied in the capital cost portion to the total costs associated with each of the areas to allow for any unexpected items that have not been considered in the estimates for each of the individual cost areas.

Table 17.4: Mill capital costs associated with this project

Item	Capital Cost ($)
Direct Project Costs	
Structural Installations	40,000
Architectural Installations	197,000
Mechanical Installations	3,557,000
Electrical Installations	4,799,000
Indirect Project Costs	
Detailed Engineering (@5% Of Directs)	430,000
Construction Management (@3% Of Directs)	258,000
Vendor Assistance (@0.5% Of Directs)	43,000
Commissioning (@0.5% Of Directs)	43,000
Contractor Mobilization/Demobilization	215,000
Total Project Costs	9,581,000
Contingency @15%	1,437,000
Total with Contingency	**11,019,000**

18. Project Infrastructure

The Madsen Gold Project is a past producing mine and has existing surface infrastructure that can be utilized for the proposed mine. The surface infrastructure is easily accessible since it has year round road access to the village of Madsen situated approximately 10 km from the town of Red Lake, Ontario.

18.1 Headframe

A continuous pour concrete headframe installed in the 1950's was used for prior underground mining operations at the site and remains in place. The headframe serviced a 1,275 meter deep, five compartment shaft and has an existing friction hoist mounted at the top. The shaft will be used primarily as a fresh air raise for the current Madsen Gold Project. New main ventilation fans and heaters will be installed adjacent to the existing headframe. These fans will provide ventilation to the mine workings from surface to a depth of 600 m (Level 12) where the air will be taken out of the shaft and directed to Level 16 to ventilate the bottom of the mine. There is no planned rehabilitation of the headframe. The shaft manway would require inspection and rehabilitation as this would be the second means of egress from the mine. It is assumed all other shaft infrastructure would remain untouched.

18.2 Processing Plant (Mill)

The mill was purchased from Placer Dome (originally located at the Dona Lake Mine), and was reassembled on site in the late 1990's. The mill was in operation at the Madsen site from 1997 to 1999, at which time it was placed on care and maintenance. The mill consists of a single stage C80 jaw crusher, a two-stage grinding circuit and cyanide leaching.

The mill refurbishing plan is based on a site inspection and estimate from a site visit in early 2017. The availability criteria used for the evaluation of the mill equipment was to refurbish/invest adequate resources/material into the plant in order to expect a 92% availability of the process equipment assuming 600 tonnes per day. As such, the mill will require some material handling system augmentation.

A new 36" covered conveyor belt will be installed which will feed the SAG mill at a rate of 30 tonnes per hour.

The arrangement of the grinding circuit is left essentially unchanged, but the following actions will be taken:

- Alignment of drive train components;
- Rework of sole plates as required;
- Replacement of bull gear/pinions as required;
- Replacement of the mill motors;
- Replacement pinion bearings;
- Dressing/grinding of gear/pinions;
- Inspection and lapping of main babbitt bearings;

- Replacement of internals; and
- Green charge.

Moreover, in order to minimize voltage drop on start-ups, allowance has been made for the replacement of the existing medium voltage soft-start drives with 600 V variable frequency drives (VFDs).

The current arrangement of the cyanide leach circuit does not require significant modification to restore its function, although it is expected that consumable products such as gaskets, end-fitting connections etc. will need to be replaced prior to service.

All existing pumps and agitators will either be rebuilt or replaced with new, based on comparison of each case and the availability of replacement components. To ensure 92% system availability, complete redundancy in pumping systems will be introduced, with installed spares available for service.

Main compressor will be suitable for service with minor (filter) maintenance and flotation cell blowers will be replaced to ensure reliability. Thickener and rake system will be inspected and cleaned.

To provide increased control of reagent flowrate and improved collection efficiency, the existing systems for reagents will be replaced with a modern Reagent Mix-Down system. The system will include mix tanks, metering pumps, flowmeters, and control devices.

The concentrator 4160 V, 600 V, 240 V and 120 V electrical distribution systems are in good condition. The SAG and Ball mills are currently driven by 450 hp and 350 hp motors respectively, the motors are 2300 V and the starters, located in the main concentrator electrical room, were sourced from a breaker in the main mine site 2300 V electrical substation. To eliminate the future need for 2300 V at the concentrator and to ensure reliable, efficient and optimized operation (SAG mill specific energy control for example) the SAG and Ball mill motors are to be replaced with new 600V motors controlled by 600 V VFD's.

To facilitate installing 600 V VFD's on the SAG and Ball mills a new 4160 V breaker would be added to feed a new 4160 V/600 V unit sub, which in turn would feed the VFD's.

The concentrator could be made to operate as it currently stands, sourcing components as needed to repair the local control panels. However, by installing a new PLC based control system along with new instrumentation, the operation would be optimized. The upgrade would include a cyanide gas detection system replacement. This new control system is needed to achieve 92% concentrator availability and to ensure the concentrator can be operated safely.

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18.3 Tailings Management Facility (TMF)

The TMF at the Madsen Gold Project site has been in operation since the late 1930's and has gone through several modifications. In the 1950's, containment structures were constructed using tailings to retain the tailings solids and provide retention before liquid effluent was discharged to the receiving waters. In 1997, two rockfill tailings dams were constructed to create a distinct tailings pond and a polishing pond. Subsequent to the 1997 construction period, modifications were made to the tailings pond and polishing pond containment structures in order to address stability and flood routing issues. The existing TMF was designed to withstand a 100-year rain or snow event.

The current available capacity is inadequate for the tailings that are envisioned for this project. There are three separate reported numbers for the existing capacity and allowances have been made based on the Trow 2008 and 2010 reports.

For an extended life of mine, as defined in the Project Definition, Pure Gold intends to establish an enlarged tailings facility, new waste rock storage, an improved haul road system, a cyanide destruction unit and complete a refresh of the existing processing plant. There is a potential need for a relatively simple water treatment facility, the design of which will depend on baseline and assessment work being conducted by Lorax. These infrastructure enhancements have been designed to occur within the existing catchments, with no additional impacts anticipated, but most changes will require a refresh of current permitting".

18.4 Maintenance Shop and Warehouse

The maintenance shop will be a steel building 12m x 30m in dimension and will service the underground and surface equipment. The warehouse will be a separate building with dimensions of 10m x 15m.

18.5 Mine Ventilation

There would be a three staged approach to accomplish the objective of providing ventilation to the active mining zones. The philosophy is to have the mine development done as quickly as possible to open all potential zones. This would allow flexibility in the potential mining horizons and reduce risk if challenges occur within a particular stoping area.

This section describes ventilation work that will be executed during the pre-production period. For more details about all the stages required to establish the mine ventilation system, consult Section 16.5.

During the pre-production period, the ventilation to support the proposed mining equipment fleet would require air volumes of approximately 130 m^3/s (275,000 cfm). The ventilation system would be a push system utilizing the ramp as fresh air, and using the Madsen shaft and the raise bore opening as exhaust.

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At Stage 1 (Pre-production period), a 900 hp fan would be set-up at the portal. This is a permanent set-up to allow the development of the ramp to Level 8 and the slashing of all the levels where future production is expected. This ventilation system will be installed with a mine propane heating system and underground emergency response system.

Once on Level 8, slashing and development of the level will take place to access the location of the exhaust raise (R.B. #1). The raise bore machine is installed and the 5.5 metre diameter exhaust raise can be excavated.

Bulkheads, doors, and ventilation regulators are installed on each level to control air that could escape through the shaft. During stage 1, the shaft is exhausting until the time the ramp as reached Level 12 and the rehabilitation of the escape way compartment inside the shaft is complete.

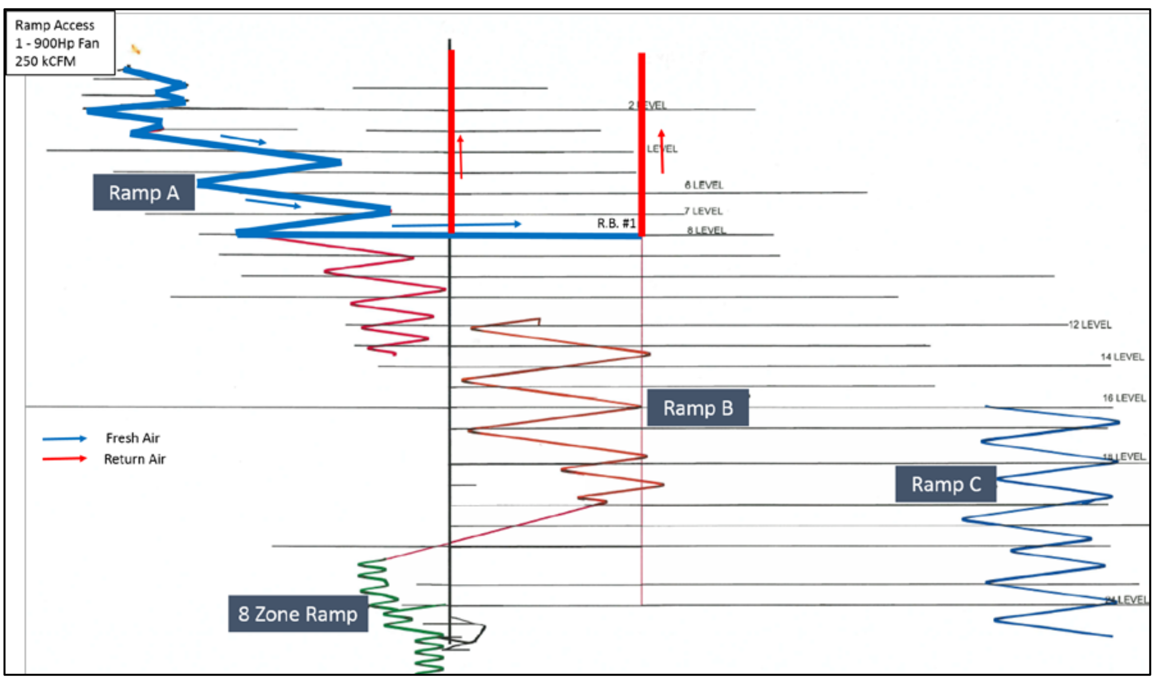

Figure 18-1: Phase 1 Ventilation

18.6 Mine Office and Dry

The mine offices would consist of a complex of four trailers for the mine and one trailer for the mill. All four mine office units will be located near the Madsen Portal, two units for Pure Gold employees and two units supplied by the Contractor. The mill office unit will be located at the mill. The site dry complex will consist of modules, which will be put together as one unit to sufficiently accommodate approximately 160 personnel, with an eight person female section. Space will be allocated for mine rescue and first aid. This dry complex will be located close to the existing Mill where water and septic services are available.

18.7 Electrical and Communications

18.7.1 Mine Site Power

Electrical grid power will provide the power to the project over the life of the mine. The existing site 2300 Volt power distribution switchgear is currently serviced by 2300 V power supplied by a Hydro One Distribution owned 44 kV/2300 V transformer station. Increased operational power requirements are expected to be available from the 44 kV supply network and power distribution for the mine site is to be provided by a new transformer station to be constructed on the mine site and a refurbished power distribution system.

18.7.2 Communications

Communication lines would be installed on the electrical pole line from the main road to the mine site. The existing mine site surface and underground radio system would be expanded. Landline telephones would be used for external contact.

18.7.3 Propane

Propane storage tanks of a suitable size would be located close to the portal area. Propane units would be used for the mine air heating system located just outside the portal.

Once the main ventilation is set up on top of the shaft, propane storage tanks of a suitable size would be located close to the headframe area. Propane units would be used for the mine air heating system located just outside the headframe.

18.7.4 Fuel Storage

The fuel storage facility would consist of one double walled 45,000 L capacity reservoir for diesel and one 5,000 L reservoir for gasoline. A service fuel truck would deliver fuel underground to mobile equipment where applicable.

18.8 Process Water

Underground process water would be drawn directly from the nearby Process Water Pond. The anticipated process water requirement is presented flow breakdown is shown in Table 18.1.

Table 18.1: Process Water

Description	Flow
Mill	20 m^3/h
Mine	8 m^3/h
Office/Dry	1 m^3/h
Total	29 m^3/h

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18.9 Compressed Air

There would be two compressed air systems at the Madsen Portal used to provide air at 0.71m^3/s (1,500 cfm) and 7.58 bar (110 psi) to the underground workings and surface shop. These units will feed the underground areas via a 101 mm (4 inch) steel pipe following the decline, and to the surface maintenance shops via a 50mm (2 inch) steel line. The existing compressor at the Mill will provide compressed air for the process plant. A spare diesel compressor would also be on site as back up in the case of power outage.

18.10 Sandfill Plant

The sandfill plant with the cement option would be installed on surface at the mill. The sandfill would be distributed underground via metal piping or fill holes to specific backfill distribution areas.

18.11 Explosives and Detonators Storage

A 20,000 kg capacity explosive magazine and a detonator magazine would be installed on surface for the pre-production phase until construction of the underground storage magazines in specific underground openings is completed. The surface explosive magazines would be constructed according to the Ontario Health and Safety Act, and be heated during the winter months.

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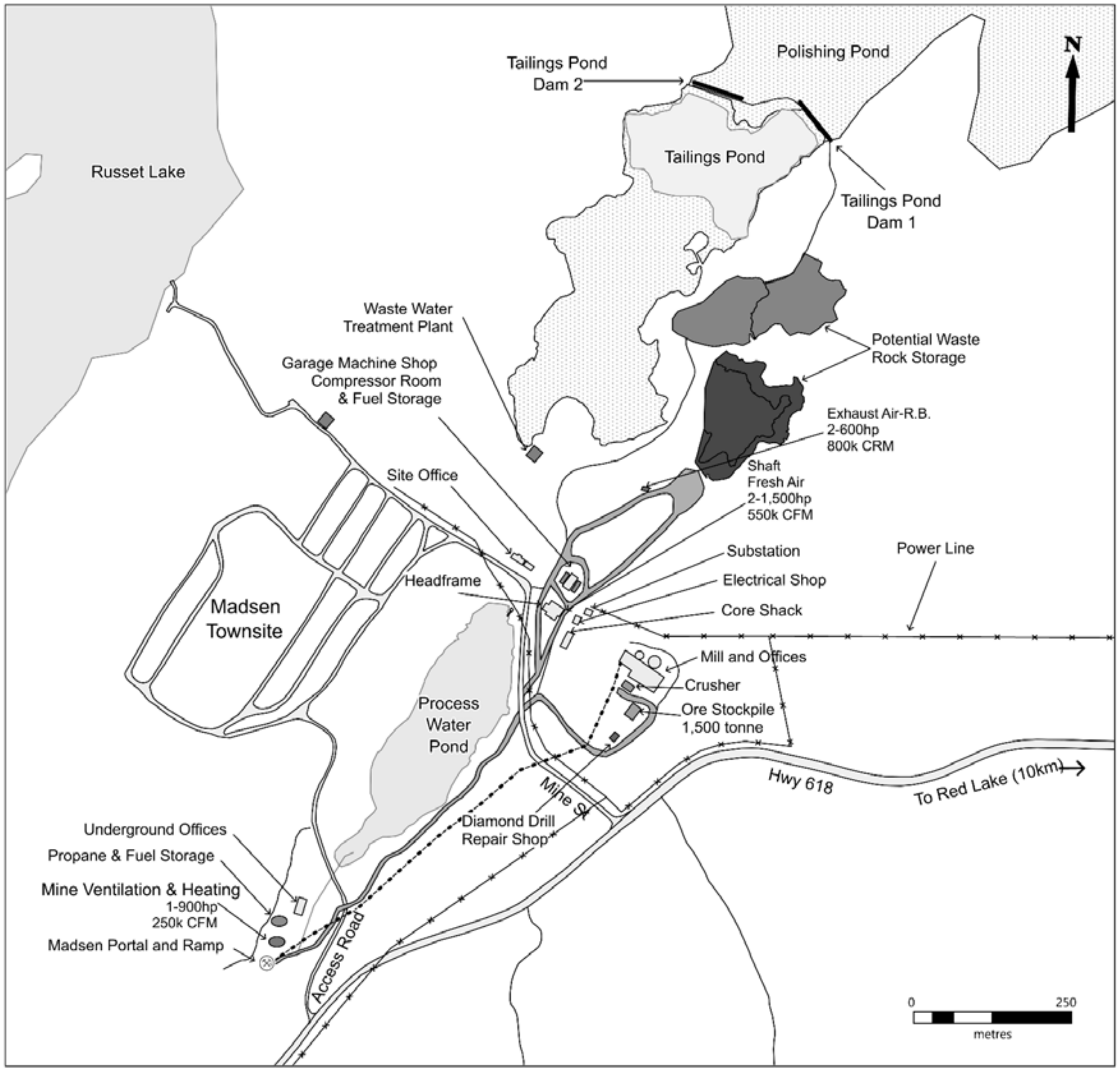

Figure 18-2: Conceptual Mine Site Layout

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19. Market Studies and Contracts

Gold will be the only concentrate produced at the Madsen Gold Project. While a specific marketing study was not undertaken, gold is freely traded, at prices that are publicly known and the prospect for the sale of any gold production is virtually guaranteed. The price of gold is usually quoted in U.S. dollars per troy ounce. Figure 19-1 represents the gold price and the American dollar to the Canadian dollar exchange rate over the past 5 years. For the basis of this PEA, a gold price of $USD 1,275 per ounce and an exchange rate of $US 1 = $CAD 1.25 was used.

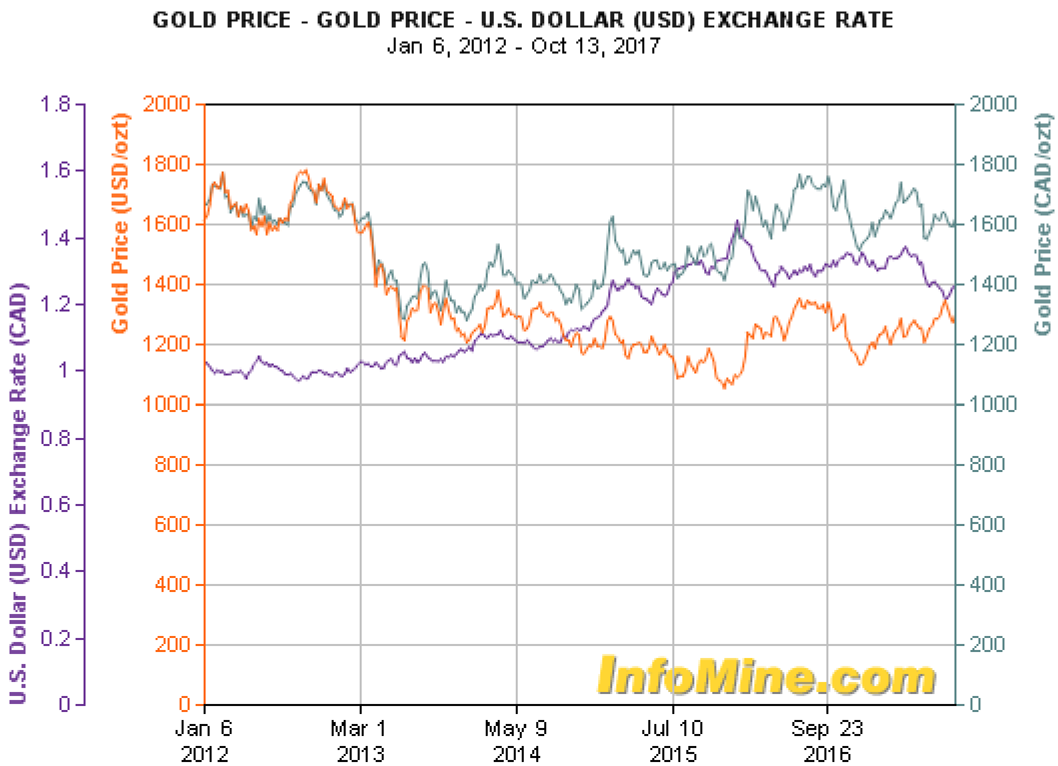

Figure 19-1: 5 Year Gold Price Charts

Doré bars would be produced from the induction furnace as part of the existing milling process at the Madsen Gold Project. The doré would be transported via a contracted security company from the mill in Red Lake to a contracted refinery. An agreement would be required with a refinery to sell doré and produce gold bullion. A cost of $3.25/oz. was used in the economic analysis associated with doré transportation, insurance and refining.

It is expected the services of outside consultants knowledgeable in the areas of marketing, finance and law as well as logistics and contract management would be employed to guide the company in the process of selling the gold produced at the Madsen Gold Project.

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20. Environmental Studies, Permitting and Social Impact

20.1 Introduction

Pure Gold is the 100% owner of the Madsen Gold Project in the Red Lake Mining District. The project consists of both early and advanced-stage mineral exploration across a large patent claim property covering 47.7 km^2. The Property encompasses two significant former mining operations at Starratt-Olsen and Madsen. The Madsen Mine was in operation from 1938 to 1976 and again from 1997 to 1999. The Starratt-Olsen Mine operated from 1948 to 1956. The Madsen Property has been amalgamated from multiple distinct properties and has had several owners throughout the long history. Old mines often have some legacy environmental issues, many that arise from standards and operating procedures that have improved over time but which cannot be applied retroactively to an existing operation. Currently, there are no known environmental issues that could materially impact Pure Gold's ability to extract the mineral resources.

Pure Gold acquired ownership of the Madsen Mine property in 2014 and has embarked on a major program of investment in exploration and rehabilitation of the site in preparation for potential renewed mining and milling operations. The mine and milling complex is currently in a state of Temporary Suspension under MNDM permitting status, with a portion of the site permitted for Advanced Exploration. This allows Pure Gold to undertake advanced exploration drilling from both surface and underground, in and around the previously mined area.

20.2 Environmental Assessment

20.2.1 Federal CEAA Environmental Assessment Process

Pure Gold has prepared a Project Definition (March 2017) for the reopening of the Madsen Mine. The Pure Gold Madsen Project as described in the Project Definition is not expected to be classed as a designated project under the Canadian Environmental Assessment Act (CEAA, 2012) as the thresholds defined in Section 17 of the Act for the expansion of an existing operation are not exceeded.

As described in the Project Definition, the Pure Gold Madsen Gold Project will not trigger the CEA Agency federal environmental assessment process. This has yet to be confirmed with the CEA Agency.

It is anticipated that the Pure Gold Madsen Gold Project could require approvals from the Department of Fisheries and Oceans under the Fisheries Act for the Authorization for potential harmful alteration, disruption or destruction of fish habitat (HADD). Pure Gold has contracted Lorax Environmental Services Ltd. and Minnow Environmental Inc. to provide additional baseline studies and modelling so that designs can be optimized to minimise the potential of creating a HADD.

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20.2.2 Provincial Environmental Assessment Process

The Ministry of the Environment and Climate Change (MOECC) has indicated that there will be no requirement for the submission of a Provincial Environmental Assessment based on the presentation of the March 2017 Project Definition.

It is anticipated that the Pure Gold Madsen Gold Project will require approvals from MOECC, Ministry of Northern Development and Mines (MNDM), Ministry of Natural Resources and Forestry (MNRF), Ministry of Labour (MoL) and Ontario Energy Board.

20.3 Environmental Authorizations and Permits

Pure Gold has worked to maintain the permits that existed for the Madsen Mine under Claude Resources. However, as regulations have changed over time and the project has developed, some permits will require updating. The permit status has been confirmed with both MNDM and MOECC. The following permits and authorisations are in good standing:

- **Madsen Closure Plan #2:** This closure plan amendment was accepted in 2014 and includes a posted bond of $2,315,089.
- **Permit-To-Take-Water (0202-AHJL45):** This permit was updated in 2017 and is in good standing allowing Pure Gold to pump approximately 6.5 ML of water per day from the mine workings. No pumping to surface is currently being undertaken.
- **Advanced Exploration Closure Plan:** In 2016, Pure Gold requested that the Madsen Portal Advanced Exploration area be taken out of Temporary Suspension and put into Advanced Exploration. The closure plan for these proposed activities was accepted along with additional funding of $90,000 for the Advanced Exploration program closure. This is in good standing and can be rolled over into a new mining operation or for complete mine closure.
- **SAR Exemption and Benefit Program Under Clause 17(2)c of SARA for Endangered Bats:** Pure Gold discovered endangered bats in the decline leading from the Madsen portal during the reopening of the portal in 2017. A new permit, allowing Pure Gold to exclude the bats with the requirement to provide outside-of-mine bat houses and research on the bats was granted in June of 2017. The permit is in good standing, has acceptable and manageable conditions, and has clearly defined Pure Gold as a responsible operator to regulatory agencies.
- **Registered Hazardous Waste Generation Site:** Pure Gold maintains its registration as a hazardous waste site. This is renewed annually and is in good standing for 2017.

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- **PCB Room Closure:** Pure Gold has rehabilitated and closed the legacy PCB storage room at the site and has met all conditions set by MOECC. A confirmation letter to this effect has been received from MOECC.

The following existing permits will require updating due to process changes or regulatory changes:

- **Environmental Compliance Approval (ECA) Industrial Sewage Works Permit:** Pure Gold is currently undertaking baseline studies focussed on optimizing water resource usage, recovery and recycling and has presented an updated operation general arrangement in the Project Definition. Changes in the effluent regulations as well as this new water usage system would require a new Industrial Sewage Works Permit. Currently, Lorax Environmental and Minnow are contracted to provide the baseline studies for this work, which is aimed at bringing Pure Gold into compliance with the Metal Mining Effluent Regulation, Ontario Water Resources Act, Regulation 560/94 (Municipal Industrial Strategy for Abatement (MISA) Regulation) and the Metal Mining Effluent Regulation.
- **ECA Air and Noise:** Due to new equipment and operational changes to minimize power, energy and water usage, a new Air and Noise ECA will be required. DST Consulting has been engaged to provide the baseline study for this work.
- **Mine Closure Plan, MNDM** Laurentian Gold, later renamed Pure Gold submitted a closure plan along with the required performance bond required to fully satisfy regulatory agencies, in February 2014. Current funding is considered to be adequate for closure of the current mine in Temporary Suspension and as considerable site cleanup has been undertaken by Pure Gold outside of the closure plan funding. Given the new Project Definition in progress and the considerable effort that has been made to clean up the site at Pure Gold's own cost, the closure plan is no longer considered to be accurate and will require updating should the mine be returned to operational status.
- **Permit to Mine, MNDM**: A Notice of Project Status was received and acknowledged by the MNDM on April 24, 2007; it allows for dewatering to 2900 feet (883.92 metres). This would require updating as mining of deeper levels is envisioned.
- Other Permits that may be required include:
  - **ECA for Sewage:** For approval to construct and operate a domestic sewage treatment system, or Health Unit approval for smaller systems.
  - **Work Permit:** Any construction/relocation of a transmission line, work on Crown land or for work in water.

- **Plans and Specifications Approval:** For construction of dams or berms, including those associated with tailings facilities and/or new ponds and ditches.
- **Forest Resource License:** Annual license for clearing of merchantable Crown timber.
- **Aggregate Permit:** Aggregate Resources Act For extraction of aggregate for dam construction.
- **Leave to Construct:** For approval to construct a transmission line.
- **Notice of Construction:** Notice is required before any contractor or construction activities take place.

SARA Approvals: For migratory birds and their breeding areas. In addition, the area falls within the range of several terrestrial endangered species, but these have not been encountered on or near the site.

20.4 Consultation

Pure Gold has committed to engagement and consultation with First Nation communities, provincial and federal government, the public, and all interested stakeholders throughout all stages of Project planning, regulatory review, and construction. The intent is to provide all interested parties with opportunities to learn about the Project, identify issues, and provide input with the goal of positively enhancing Project planning and development.

Pure Gold recognizes the importance of full and open discussion of the issues and options associated with the development of the Project and the related concerns those individuals or communities may have in relation to Pure Gold activities. In light of this, Pure Gold will maintain open and honest communications with First Nations, local communities and individual stakeholders throughout all stages of the Project. Pure Gold intends to ensure that its operational practices, both now and into the future, reflect the values, expectations, and needs of the community in which it is operating, based upon continued mutual respect. Pure Gold has captured these commitments in a Consultation Plan, the main contents of which are summarized below.

20.4.1 First Nations Considerations

The Grand Council of Treaty # 3 represents and assists 28 member First Nation communities, five of which have been identified by the Grand Council to Pure Gold as needing to be informed and engaged with respect to Pure Gold activities and plans. The MNDM has indicated to Pure Gold that only Wabauskang First Nation and Lac Seul First Nation need to be so engaged and consulted at this early stage, and further, that the MNDM will fulfill the duty to consult. (Figure 20-1). At this time, the primary role of Pure Gold with First Nations is to ensure that appropriate information sharing occurs. The MNDM will consider additional development and advise, if and when a more formal consultation role should be undertaken by Pure Gold.

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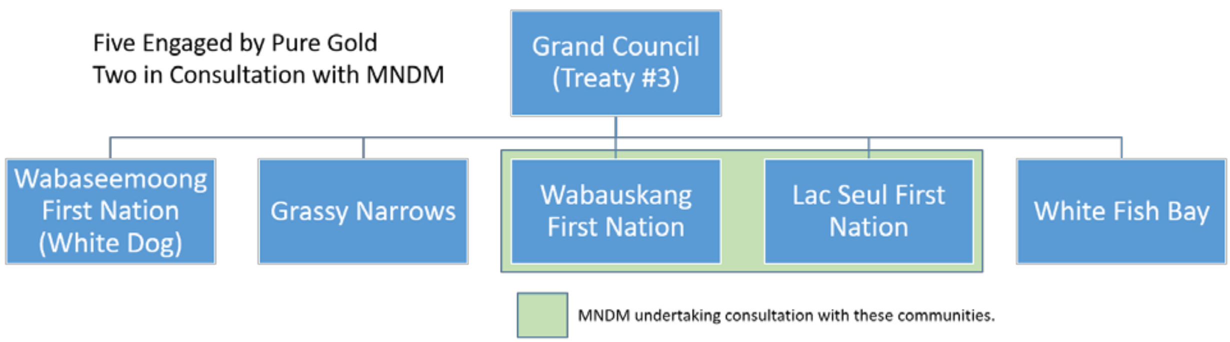

Figure 20-1: Treaty 3 First Nations Engaged by Pure Gold

Pure Gold considers that it has good relations with First Nations and is making efforts to enhance and strengthen those relations. Pure Gold has developed a Consultation Plan and is seeking to align this with First Nations requirements. Pure Gold has an extensive record of all consultation with First Nations since taking ownership of the mine. Pure Gold and the Wabauskang First Nation and the Lac Seul First Nation are cooperating to develop Exploration Agreements to formally define cooperative and mutually beneficial relationships.

20.4.2 Community Considerations

Pure Gold has had ongoing communication with Red Lake Municipality and the various regulators who have an interest in the Project. Pure Gold has held a Community Meeting in October of 2016 to describe its activities and plans, to present its closure plan and obtain feedback for the Advanced Exploration at the Madsen Portal. Pure Gold has also developed a Consultation Plan that forms the basis of the ongoing plans for community, regulator and First Nations Consultation. Currently, Pure Gold's plan to reopen the Madsen Property is largely seen as a benefit to the local community, which has suffered economically from the decline in mining over recent years.

20.4.3 Regulator Considerations

Pure Gold has engaged with regulators and established good working relationships. Regulators from Ontario MOECC, MoL, MNDM, MNRF, and the Red Lake Municipality have visited and are familiar with Pure Gold's activities at the project site.

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20.5 Factors for Consideration

20.5.1 Consultation Plan and Agreements with First Nations

Lac Seul and Wabauskang First nations are working with Pure Gold towards developing an Exploration Agreement. All parties have expressed an interest in developing agreements based on respect for collective interests and the mutual desire to bring the Madsen Property back to profitable operation and current regulatory and environmental thresholds.

20.5.2 Wastewater

Currently, the community of Madsen has a sewage outfall that reports to the Pure Gold Madsen Mine tailings pond, after primary solids separation in a dated system. Although Pure Gold has no responsibility for this system, it is considered undesirable, as the water from the tailings pond will be recirculated to the mineral processing plant. Aside from workers having to work with water containing untreated sewage, which is a potential health risk, sewage may affect the mineral processing circuit and reduce recovery of gold as well as require a higher loading of cyanide in the process. This additional cyanide will need to be destroyed after processing and would result in higher levels of ammonia in the waste stream. Currently, some 50,000 m^3 of untreated sewage is being added to the tailings facility annually. This will ultimately have to be routed away from the tailings facility so that proper closure of the tailings facility can be achieved. Engagement with the Municipality of Red Lake is ongoing to find a solution.

20.5.3 Effects of Mining

Although very few new impacts are expected from the reopening of the Madsen Property as described in the Project Definition, this is an existing mine in Temporary Suspension with a long legacy of mining at the Madsen site. Pure Gold has expended considerable effort, at their own cost, to clear legacy waste and reclaim the surface as well as manage both public and mine related activities at the site.

It is also noted from an MNDM report that several underground aspects will need to be addressed including a crown pillar investigation, forecasting the quality of water to be pumped from underground workings, and quality of water exiting the tailings facility. Pure Gold is currently undertaking water, hydrology and geochemical tests on future ore bodies and waste rock, as well as historical rock piles, with initial indications that there is not an acid mine drainage issue at the site.

20.5.4 Infrastructure Requirements

For an extended life of mine, as defined in the Project Definition, Pure Gold intends to establish an enlarged tailings facility, new rock dump, an improved haul road system, a cyanide destruction unit and complete an upgrade of the existing processing plant. There is a potential need for a water treatment facility, the design of which will depend on baseline and assessment work being conducted by Lorax. These infrastructure enhancements have been designed to occur within the existing catchment, with no additional impacts anticipated, however some update of current permitting will be required.

20.5.5 Environmental Permitting

The baseline studies required to inform permits are currently underway and water quality predictions from modelling have yet to be finalised. Permit applications will be based on the modelling outcomes and therefore there is some uncertainty regarding the conditions of approval. The water quality is not expected to differ much from past operations, however it is important to note that a cyanide destruction unit will be required and that effluent standards have become more stringent in recent years.

20.5.6 Social, Community and Economics Effects

Other mines in the Red Lake area have, over recent years, reduced their staffing levels as proposed operations have failed to materialize or develop as planned. As a consequence, there has been a reduction of employment of skilled people and expertise in the area, which has resulted in an increase in availability of affordable housing. It is anticipated that the potential reopening of the Madsen Property will occur in a timely fashion such that a skilled workforce will be available locally and that conditions in the regional housing market will be favourable.

As mining is a major contributor to the economy of the Red Lake area, reopening the Madsen Property will provide a welcome boost to economic activity. Pure Gold will need to work with other mines as well as the Red Lake Municipality to ensure that the Pure Gold aspiration to leave a positive and lasting mining legacy is achieved by building an economic base that can become independent of mining. Pure Gold intends to work with First Nations and the Red Lake communities to establish mechanism that will contribute to the lasting legacy of mining.

20.5.7 Environmental Liability – Closure Plans

Pure Gold inherited a mining legacy site with a history of almost a century of exploration and mining, and an unfunded closure program submitted by Claude Resources. The closure plan was updated and additional required funding was submitted by Pure Gold. Pure Gold has also undertaken, at its own expense, a site cleanup that has seen significant amounts of waste removed from the site, off-site tire and metal recycling, derelict building removal, PCB storage site decommissioning and rehabilitation, road upgrading and re-vegetation of critical areas. Reopening of the property will require an update of the closure plan and additional funding of that plan. The reopening will facilitate final closure by allowing Pure Gold to fund further progressive reclamation of the Project site.

21. Capital and Operating Costs

Pre-production capital costs are estimated to be $51 million with the majority of the costs associated with mill refurbishment and ramp development. Additional capital cost requirements include surface installations and new ventilation and pumping systems, which will utilize the existing shaft. Pre-production capital would be minimized by utilizing existing infrastructure, including the 600 t/d mill with carbon-in-pulp (CIP) circuit and TMF. Preparation of the capital cost estimates are based on a Nordmin philosophy that emphasizes accuracy over contingency and uses defined and proven project execution strategies. The estimates were developed by using first principles, applying direct applicable project experience and by avoiding the use of general industry factors for major capital items. Essentially all of the estimate inputs are derived from engineers, contractors and suppliers who have provided similar services to existing operations and have demonstrated success in executing the plans as defined in the PEA.

The following cost estimates are detailed within this section:

i. Initial Capital Cost – Major costs incurred in constructing and refurbishing the Mill and electrical upgrades for ventilation and Mill.
ii. Sustaining Capital Cost – Expenditures incurred during operations for waste development, underground setup and underground infrastructure.

It is anticipated that contractors would perform preproduction activities and full production mining. The following costs are not included in the capital cost estimate:

i. HST;
ii. Schedule acceleration costs;
iii. Schedule delays and associated costs, such as those caused by:
    a. Unexpected site conditions;
    b. Latent ground conditions;
    c. Force majeure;
    d. Permit applications;
iv. Development fees and approval costs beyond those specifically identified;
v. Cost of any disruption to normal operations;
vi. Foreign currency changes from project exchange rates;
vii. Commodity specific escalation rates;
viii. Event risk;
ix. Cost associated with third party delays;
x. Sunk costs;
xi. Escalation – all cost data is presented in Canadian 2015 dollars; and
xii. Owner's cost.

Certain items within the operating costs begin during the pre-production phase and continue through the life of mine. All costs incurred during the pre-production phase have been capitalized and are part of the capital cost estimate under sustaining capital. Operating costs have been compiled in accordance with industry standards.

The pre-production capital expenditures have an internal contingency of 15%. The development portion of the capital costs have a contingency of 5% even though the mobilization of the proposed contractor will have a 15% contingency added to the cost. The estimates are based on budget pricing from suppliers for critical components, consultants, contractors and a review of other similar Canadian projects. Smaller equipment and facilities component costs were factored based on industry norms for the type of facility being constructed and, where possible, adjusted to reflect local conditions. (see Table 21.1)

Table 21.1: Detailed Capital Expenditures

Capital Expenditures	Contingency %	Cost $ (in thousands)
Project Infrastructure Capital	15	4,032
Ramp (4.2 m by 4.2 m)	15	9,286
Level Access (4.0 m by 4.0 m)	15	2,485
Bypass (4.0 m by 4.0 m)	15	2,890
Vent Access (5.0 m by 5.0 m)	15	-
Slash Linear Meters (4.0 m by 4.0 m)	15	1,751
Vent Raise - Raisebore	15	-
Surface Equipment	15	1,823
Ventilation	15	5,781
Sand fill Plant	15	-
Compressed Air	15	897
Mine Water Management	15	2,611
Communication	15	359
Electrical - Hydro One	15	1,725
Safety	15	707
Engineering Equipment	15	259
Manway Rehab & Dewatering	15	4,176
Miscellaneous	15	63
Electrical UG Distribution	15	982
Underground - Explosives Storage	15	104
Mill (Refurbish & Lab)	15	11,019
Total		**50,948**

The sustaining capital expenditures have 5% contingency. Included in these expenditures are the initial development for the underground mine (see Table 21.2).

Table 21.2: Sustaining Capital Expenditures (millions of dollars)

Sustaining Capital	Contingency %	Cost $ (Million)
Ramp (4.2m by 4.2m)	5	58.0
Level Access (4.0m by 4.0m)	5	3.0
Bypass (4.0m by 4.0m)	5	20.7
Vent Access (5.0m by 5.0m)	5	4.9
Slash Linear Meters (4.0m by 4.0m)	5	17.7
Vent Raise M - Raisebore	5	7.5
Transfer Muck Raise	5	2.2
Mill (Instrumentation Controls)	5	2.1
Tailings Work	5	0.9
Sand fill Plant	15	1.2
Diamond Drilling (Apart from Exploration)	5	3.5
Ventilation	15	13.0
Total Sustaining Expenditures		**134.7**
Total Capital Expenditures		**50.9**
Total Sustaining + Capital Expenditures		**185.6**

21.1 Operating Costs Estimates

Operating costs are based on typical Canadian prices from suppliers and other comparable Canadian projects, for consumables and parts. The cost of power is based on rates charged by Hydro One for similar sized power consumers in the province. Critical operating cost components are based on the following Table 21.3.

Table 21.3: Operating Cost Components

Cost Data	Unit	Rate
U.S. Gold price	$/oz.	$1,275
Gold recovery		92%
Exchange rate	CAD=US	$1.25
Capital contingency		15%
Development and mining contingency		5%
Diesel	$/L	$0.927
Power	$/kw/hr	$0.10
Propane	$/L	$0.618
Cement	$/t	$269
Freight materials		8%
Freight equipment		6%

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All waste development would be performed by a mining contractor using two boom electric hydraulic drill jumbos, 2.7 cubic-meter bucket LHDs, 20 tonne haul trucks, scissor lift/bolters and other rubber tired diesel-powered support equipment. Total LOM waste development is summarized in Table 21.4 below.

Table 21.4: LOM Waste Development

Development Type	Metres
Ramp	17,164
Level Access	1,748
Bypass	7,803
Vent Access	1,403
Slash	9,781
Sub Total	**37,900**
Vent Raise	1,232
Total	**39,132**

Table 21.5 summarizes the unit rates used to estimate the development costs.

Table 21.5: Development Costs

Development Type	Unit Rate ($/m)
Ramp (4.2m by 4.2m)	3,687
Level Access (4.0m by 4.0m)	2,848
Bypass (4.0m by 4.0m)	2,848
Vent Access (5.0m by 5.0m)	3,336
Slash Linear Meters (4.0m by 4.0m)	1,883
Vent Raise M - Raisebore	5,824

21.2 Mining

The PEA mine plan envisions that conventional and mechanized cut & fill and shrinkage, mining methods would be utilized to extract the mineralized material. All three of these methods have been used historically with success at the Madsen mine.

All Operating costs in Table 21.6 have a 5% contingency applied.

Table 21.6: Mining Operating Costs

Operating Cost	$/t
Cut & Fill Ore	88.23
Shrinkage Ore	97.83
Power Costs (average)	26.08
Processing	26.92
Overhead and Indirects	42.76
Haulage - Upper Mine (Above 16 level)	17.84
Haulage - Lower Mine (Below 16 Leve)	54.04

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General and Administration (G&A) operating costs include costs and taxes for maintaining the property in good standing, land taxes, and resource usage fees (water, etc.). The G&A operating costs encompass all operating costs associated with operating the site offices and providing materials and supplies for staff. The cost of G&A within the report with 5% contingency added is estimated at $42.76/tonne. All G&A costs are summarized in the following tables.

Table 21.7: Project Salaried Personnel

Operating Personnel	Quantity	Total ($/Yr.)
Staff - Mine Operations		
Mine Superintendent	1	254,800
Chief Mining Engineer	1	193,050
Chief Geologist	1	178,750
Production Geologist	1	136,500
Geological Technician/Sampler	6	696,150
Surveyor/Mine Technician	6	696,150
Mine Rescue/Safety/Training Officer	2	245,700
Total Mine Operating Staff	**18**	**2,401,100**
Staff – Mine Maintenance		
Maintenance Superintendent	1	182,000
Mechanical	3	400,140
Electrician	2	266,760
Security	4	348,140
Total Mine Maintenance Staff	**10**	**1,197,040**
Total Mine Staff	**28**	**3,598,140**
Cost Per Tonne @600 t/d	**$/t**	**16.43**

Table 21.8: Mine Construction Crew

Construction Personnel	Quantity	Total ($/Yr.)
Superintendent	1	177,125
Leader	2	273,000
Labourer	2	259,350
Helper	2	218,400
Total	**7**	**927,875**
Cost Per Tonne @600 t/d	**$/t**	**$4.24**

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Table 21.9: Services Operating Cost

Cost Description	Units	Equipment Op Cost ($/hr)	Total Cost ($/yr.)
Ventilation			
Main Ventilation Fan	4	6.17	216,337
Auxiliary Ventilation Fan, 100 kW	6	0.97	50,910
Auxiliary Ventilation Fan, 75 kW	4	0.77	26,932
Auxiliary Ventilation Fan, 50kW	4	0.69	24,283
Vent. Doors/Regulators/Bulkheads	21		315,000
Main Compressors	2	5.50	96,360
Transporting Men and Materials			
U.G Supervisor/Engineering Vehicle	4	7.54	118,891
Pick-up Trucks	6	3.60	35,492
Development Fuel	5	26.91	785,830
Mine Dewatering			
Main Dewatering Pump	4	3.28	114,791
Submersible Pump	4	0.28	9,713
Mine Dewatering Supplies			10,000
Underground Construction			120,000
Technical Supplies/Environment			10,000
Office & Misc. Supplies			10,000
Donations / Travel			150,000
Communications			15,000
Consultants /Environment			250,000
Total Services Cost ($)	$/Yr.		2,161,230
Site Taxes	cost/Yr.		300,000
Closure Plan Costs	cost/Yr.		210,000
Services Cost @600t/d	**$/t**		**$13.10**
Air Heating			
Propane	$/t		9.52
Total			**$22.62**

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Table 21.10: Mine Safety, Training, Mine Rescue & Security

Cost Description	Unit	Cost
Mine Rescue Equipment	$/year	5,000
Mine Safety Equipment	$/year	15,000
Cap Lamps	$/year	1,188
Cap Lamp Charger	$/year	10,500
PPE/Safety Equipment	$/year	6,678
Total Safety Equipment Cost	$/year	22,791
First Aid Supplies	$/year	4,950
PPE/Safety/Mine Rescue Supplies	$/year	19,800
Total Safety Supplies Cost per Year	$/year	24,750
Mine Rescue Training	$/year	25,805
Safety Training	$/year	10,291
Total Training	$/year	36,095
Total Safety Cost per Year	$/year	83,636
Mine Production Rate	t/year	219,000
Mine Safety Cost per Tonne @600/d	**$/year**	**0.38**

All mine personnel except for technical and support staff would be contracted employees. Total personnel onsite, including contractors, is estimated to be 200 people. This estimate includes mine and surface employees, mine site management, engineers and geology personnel. During the peak period, the direct mining personnel total approximately 90 people. Technical and support staff are expected to be based in the Red Lake area.

The PEA considers refurbishing the existing mill and tailings management facility which have been on care and maintenance since 1999. Mill production of 600 t/d is assumed to be achievable by modernizing controls and instrumentation of the reagent and grinding circuits. Mill and tailings refurbishment is estimated to be $13 million, of which $3 million is included as a sustaining capital cost item for TMF lift and controls for the Mill.

The mill consists of a single stage crushing circuit and a two-stage grinding circuit, which is followed by cyanide leaching. The leached gold is collected in a CIP circuit which is subsequently stripped using mild caustic and collected on stainless steel mesh cathodes by electrowinning. The product from electrowinning is refined into doré bars in an induction furnace.

A 92% gold recovery was assumed for the PEA, based on the historical average recovery rate of the mill when it operated intermittently from 1997 to 1999.

Pure Gold’s existing permits, including the Environmental Compliance Approval, allows for operation of a 1,089 t/d mill and CIP circuit with discharge of treated tailings to the existing tailings facility. Further work is required to determine the optimum processing rates. Operating costs are summarized in Table 21.11.

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Table 21.11: Operating Costs

Cost Type (5% Contingency)	Rate $/t	Total Cost ($m)
Cut & Fill Ore	88.23	118.4
Shrinkage Ore	97.83	176.3
Power Costs	26.04	75.7
Processing	26.92	84.7
Overhead and Indirects	42.76	128.1
Haulage - Upper Mine (Above 16 level)	17.84	36.8
Haulage - Lower Mine (Below 16 Leve)	54.04	58.5
Transport & Refining	3.25/oz.	3.0
Total Operating Cost		681.4

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22. Economic Analysis

The PEA is prelimininary in nature and is based on Indicated and Inferred Mineral Resources. The Inferred Resources are preliminary and generally considered to be too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves and there is no certainty that the preliminary economic assessment will be realized. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

The recently added Russet South and Fork deposit resources do not affect the work previously performed for the original PEA on this property as a whole and were not considered for the mine plan or economic evaluation.

An engineering economic model was developed to estimate annual cash flow and sensitivities. Pre-tax estimates of project values were prepared for comparative purposes, while after-tax estimates were developed to approximate the true investment value. It should be noted that tax estimates involve many complex variables that can only be accurately calculated during operations and, as such, the after-tax results are only approximations. For the cash flow model, a gold price of US$1,275/oz. or CDN$1594/oz, and exchange rate of CDN$=US$1.25 were considered.

The processing plant recovery for gold is 92% utilized throughout the project life.

Table 22.1: Mineral Resource Statement for Madsen Gold Project [1,2,3,4] - Effective December 14, 2017

Deposit	Indicated			Inferred		
	Tonnage tonnes	Au Grade g/t	Au Content ounces	Tonnage tonnes	Au Grade g/t	Au Content ounces
Madsen	5,785,000	8.86	1,648,000	587,000	9.42	178,000
Fork	194,000	6.47	40,000	255,000	5.76	47,000
Russet South	259,000	6.70	56,000	322,000	6.82	71,000

[1] Mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent.

[2] Mineral resources that are not mineral reserves do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resources estimated will be converted into mineral reserves. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.

[3] The 2014 CIM Definition Standards were followed for the classification of indicated and inferred mineral resources. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there has been insufficient exploration to define these inferred mineral resources as an indicated mineral resource. It is reasonably expected that the majority of inferred mineral resources could be upgraded to indicated mineral resources with further exploration.

[4] All figures in Table 22.1 have been rounded to the nearest thousand to reflect the relative accuracy of the estimates.

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The potentially mineable underground resource considered for this study is estimated to be approximately 3,000,000 tonnes at a grade of 10.3 g/t Au. The Preliminary Economic Assessment includes both Indicated Mineral Resource (93% of the total tonnes) and Inferred Mineral Resource. Table 22.2 shows a breakdown of the potentially mineable resource.

Table 22.2: Mineral Resource (Mine Diluted) Included in PEA Mine Plan *

Resource Classification	Tonnes	Au (g/t)	Recovered ounces
Indicated	2,391,512	11.56	826,977
Inferred	187,407	14.98	84,520
Total dilution	415,598		

**Mineral resources that are not mineral reserves do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Initial disclosure of mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent. For the purpose of the PEA, mine diluted mineral resources are reported with a variable cut-off grade dependent on individual stoping areas, a US$1,275 per troy ounce gold, and gold metallurgical recoveries of 92 percent.*

Mill recovery rates are estimated at 92%, which results in 911,497 ounces of recoverable gold based on the current estimated potentially mineable resource.

The PEA as envisioned includes an underground mining operation relying heavily on the existing mining, milling and tailings management infrastructure at the Madsen Gold Project. Primary access will be via the existing Madsen portal, which is located approximately one kilometre from the existing mill, and provides ramp access to the top 150 vertical metres of the mine workings. The PEA mine plan includes further ramp development access to access the 24 levels of the mine and below the existing shaft. The existing Madsen shaft would be used for ventilation and a second means of egress via the manway located in the shaft.

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Table 22.3: Yearly Cash Flow

	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Cash-flow																
Net Revenue	$16,372,000	$54,207,000	$86,397,000	$93,497,000	$93,497,000	$134,550,000	$135,867,000	$135,348,000	$133,934,000	$113,640,000	$94,340,000	$94,083,000	$94,083,000	$94,083,000	$76,064,000	$1,449,962,000
Total Operating Cost	$9,675,000	$29,474,000	$44,541,000	$46,100,000	$51,164,000	$51,499,000	$51,625,000	$51,405,000	$51,302,000	$51,311,000	$51,403,000	$51,302,000	$51,302,000	$49,922,000	$36,417,000	$678,443,000
EBITDA	6,697,000	24,733,000	41,856,000	47,397,000	42,333,000	83,051,000	84,242,000	83,943,000	82,632,000	62,329,000	42,937,000	42,781,000	42,781,000	44,161,000	39,647,000	771,519,000
Capital Expenditures	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Sustaining Capital																
Total Capital Expenditures	$50,948,000	$21,470,000	$20,059,000	$20,474,000	$20,356,000	$17,383,000	$16,420,000	$11,026,000	$7,486,000	-	-	-	-	-	-	$185,621,000
Mine Life	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Pre-Tax Cashflow	-$44,251,000	$3,263,000	$21,797,000	$26,923,000	$21,977,000	$65,668,000	$67,823,000	$72,916,000	$75,146,000	$62,329,000	$42,937,000	$42,781,000	$42,781,000	$44,161,000	$39,647,000	$585,898,000
Pre-Tax Cumulative Cashflow	-$44,251,000	-$40,988,000	-$19,191,000	$7,732,000	$29,709,000	$95,377,000	$163,200,000	$236,116,000	$311,262,000	$373,591,000	$416,528,000	$459,309,000	$502,090,000	$546,251,000	$585,898,000	
Tax	$ -	$ -	$ -	$ 2,371,066	$ 5,525,303	$ 19,587,465	$ 20,560,317	$ 21,388,816	$ 21,880,615	$ 17,028,169	$ 11,676,173	$ 12,143,053	$ 12,506,389	$ 13,236,775	$ 11,347,243	$169,251,000
After-Tax Cashflow	-$44,251,000	$3,263,000	$21,797,000	$24,552,000	$16,452,000	$46,081,000	$47,262,000	$51,527,000	$53,266,000	$45,301,000	$31,260,000	$30,638,000	$30,275,000	$30,925,000	$28,300,000	$416,647,000
After-Tax Cumulative Cashflow	-$44,251,000	-$40,988,000	-$19,191,000	$5,361,000	$21,813,000	$67,893,000	$115,156,000	$166,683,000	$219,949,000	$265,249,000	$296,510,000	$327,148,000	$357,423,000	$388,347,000	$416,647,000	

Table 22.4 shows the key economic parameters used for the Preliminary Economic Assessment.

Table 22.4: PEA Parameters

Parameters	Units
Gold Price	US$1,275/oz.
Exchange Rate (US$ to C$)	1.25
Total Resource Tonnes Mined / Milled	2.99 million
Processing Rate	600 t/d
Diluted Head Grade	10.3 g/t
Gold Recovery Rate	92%
Mine Life	13.8 years
Total Gold Ounces Recovered	**911,497 oz.**
Average Annual Gold Production	66,109 oz.
Peak Annual Gold Production	85,411 oz.
Pre-production Capital Cost	$50.9 million
Sustaining Capital Cost (Life of Mine)	$134.7 million
Unit Operating Costs (per tonne processed)	
Mining Costs	$155/tonne
Processing Costs	$28/tonne
G&A	$43/tonne
LOM Average Cash Cost(1)	US$595/oz.
LOM Cash Cost plus Sustaining Cost	US$714/oz.
Royalties	None
Corporate Income Tax / Ontario Mining Tax	25% / 10%

(1) Cash cost includes mining cost, mine-level G&A, mill and refining cost

Table 22.5 demonstrates how the PEA is sensitive to the price of gold.

Table 22.5: PEA Sensitivities

Gold Price (US$/oz.)	$1,175	$1,225	$1,275	$1,325	$1,375
Pre-Tax NPV5% (C$ million)	$289	$327	$365	$403	$442
After-Tax NPV5% (C$ million)	$205	$232	$258	$285	$311
Pre-Tax IRR	44%	49%	54%	59%	64%
After-Tax IRR	38%	42%	47%	51%	56%

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23. Adjacent Properties

Relevant information is provided herein for three adjacent properties to the Madsen Property – the Hasaga Property of Premier Gold Mines Limited ("Premier") (Jourdain et al., 2017); the North Madsen Property of Yamana Gold Inc. ("Yamana") (McCracken and Utiger, 2014); and the Red Lake Gold Mines Property of Goldcorp Inc. ("Goldcorp") (Goldcorp Inc., 2017).

The qualified person has been unable to verify the information provided with respect to the adjacent properties which was obtained from publicly disclosed documents as indicated. The proximity and geologic similarities between these adjacent properties and Madsen does not mean that Pure Gold will obtain similar results on the Madsen Property.

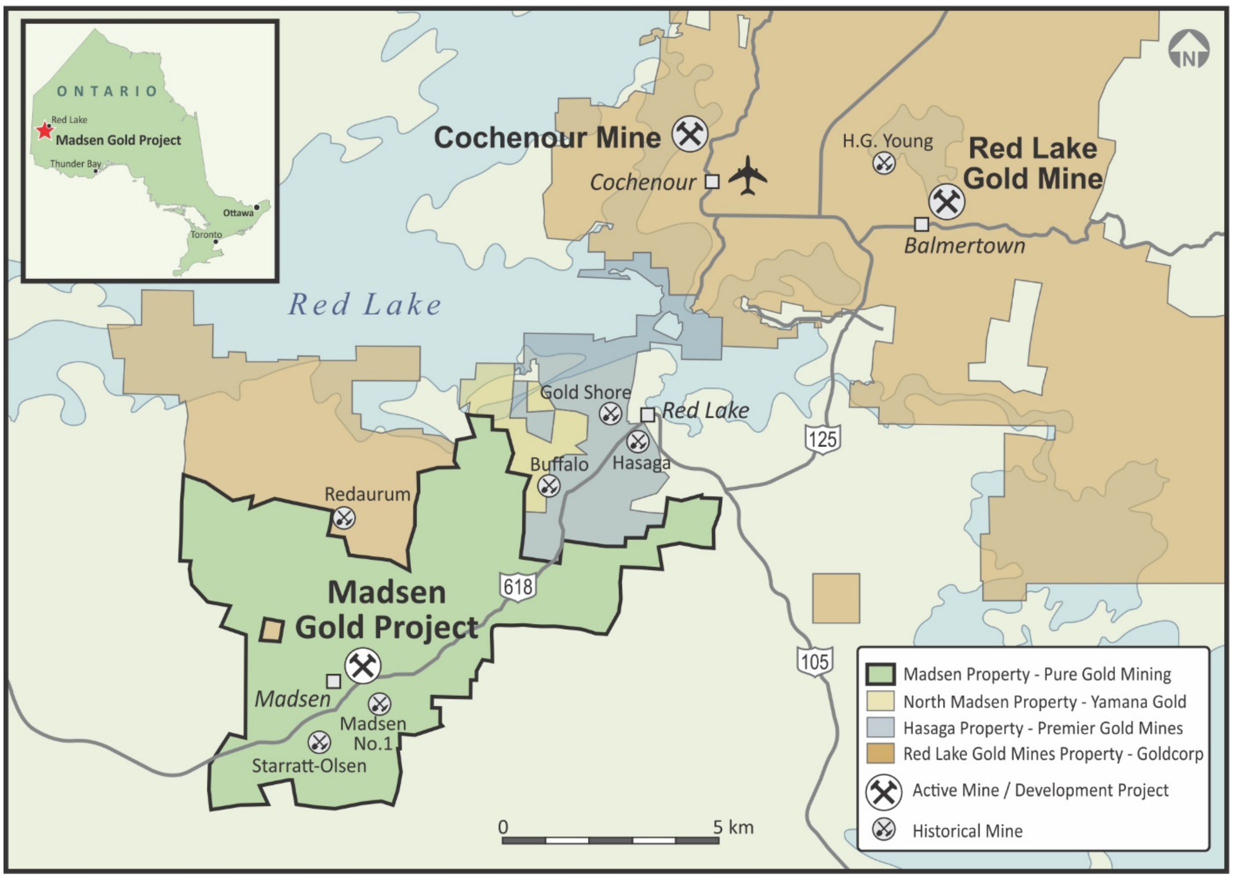

Figure 23-1: Location of Madsen Gold Project and Adjacent Properties

23.1 Hasaga Property – Premier Gold Mines Limited

Premier has recently been exploring the Hasaga Property which is contiguous to the Madsen Property on the northeast boundary (Figure 23-1). The property contains three past producing mines – the Gold Shore, Buffalo and Hasaga Mines. The combined historical gold production of these three historical operations is reported to be 240,970 ounces (Lichtblau et al., 2017). Exploration has been conducted on this property since 1927 and recently (2015–2016) Premier has completed diamond-drilling of 259 holes, totalling 110,166 m (Jourdain et al., 2017).

23.1.1 Hasaga Property Mineral Resource Estimate

Hasaga was the largest deposit where mineralization is hosted within a quartz-feldspar porphyry dyke which intruded Balmer Assemblage basalt. Gold mineralization is structurally controlled and occurs in veins, lenses and fractures. Competency contrast between host rocks provided an important focus for gold mineralizing fluids (Jourdain et al., 2017). Table 23.1 summarizes the recent mineral resource estimate for the Hasaga Property.

Table 23.1: Hasaga Property mineral resource estimate of Jourdain et al. (2017)

Zone	Category	Tonnage	Grade (g/t)	Cutoff Grade (g/t)	Contained Ounces
Central	Indicated Resources	31,613,000	0.8	0.5	803,900
Central	Inferred Resources	23,733,000	0.8	0.5	582,700
Hasaga	Indicated Resources	9,050,000	0.9	0.5	258,100
Hasaga	Inferred Resources	806,000	1.0	0.5	26,000
Buffalo	Indicated Resources	1,632,000	1.2	0.5	61,900
Buffalo	Inferred Resources	604,000	1.1	0.5	21,800

Pure Gold holds a 1.0% net smelter return royalty on the southwestern portion of the Hasaga Property (Buffalo Claims). The proximity and geologic similarities of Hasaga does not mean that Pure Gold will obtain similar results on the Madsen Property.

23.2 North Madsen Property – Yamana Gold Inc.

Recently, Yamana has been exploring their North Madsen Property which is contiguous along on the northeast boundary of Pure Gold's Madsen Property. The North Madsen Property has been explored since 1925, however no gold production has resulted.

23.2.1 North Madsen Property Mineral Resource Estimate

Table 23.2 summarizes the recent mineral resource estimate of McCracken and Utiger (2014). Most of the resources in all categories are hosted in the Main (41) Zone. The Main Zone mineralization is hosted within the Dome Stock granodiorite and is associated with shear zones and over-printing quartz-tourmaline veins (McCracken and Utiger, 2014). The proximity and geologic similarities of the North Madsen Property does not mean that Pure Gold will obtain similar results on the Madsen Property.

Table 23.2: North Madsen Property mineral resource estimate of McCracken and Utiger (2014)

Category	Tonnage	Grade (g/t)	Cutoff Grade (g/t)	Contained Ounces
Measured Resources	16,728,310	1.3	0.6	685,891
Indicated Resources	6,230,600	1.0	0.6	202,862
Measured and Indicated Resources	22,958,910	1.2	0.6	888,752
Inferred Resources	10,138,000	1.2	0.6	383,936

23.3 Red Lake Gold Mines Property – Goldcorp Inc.

Goldcorp's Red Lake Gold Mines Property is contiguous to the Madsen Property on the northern boundary and the Madsen Mine and the Red Lake Gold Mines (RLGM) complex are approximately 16 km apart. The RLGM is the largest mining operation in the Red Lake mining district and has been in continuous operation since 1948. Mines on what is now the RLGM Property have produced more than 24.5 million ounces of gold to 2016 including gold production of 324,000 ounces in 2016 (Lichtblau et al., 2017).

23.3.1 RLGM Reserves and Resources

Table 23.3 provides Reserve and Resource values for the RLGM as recently disclosed by Goldcorp (Goldcorp Inc., 2017).

Table 23.3: RLGM reserves and resources from Goldcorp Inc. (2017)

Category	Tonnage	Grade (g/t)	Cutoff Grade (g/t)	Contained Ounces
Proven Reserves	1,280,000	11.7	7.9*	480,000
Probable Reserves	6,260,000	7.7	7.9*	1,540,000
Measured Resources	1,430,000	19.8	7.3**	910,000
Indicated Resources	3,050,000	15.4	7.3**	1,510,000
Inferred Resources	4,580,000	17.8	7.3**	2,620,000

**Mineral Reserves are reported using variable cut-off grades depending on the mineralization type and zone. The mineral reserve cut-off grade averages 7.90 g/t. **Mineral Resources are reported using variable cut-off grades depending on the mineralization type and zone. The mineral resource cut-off grade averages 7.30 g/t.*

The RLGM deposits are hosted by basalts of the Balmer Assemblage. The host rock sequence has been intruded by Balmer-aged ultramafic, mafic and felsic dykes, and sills and uncomformably overlain by felsic and intermediate volcanic, volcaniclastic, and sedimentary rocks of the Bruce Channel Assemblage and Confederation Assemblage calc-alkaline volcanic rocks. The deposit lies near the transition between greenschist and amphibolite metamorphic facies. Key, early alteration assemblages comprise widespread pervasive carbonatization and aluminous alteration. Potassic alteration (biotite and potassium feldspar) and silicification overprint the earlier alteration. Gold is associated with the silicification event and is overprinted by a second quartz-tourmaline +/- gold event associated with the Dome Stock. Ore types include silica replaced carbonate veins, siliceous replacement-style mineralization, disseminated sulphide mineralization along major shear zones, and minor sulphidized chemical sedimentary rock-hosted ore (Cadieux et al., 2006).

In 2017, two of the original shafts and the Red Lake Mill were placed on care and maintenance as part of a program to reduce fixed costs through infrastructure rationalization. RLGM exploration in 2017 is focused on the newly discovered HG Young deposit and at the High Grade Zone at depth including testing for potential deep offsets. The Cochenour Project is in prefeasibility stage with initial production expected in 2017 and the HG Young Project is in preliminary economic assessment stage, with prefeasibility work expected to start in early 2018 (Goldcorp Inc., 2017). The proximity and geologic similarities to RLGM does not mean that Pure Gold will obtain similar results on the Madsen Property.

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24. Other Relevant Data and Information

Nordmin, Ginto Consulting and Equity Exploration are not aware of any other relevant data.

To the best of the authors' knowledge, there is no other relevant data, additional information or explanation necessary to make the Report understandable and not misleading.

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25. Interpretation and Conclusions

The mineral resource at the Madsen Gold Project contains an Indicated mineral resource of 6.238 million tonnes for 1.744 million contained ounces of gold and an Inferred mineral resource of 1.164 million tonnes for 296,000 contained ounces of gold as shown in Table 25.1.

Table 25.1: Mineral Resource Statement for Madsen Gold Project [1,2,3,4] - Effective December 14, 2017

Deposit	Indicated			Inferred		
	Tonnage tonnes	Au Grade g/t	Au Content ounces	Tonnage tonnes	Au Grade g/t	Au Content ounces
Madsen	5,785,000	8.86	1,648,000	587,000	9.42	178,000
Fork	194,000	6.47	40,000	255,000	5.76	47,000
Russet South	259,000	6.70	56,000	322,000	6.82	71,000

[1] *Mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent*.

[2] *Mineral resources that are not mineral reserves do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resources estimated will be converted into mineral reserves. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues*.

[3] *The 2014 CIM Definition Standards were followed for the classification of indicated and inferred mineral resources. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there has been insufficient exploration to define these inferred mineral resources as an indicated mineral resource and it is uncertain if further exploration will result in upgrading them to an indicated mineral resource category*

[4] *All figures in Table 25.1 have been rounded to the nearest thousand to reflect the relative accuracy of the estimates.*

The newly estimated Russet South and Fork deposit mineral resources lie outside of the footprint of the PEA mine plan and economic evaluation

The resources in the Madsen deposit could be accessed via the existing Madsen portal and by extending the existing decline. The existing Madsen Shaft and headframe would be used for ventilation and second means of egress from the proposed mining areas.

Table 25.2: Mineral Resource (Mine Diluted) Included in PEA Mine Plan*

Resource Classification	Tonnes	Au (g/t)	Recovered ounces
Indicated	2,391,512	11.56	826,977
Inferred	187,407	14.98	84,520
Total dilution	415,598		

**Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Initial disclosure of mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92 percent. For the purpose of the PEA, mine diluted mineral resources are reported with a variable cut-off grade dependent on individual stoping areas, a US$1,275 per troy ounce gold, and gold metallurgical recoveries of 92 percent.*

The mine plan envisions the development and mining activities being performed by contractors. Rubber tired two boom electric hydraulic jumbo drills, 2.7 m^3 LHDs, 20 tonne haul trucks, scissor lifts and other utility equipment would be utilized during the mine life. Total LOM development is summarized in Table 25.3.

Table 25.3: Waste Development in PEA Mine Plan

Waste Development	Metres
Ramp	17,164
Slash	9,781
Ventilation Raise	1,232
Access Development	10,955
Total	**39,132**

Extraction of the mineralized material will be done using cut-and-fill and shrinkage mining methods, which have all been used during the 38 year mining history at Madsen.

The existing mill at the Madsen Gold Project has been on care and maintenance since Claude Resources last used it in 1999. It is assumed that the mill would be capable of processing 600 tonnes per day by modernizing controls and instrumentation of the reagent and grinding circuits.

The existing tailings facility is permitted for operation of a 1,089 tonne per day mill and CIP circuit. Further work would be required to determine the optimum processing rates. There has been an estimated $9.6 million included as pre-production capital and $2.9 million in sustaining capital for the mill refurbishment and tailings facility upgrades.

Table 25.4 summarizes the estimated operating costs developed for the PEA.

Table 25.4: Operating Costs

Operating Costs	Processed ($/t)	$/oz.	US$/oz.
Mining Cost	155	511	409
Processing Cost	28	93	74
G&A Cost	43	141	112
Total Cash Cost(1)	**227**	**745**	**595**
Sustaining Capital	45	148	118
Cash Cost plus Sustaining Capital	**272**	**892**	**714**

(1) Cash cost includes mining cost, mine-level G&A, mill and refining cost

Financial analysis yields positive economic returns for the project with a pre-production capital investment of $44.3 million and $127.1 million of sustaining capital investment before contingency. Table 25.5 shows the expected returns for the Madsen Project.

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Table 25.5: PEA Highlights

Pre-Tax NPV5%	**$365 million**
Pre-Tax IRR	54%
Payback Period	2.7 Years
After-tax NPV$_{5\%}$	$258 million
After-tax IRR	47%
Payback Period	2.8 years

Based on the results of the PEA Study, the following conclusions can be made:

1. The Madsen Gold Project has significant potential to provide positive and robust returns.
2. Additional exploration and expansion of the potentially mineable resource are warranted including the potential conversion of inferred resources to measured and indicated and the potential addition of mill feed from satellite deposits, such as the recently defined Russet South and Fork deposits.
3. The Madsen Gold Project is a brownfield site with existing infrastructure such as an existing mill, permitted tailings management facility, Madsen Portal, decline and Madsen Shaft. This lowers the estimated capital required to advance the project into production.
4. The PEA considers only mining methods historically used in the past 38 years of production mining at Madsen.
5. Under the existing Environmental Compliance Approval, the mill and tailings management facility is permitted to run at 1,089 tonnes per day providing some potential for increasing the processing and overall mining rates.
6. Further metallurgical testing and upgrading of reagent and grinding circuit controls could lead to increased gold recovery above the 92% used in the PEA.

25.1 Other Risks

The PEA does demonstrate that the Madsen Gold Project has the potential to be technically and economically viable. There are risks that have been identified within the recommendations.

The mining of the Madsen deposits is technically simple because of the near surface nature of the upper portion of the deposits and single ramp direct access to the underground mine. The processing plant uses well proven technologies to achieve excellent gold recoveries. Infrastructure requirements are also relatively risk free as the mine is in an area of other economic activity with many regional services.

The main risks to project success are summarized below:

- Until the mill is re-energized, there is some uncertainty with regards to the mill electrical components including the motors. Cost allowances have been made for refurbishing the mill motors and pumps;

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- Adequate electricity supply from Hydro One is a concern in Northwestern Ontario and while capacity consultations with Hydro One suggest adequate power will be available for this PEA scenario it remains an area of uncertainty for the Madsen Gold Project;
- Another concern identified in the recommendations relates to environmental aspects. With recent changes in environmental regulations, further baseline work is recommended as well as studies into whether a cyanide destruction plant is required. Should mining of new satellite deposits be contemplated in the future to increase throughput, these will require additional permitting;
- Exact water depth in the shaft is unconfirmed. Further investigation is required. Preliminary testing indicates that the water level is between Level 4 and Level 5.

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26. Recommendations

The results of this PEA study demonstrate that the Madsen Gold Project has the potential to be technically and economically viable. Significant exploration potential at the Madsen Gold Project and satellite targets across the property provide opportunities for potential project enhancement and optimization. Given the positive results of this study and the potential for enhancement, Nordmin recommends advancement of the Madsen Gold Project to feasibility level study.

Geology and Exploration

1. Continue drilling the mineralized zones from surface and underground to increase confidence of the mineral resource
2. Continue with the current surface drilling program targeting high prospectivity areas to grow the overall resource base including the expansion of known and addition of new satellite deposits
3. Update the geological modelling and mineral resource estimate to incorporate new data and satellite deposits, as completed at Russet South and Fork
4. Continue detailed surface and underground geological mapping to refine understanding of structural setting and characterize mineralization

Underground Development and Rehabilitation

1. Extend ramp development to allow for access to mineralized structure and rehabilitate 2 level for drilling
2. Continue geotechnical/rock mechanics study to determine ground support requirements for development headings and stoping areas.
3. Continue to establish and confirm underground and mine grid survey control
4. Drift and raise on mineralized structure to establish lateral and vertical continuity

Feasibility Level Study

1. Initiate feasibility level studies including further engineering studies and design work, including metallurgical and mill optimization

Environmental and Permitting

1. Continue environmental baseline studies
2. Continue to advance permitting amendments including mine closure plan if required for ramp and development advancement

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Table 26.1: Budget

Program	**Cost (C$)**
Surface exploration drilling	
35,000 metres of drilling including assay costs, wages and project G&A	7,500,000
Underground exploration drilling	
6,500 metres of drilling including underground support, assay costs, wages and project G&A	1,500,000
Exploration access development	
Extend ramp development to allow for access to mineralized structure and rehabilitate 2 level for drilling	1,600,000
Resource study	
Drift and raise on mineralized structure to establish lateral and vertical continuity in detail	3,500,000
Initial mineral resource estimate Russet South and Fork deposits and update Madsen Estimate	150,000
Mapping and Survey	
Surface geological mapping including geochronology	150,000
Underground geological mapping	50,000
Underground and mine grid survey control	75,000
Historical data capture	
50,000 metres of historical core re-logging and historical data compilation	300,000
Environmental and permitting	
Environmental baseline studies, permitting support and tailings study	1,000,000
Engineering	
Engineering studies and design work, including Feasibility studies	2,250,000
TOTAL	**$18,075,000**

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Certificates

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Certificate of Qualified Person

I, Darcy E.L. Baker, P.Geo., residing at 3579 Marshall Street, Vancouver, British Columbia, V5N 4S2, do hereby certify:

1) I am a consulting geologist and President of Equity Exploration Consultants Ltd., a mining exploration management and consulting.
2) I am the co-author of this technical report titled Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates at the Madsen Gold Project for Pure Gold Mining Inc. with an effective date of December 14, 2017.
3) I am a graduate of Dalhousie University (1997) with an Honours Bachelor of Science degree in Geology and am a graduate of the University of Newcastle, Australia (2003) with a Doctor of Philosophy degree in Geology.
4) Since 2003, I have worked managing exploration programs focused on identifying and delineating epithermal, porphyry, VMS, orogenic gold, IOCG and other deposits in Alaska, British Columbia, Mexico, Nevada, Nunavut, Ontario, Quebec and Yukon. Prior to launching a career in mineral exploration, I completed a Ph.D. research project studying the timing and structural relations of orogenic gold deposits in the Archean Pilbara Craton of Western Australia.
5) I am a Professional Geologist in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (registration number 33448) and with the Association of Professional Geoscientists of Ontario (registration number 2746).
6) I have read the definition of “Qualified Person” in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* (“NI 43-101”) and according to NI 43-101 I am a qualified person owing to my education, experience and registration with professional associations.
7) Since 2014, I have visited the Madsen Gold Project numerous times and my most recent property visit was November 9, 2017.
8) I have completed geological mapping, geochemical sampling, drill targeting, geological modelling, review of historical hard copy plan maps and diamond drill logs and examination of historical and recent drill core at the Madsen Gold Project.
9) I am independent as defined by Chapter 5, Section 1.5 of NI 43-101.
10) I am responsible for sections 4 and 6 to 12 and 23 of this report.
11) I have read NI 43-101 and confirm that the sections of this report for which I am an author or co-author have been prepared in compliance with NI 43-101.
12) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am an author or co-author contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

The business address:
Equity Exploration Consultants Ltd.
1510 – 250 Howe Street
Vancouver, British Columbia, V6C 3R8

(signed) *“Darcy E.L. Baker”*

Darcy E.L. Baker, Ph.D., P.Geo.

Effective date: December 14, 2017
Signed date: January 29, 2018

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Certificate of Qualified Person

I, Gilles Blais, P.Eng., residing at 2008 Sagebrush Place, Sudbury, Ontario, P3A 4X7, do hereby certify:

1) I am a Project Engineer for Nordmin Engineering Ltd., a mining service and consulting company.

2) I am the co-author of this technical report titled Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates at the Madsen Gold Project for Pure Gold Mining Inc. with an effective date of December 14, 2017.

3) I am a graduate of Université Laval, with B.Sc.A Génie Minier, 1990.

4) I am a Professional Engineer in good standing with the Association of Professional Engineers of Ontario (registration number – 47688).

5) My experience is as follows:

- Production Foreman - MSV Resources - 1990-1993
- Mine and Project Engineer - MSV Resources - 1993 to 1996
- Mine and Project Engineer - Noranda - 1996 to 1998
- Mine Engineer - Harmony Gold - 1998 to 1999
- Teacher - Collège de Thetford Mines – 1999-2000
- Mine Planner - Inco - 2000 to 2002
- Cost Planner - Inco - 2002 to 2003
- Long Range Planner – Inco - 2003 to 2004
- Project Control Coordinator - Inco - 2004 to 2005
- Senior Project Evaluation Engineer - Inco - 2005 to 2006
- Project Engineer - CVRD Inco - 2006 to 2009
- Senior Mine Evaluation Engineer - Vale - 2009 to 2011
- Project Manager - Vale - 2011 to 2012
- Project Manager - SNC-Lavalin – 2012-2016
- Project Manager - Nordmin Engineering - since 2017

6) I have read the definition of "Qualified Person" in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and according to NI 43-101 I am a qualified person owing to my education, experience and registration with professional associations.

7) I have not visited the Madsen Gold Project.

8) I am independent as defined by Chapter 5, Section 1.5 of NI 43-101.

9) I am responsible for section 18 of this report.

10) I have read NI 43-101 and confirm that the sections of this report for which I am an author or co-author have been prepared in compliance with NI 43-101.

11) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am an author or co-author contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

The business address:
Nordmin Engineering Ltd.
2565 Kingsway
Sudbury, Ontario, P3B 2G1

(signed) *"Gilles Blais"*
Gilles Blais, P. Eng.

Effective date: December 14, 2017
Signed date: January 29, 2018

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Certificate of Qualified Person

I, John Folinsbee, do hereby certify:

- I am the co-author of this technical report titled Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates at the Madsen Gold Project for Pure Gold Mining Inc. with an effective date of December 14, 2017.
- I am currently a member in good standing of the Association of Professional Engineers of Ontario, the Association of Professional Engineers and Geoscientists of British Columbia.
- 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.
- I visited the property in January 2013 that is subject of this Technical Report.
- I have authored, co-authored or supervised completion of sections 13, 17.
- I am independent of as defined by Chapter 5, Section 1.5 of NI 43-101.
- I have read NI 43-101 and have reviewed the sections of the report dated and sections for which I supervised and reviewed work performed as noted above and the sections have been prepared in compliance with NI 43-101.
- As of the date of this 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.
- The business address:

  Heads Ore Tails Metallurgical Consulting Inc.
  3726 Overlander Drive
  Kamloops, British Columbia V2B 8M4

(signed) *"John Folinsbee"*

John Folinsbee

Effective Date: December 14, 2017
Signed Date: January 29, 2018

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Certificate of Qualified Person

I, Marc Jutras, P.Eng., residing at 333 West 17th Street, North Vancouver, British Columbia, V7M 1V9, do hereby certify:

1) I am a professional engineer and Principal, Mineral Resources at Ginto Consulting Inc., a consulting company specializing in the estimation of mineral resources, with offices at 333 West 17th Street, North Vancouver, British Columbia, V7M 1V9.

2) I am the co-author of this technical report titled Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates at the Madsen Gold Project for Pure Gold Mining Inc. with an effective date of December 14, 2017.

3) I am a graduate of the University of Québec in Chicoutimi in 1983, and hold a Bachelor's degree in Geological Engineering. I am also a graduate of the Ecole Polytechnique of Montréal in 1989, and hold a Master's degree of Applied Sciences in Geostatistics.

4) Since 1984, I have worked continuously in the field of mineral resource estimation of numerous international exploration projects and mining operations. I have been involved in the evaluation of mineral resources at various levels: preliminary studies, preliminary economic assessments, prefeasibility studies, feasibility studies and technical due diligence reviews.

5) I am a Registered Professional with the Engineers and Geoscientists British Columbia (license # 24598) and Engineers and Geoscientists Newfoundland and Labrador (license # 09029). I am also a Registered Engineer with the Quebec Order of Engineers (license # 38380).

6) I have read the definition of "Qualified Person" in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and according to NI 43-101 I am a qualified person owing to my education, experience and registration with professional associations.

7) I have completed a site inspection of the Madsen Gold property on August 30, 2017. At that time the core logging and sample preparation facilities were visited, as well as the SGS assaying laboratory. Drill hole core of the high-grade and low-grade mineralized zones from the Austin, South Austin, McVeigh, and 8 Zone areas were examined. An underground visit of the McVeigh area was performed from the ramp access down to the 1 level. A brief review of some of the historical sections and plans was also carried out during this visit. Overall, the site inspection was satisfactory.

8) I have completed the estimation of the mineral resources of the Madsen Gold Project.

9) I am independent as defined by Chapter 5, Section 1.5 of NI 43-101.

10) I am responsible for section 14 of this report.

11) I have read NI 43-101 and confirm that the sections of this report for which I am an author or co-author have been prepared in compliance with NI 43-101.

12) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am an author or co-author contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

The business address:
Ginto Consulting Inc.
333 West 17th Street
North Vancouver, BC, V7M 1V9

(signed) "Marc Jutras"
Marc Jutras, P. Eng., M.A.Sc.

Effective date: December 14, 2017
Signed date: January 29, 2018

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Certificate of Qualified Person

I, Roy Levesque, P.Eng., residing at 44 Tawny Port Drive, Sudbury, Ontario, P3E 0A8, do hereby certify:

1) I am a Senior Mine Engineer for Nordmin Engineering Ltd., a mining service and consulting company.

2) I am the co-author of this technical report titled Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates at the Madsen Gold Project for Pure Gold Mining Inc. with an effective date of December 14, 2017.

3) I am a graduate of Laurentian University in Sudbury, Ontario, Canada.

4) I am a Professional Engineer in good standing with the Association of Professional Engineers of Ontario (registration number – 100072522).

5) My experience is as follows:

- Senior Mining Engineer – Nordmin Engineering – since 2016
- President – Norite Mining Consulting Inc. – 2014-2016
- Managing Senior Mining Engineer – SNC Lavalin – 2012-2013
- Mining Staff Manager – Tetra Tech – 2011-2012
- Senior Mining Engineer – Stantec Consulting – 2010-2011
- Senior Mine Engineer – FNX Mining Company – 2008-2010
- Senior Mine Engineer – SRK Consulting – 2006-2008
- Mining Consultant – AST Mining Canada – 2003-2006

6) I have read the definition of "Qualified Person" in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and according to NI 43-101 I am a qualified person owing to my education, experience and registration with professional associations.

7) I have not visited the Madsen Gold Project property.

8) I am independent as defined by Chapter 5, Section 1.5 of NI 43-101.

9) I am responsible for sections 1 to 3, 5, 16, 19 to 22, 24 to 27 of this report.

10) I have read NI 43-101 and confirm that the sections of this report for which I am an author or co-author have been prepared in compliance with NI 43-101.

11) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am an author or co-author contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

The business address:
Nordmin Engineering Ltd.
2565 Kingsway
Sudbury, Ontario, P3B 2G1

(signed) *"Roy Levesque"*
Roy Levesque, P. Eng.

Effective date: December 14, 2017
Signed date: January 29, 2018

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CONSENT OF QUALIFIED PERSON

TO: British Columbia Securities Commission

Alberta Securities Commission

RE: Technical report prepared for Pure Gold Mining Inc. with an effective date of December 14, 2017 and a signing date of January 29, 2018 entitled Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates at the Madsen Gold Project for Pure Gold Mining Inc. (the "Technical Report")

I, Darcy E.L. Baker, a consulting geologist at Equity Exploration Consultants Ltd., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to the use of any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated December 14, 2017 (the "Press Release").

I certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 29th day of January, 2018.

"Darcy Baker"

Darcy E.L. Baker, Ph.D., P.Geo.

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CONSENT OF QUALIFIED PERSON

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Alberta Securities Commission

RE: Technical report prepared for Pure Gold Mining Inc. with an effective date of December 14, 2017 and a signing date of January 29, 2018 entitled Restated Preliminary Economic Assessment and Initial Satellite Deposit Mineral Resource Estimates at the Madsen Gold Project for Pure Gold Mining Inc. (the "Technical Report")

I, Gilles Blais, a Project Engineer at Nordmin Engineering Ltd., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to the use of any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated December 14, 2017 (the "Press Release").

I certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 29th day of January, 2018.

"Gilles Blais"

Gilles Blais, P.Eng.

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I, John Folinsbee, President at Head Ore Tails Metallurgical Consulting Inc., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to the use of any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated December 14, 2017 (the "Press Release").

I certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 29th day of January, 2018.

"John Folinsbee"

____

John Folinsbee P. Eng.

President, Heads Ore Tails Metallurgical Consulting Inc.

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I, Marc Jutras, Principal, Mineral Resources at Ginto Consulting Inc., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to the use of any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated December 14, 2017 (the "Press Release").

I certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 29th day of January, 2018.

"Marc Jutras"

Marc Jutras, P. Eng., M.A.Sc.

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I, Roy Levesque, a Senior Engineer at Nordmin Engineering Ltd., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to the use of any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated December 14, 2017 (the "Press Release").

I certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 29th day of January, 2018.

"Roy Levesque"

____

Roy Levesque, P.Eng.