Moose River Consolidated Mine
Nova Scotia, Canada,
NI 43-101 Technical Report

Report Authors

Mr L. Paul Staples, P.Eng.
Mr Neil Schofield, MAIG
Mr Marc Schulte, P.Eng.
Mr Tracey Meintjes, P.Eng.
Mr James Millard, P.Geo.
Mr Daniel Fontaine, P.Eng.

ATLANTIC GOLD

Report Effective Date:
25 March, 2019

Ausenco

CERTIFICATE OF QUALIFIED PERSON

I, L. Paul Staples, P.Eng. am employed as employed as the Vice President and Global Practice Lead, Minerals and Metals with Ausenco Solutions Canada Inc. (Ausenco) with an address at 855 Homer Street, Vancouver, BC V6B 2W2.

This certificate applies to the technical report titled "Moose River Consolidated Mine, Nova Scotia, Canada, NI 43-101 Technical Report" that has an effective date of 25 March, 2019 (the "technical report").

I am a registered Professional Engineer of British Columbia, membership number 47367. I am also a P.Eng. in New Brunswick. I graduated from Queens University in 1993 with a degree in Materials and Metallurgical Engineering.

I have practiced my profession for 25 years. I have been directly involved in process operation, design and management from over 16 similar studies or projects including the 80 Mt/y Grasberg complex in Indonesia (1998–2003), the 20 Mt/y Lumwana Project in Zambia (2005–2007), the 26 Mt/y Constancia Project in Peru (2010–2015) and the 38 Mt/y Dumont feasibility study in Canada (2010–2016).

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101).

My most recent site visit was on 7 March, 2019.

I am responsible for Sections 1.1 to 1.4, 1.9, 1.14, 1.15, 1.18 to 1.19, 1.23; Sections 2.1 to 2.4, 2.6, 2.7; Section 3; Section 4; Section 5; Section 13; Section 17; Sections 18.1 to 18.3, 18.8, 18.9; Sections20.8.1, 20.8.2; Sections 21.1, 21.2.1, 21.2.3 to 21.2.7, 21.3.1, 21.3.2, 21.3.4, 21.3.5; Section 23; Section 24; Sections 25.1, 25.2, 25.5, 25.9, 25.10, 25.13, 25.14; Sections 26.1, 26.3.1 (process-related information only), and Section 27 of the technical report.

I am independent of Atlantic Gold Corporation as independence is described by Section 1.5 of NI 43–101.

I have previously co-authored technical reports on the Moose River Consolidated Project as follows:

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., Parks, J., and Fontaine, D., 2018: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, FSSI Consultants (Australia) Pty Ltd., Moose Mountain Technical Services, GHD Limited, and Knight Piésold Ltd for Atlantic Gold Corporation, effective date 24 January, 2018
- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., and Parks, J., 2017: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd. for Atlantic Gold Corporation, effective date 20 July, 2017.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated: 9 May, 2019

"Signed and sealed"

L. Paul Staples, P.Eng.

FSS International Consultants (Australia) Pty. Limited
P.O. Box 493, Beecroft, NSW 2119
Telephone-Fax: (612) 8407 0956
Mobile: 0404 879 931
Email: nas@iprimus.com.au
A.B.N. 69 003 643 801

CERTIFICATE OF QUALIFIED PERSON

I, Neil Schofield, MAIG, am employed as the manager and principal consultant at FSSI Consultants (Australia) Pty Ltd.

This certificate applies to the technical report titled "Moose River Consolidated Mine, Nova Scotia, Canada, NI 43-101 Technical Report" that has an effective date of 25 March, 2019 (the "technical report").

I am a Member in good standing of the Australian Institute of Geoscientists (Member # 2400).

I am a graduate of University of Queensland, Brisbane, Australia with a Bachelor of Science in Geology and hold a degree of Master of Science from the School of Applied Earth Sciences, Stanford University, California, USA. I have worked as a mineral exploration geologist since 1972 and as a geostatistician in mineral resource assessment since 1989. My relevant experience for the purpose of the Technical Report is:

- Exploration for copper and gold projects in both Papua New Guinea and Indonesia.
- Manager of exploration for the Sulawesi Copper-Gold projects in Indonesia.
- Mineral resource estimation and ore control consultant in base and precious metals for the past 30 years.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101).

I most recently visited the Moose River Consolidated Mine from March 11 to March 16, 2019.

I am responsible for Sections 1.1 to 1.2, 1.5 to 1.8, 1.10 to 1.11, 1.23; Section 2; Section 6; Section 7; Section 8; Section 9; Section 10; Section 11; Section 12; Section 14; Sections 25.1, 25.3 to 25.4, 25.6; Sections 26.1, 26.2; and Section 27 of the technical report.

I am independent of Atlantic Gold Corporation as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Moose River Consolidated Phase 2 Project since 2008, in my role as Consulting Geologist on behalf of my current and former employers, FSS International Consultants (Australia) Pty. Ltd. and Hellman & Schofield Pty. Ltd.

I have previously authored or co-authored the following reports on deposits within the Moose River Consolidated Project:

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., Parks, J., and Fontaine, D., 2018: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, FSSI Consultants (Australia) Pty Ltd., Moose Mountain Technical Services, GHD Limited, and Knight Piésold Ltd for Atlantic Gold Corporation, effective date 24 January, 2018

FSS International Consultants (Australia) Pty. Limited
P.O. Box 493, Beecroft, NSW 2119
Telephone-Fax: (612) 8407 0956
Mobile: 0404 879 931
Email: nas@iprimus.com.au
A.B.N. 69 003 643 801

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., and Parks, J., 2017: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd. for Atlantic Gold Corporation, effective date 20 July, 2017.
- Parks, J., Schulte, M., Schofield, N., Meintjes, T., and Scott, K., 2015: NI 43-101 Technical Report Feasibility Study for Moose River Consolidated Project, Nova Scotia: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd for Atlantic Gold Corporation, effective date 2 July, 2015.
- Schofield, N., 2015a: Technical Report of the Fifteen Mile Stream Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Atlantic Gold Corporation, effective date 18 February, 2015
- Schofield, N., 2015b: Technical Report of the Beaver Dam Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Atlantic Gold Corporation, effective date 2 March, 2015
- Schulte, M., Schofield, N., and Thomas, J., 2014: NI 43-101 Technical Report Preliminary Economic Assessment Nova Scotia, Canada: report prepared by Moose Mountain Technical Services, FSSI Consultants (Australia) Pty Ltd, and JAT Metconsult Ltd for Atlantic Gold Corporation, effective date 14 October, 2014.
- Schofield, N., 2014a: Technical Report of the Cochrane Hill Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Spur Ventures Inc, effective date 1 August, 2014.
- Schofield, N., 2014b: Mineral Resource Estimate for the Touquoy Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Spur Ventures Inc, effective date 1 August, 2014.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated: 9 May, 2019.

"Signed"

Neil Schofield, MAIG

Moose Mountain Technical Services
#210 1510 2nd Street North
Cranbrook, BC V1C 3L2
Canada
www.moosemmc.com

CERTIFICATE OF QUALIFIED PERSON

I, Marc Schulte, P.Eng. am employed as a Mining Engineer with Moose Mountain Technical Services, with an office address of #210 1510 2nd Street North Cranbrook, BC V1C 3L2.

This certificate applies to the technical report titled "Moose River Consolidated Mine, Nova Scotia, Canada, NI 43-101 Technical Report" that has an effective date of 25 March, 2019 (the "technical report").

I am a member of the self-regulating Engineers Nova Scotia. (#10895). I graduated with a Bachelor of Science in Mining Engineering from the University of Alberta in 2002.

I have worked as a Mining Engineer for a total of 17 years since my graduation from university. I have worked on precious metals, base metals and coal mining projects, including mine operations and evaluations.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101).

My most recent site visit was from January 7–13, 2018.

I am responsible for Sections 1.1, 1.2, 1.12, 1.13, 1.18, 1.19, 1.23; Section 2; Section 15; Section 16; Sections 18.5, 18.6; Section 20.7; Sections 21.1, 21.2.1, 21.2.2, 21.2.6, 21.2.7, 21.3.1, 21.3.2, 21.3.3; Sections 25.1, 25.7, 25.8, 25.10, 25.13, 25.14; Sections 26.1, 26.3.1 (mining-related only); and Section 27 of the technical report.

I am independent of Atlantic Gold Corporation as independence is described by Section 1.5 of NI 43–101.

I have previously co-authored the following reports on the Moose River Consolidated Project:

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., Parks, J., and Fontaine, D., 2018: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, FSSI Consultants (Australia) Pty Ltd., Moose Mountain Technical Services, GHD Limited, and Knight Piésold Ltd for Atlantic Gold Corporation, effective date 24 January, 2018

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., and Parks, J., 2017: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd. for Atlantic Gold Corporation, effective date 20 July, 2017

- Parks, J., Schulte, M., Schofield, N., Meintjes, T., and Scott, K., 2015: NI 43-101 Technical Report Feasibility Study for Moose River Consolidated Project, Nova Scotia: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd for Atlantic Gold Corporation, effective date 2 July, 2015

- Schulte, M., Schofield, N., and Thomas, J., 2014: NI 43-101 Technical Report Preliminary Economic Assessment Nova Scotia, Canada: report prepared by Moose Mountain Technical

Services, FSSI Consultants (Australia) Pty Ltd, and JAT Metconsult Ltd for Atlantic Gold Corporation, effective date 14 October, 2014.

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated: 9 May, 2019

"Signed and sealed"

Marc Schulte, P.Eng.

Moose Mountain Technical Services
#210 1510 2nd Street North
Cranbrook, BC V1C 3L2
Canada
www.moosemmc.com

CERTIFICATE OF QUALIFIED PERSON

I, Tracey Meintjes, P.Eng. am employed as a Principal with Moose Mountain Technical Services with an office address of #210 1510 2nd Street North, Cranbrook, BC V1C 3L2.

This certificate applies to the technical report titled "Moose River Consolidated Mine, Nova Scotia, Canada, NI 43-101 Technical Report" that has an effective date of 25 March, 2019 (the "technical report").

I am a Professional Engineer in the Province of British Columbia (Licence #37018). I graduated from the Technikon Witwatersrand (NHD Extraction Metallurgy) in 1996.

My relevant experience includes process engineering, project financial evaluation, process operation and supervision, and mine planning in South Africa, North America and South America. I have been working in my profession continuously since 1996. In particular, I have mining, metallurgical and economic evaluation experience in a number of gold projects in Canada, the US, Mexico, and South Africa. I have worked as an engineer in mining and metallurgy for a total of 23 years. I have worked on precious metals, base metals and coal mining projects including mine and plant operations and mine evaluations.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101).

I visited the Touquoy property that is part of the Moose River Consolidated Phase 2 Project on October 26, 2016 and September 1, 2017. I visited the Cochrane Hill and Fifteen Mile Stream sites on 31 August, 2017.

I am responsible for Sections 1.1, 1.2, 1.17, 1.20 to 1.22; Section 2; Section 19; Section 22; Sections 25.1, 25.11, 25.15, 25.16; and Section 27 of the technical report.

I am independent of Atlantic Gold Corporation as independence is described by Section 1.5 of NI 43–101.

I have previously co-authored the following reports on the Moose River Consolidated Project:

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., Parks, J., and Fontaine, D., 2018: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, FSSI Consultants (Australia) Pty Ltd., Moose Mountain Technical Services, GHD Limited, and Knight Piésold Ltd for Atlantic Gold Corporation, effective date 24 January, 2018

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Moose Mountain Technical Services
#210 1510 2nd Street North
Cranbrook, BC V1C 3L2
Canada
www.moosemmc.com

I have read NI 43–101 and the sections of the technical report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated: 9 May, 2019.

"Signed and sealed"

Tracey Meintjes, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

I, James Millard, P.Geo. am employed as Manager Environmental and Permitting, with Atlantic Gold Corporation, located at Suite 3083 - 595 Burrard Street Vancouver B.C. Canada V7X 1L3.

This certificate applies to the technical report titled "Moose River Consolidated Mine, Nova Scotia, Canada, NI 43-101 Technical Report" that has an effective date of 25 March, 2019 (the "technical report").

I am a member (P.Geo.) of the Association of Professional Geoscientists of Nova Scotia; Membership No. 021. I graduated from Brock University with an B.Sc. (Hons) in Geological Science (1986) and from Queens University, with an M.Sc. in Environmental Engineering (1995).

I have practiced my profession for 33 years. I have been directly involved in the management and technical review of all environmental programs related to the Cochrane Hill, and Fifteen Mile Stream Projects. As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 Standards of Disclosure for Mineral Projects (NI 43–101).

Mr. James Millard is based at both the Touquoy Mine site and the Atlantic Gold Halifax office. My most recent visit to Cochrane Hill was on April 4, 2019 and to Fifteen Mile Stream on December 7, 2018.

I am responsible for Sections 1.1, 1.2, 1.16, 1.23; Sections 2.1 to 2.4, 2.6, 2.7; Section 18.4; Sections 20.1 to 20.6, 20.9 to 20.12; Section 25.1, 25.10, 25.12; Sections 26.1, 26.3.2; and Section 27 of the technical report.

I am not independent of Atlantic Gold Corporation as independence is described by Section 1.5 of NI 43–101.

I have worked at the Touquoy Mine site since May 2017.

I have previously co-authored technical reports on the Moose River Consolidated Project as follows:

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., Parks, J., and Fontaine, D., 2018: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, FSSI Consultants (Australia) Pty Ltd., Moose Mountain Technical Services, GHD Limited, and Knight Piésold Ltd for Atlantic Gold Corporation, effective date 24 January, 2018

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., and Parks, J., 2017: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd. for Atlantic Gold Corporation, effective date 20 July, 2017

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Dated: 9 May, 2019

"Signed and sealed"

James Millard, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

I, Daniel Fontaine, P.Eng. am employed as a Specialist Engineer and Associate with Knight Piésold Ltd., with a business address at 1400 – 750 West Pender Street, Vancouver, British Columbia, V6C 2T8.

This certificate applies to the technical report titled "Moose River Consolidated Mine, Nova Scotia, Canada, NI 43-101 Technical Report" that has an effective date of 25 March, 2019 (the "technical report").

I am a registered Professional Engineer in Nova Scotia (license number 11856) and in British Columbia (license number 36208). I graduated from McGill University in 2006 with a bachelor's degree in Civil Engineering.

I have practiced my profession for over 12 years since graduation. I have been directly involved in performing and overseeing geotechnical engineering design, tailings management and water management studies, and environmental assessments for mining projects during this time.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101).

I visited the Touquoy mine site on 13 October, 2017. I most recently to the Fifteen Mile Stream area on July 3 and November 16, 2018, and the Cochrane Hill area on July 4, 2018

I am responsible for Sections 1.1, 1.2, 1.16.3, 1.16.4; 1.18; Sections 2.1 to 2.4, 2.6, 2.7; Sections 18.4, 18.7; Sections 20.3.3, 20.8.3, 20.8.4; Sections 21.2.6, 21.2.7; Sections 25.1, 25.10, 25.12; Sections 26.1, 26.3.1 (tailings only); and Section 27 of the technical report.

I am independent of Atlantic Gold Corporation as independence is described by Section 1.5 of NI 43–101.

I have previously co-authored a technical report on the Moose River Consolidated Project as follows:

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., Parks, J., and Fontaine, D., 2018: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, FSSI Consultants (Australia) Pty Ltd., Moose Mountain Technical Services, GHD Limited, and Knight Piésold Ltd for Atlantic Gold Corporation, effective date 24 January, 2018

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As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated: 9 May, 2019

"Signed and sealed"

Daniel Fontaine, P.Eng.

Knight Piésold Ltd.
Suite 1400 - 750 West Pender Street
Vancouver, BC V6C 2T8
Canada
www.knightpiesold.com

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Figures

1.0 SUMMARY

1.1 Introduction

Mr. Paul Staples, P.Eng., Mr. Neil Schofield, MAIG, Mr. Marc Schulte P.Eng., Mr. Tracey Meintjes, P.Eng., Mr. James Millard P.Geo., Mr. Jeff Parks P.Geo., and Mr. Daniel Fontaine P.Eng., have prepared an NI 43-101 Technical Report (the Report) on the Moose River Consolidated Mine (the Project) for Atlantic Gold Corporation (Atlantic Gold). The Moose River Consolidated Operation is located in Nova Scotia, Canada.

The Project as currently defined includes the Touquoy Gold Mine and the Beaver Dam, Fifteen Mile Stream and Cochrane Hill deposits.

1.2 Terms of Reference

The Report has been prepared in support of disclosures in Atlantic Gold's news release dated 25 March 2019 entitled "Updated MRC Production Schedule, mineral reserves increase by 401,000 ounces or 27%, mine life increases to 10+ years, total mineral reserves of 1.9 million ounces, compound annual growth rate of production of 21%, Cochrane hill pit open at depth and to the east further mine life potential at 149 and other regional targets".

A portion of this Report is supported by information from a feasibility study completed in 2015 (2015 Feasibility Study) on the Touquoy and Beaver Dam deposits, a pre-feasibility study completed in 2018 (the 2018 Pre-Feasibility Study) that incorporated the Fifteen Mile Stream and Cochrane Hill deposits as an expansion to the current Touquoy operations and planned Beaver Dam Mine. A life-of-mine (LOM) plan (LOMP) was prepared in 2019 for all four deposits (the 2019 LOMP).

Mineral Resource and Mineral Reserve estimates were performed in accordance with the 2003 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines, and reported in accordance with the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (2014 CIM Definition Standards).

Units used in the report are metric units unless otherwise noted. Monetary units are in Canadian dollars (C$) unless otherwise stated.

1.3 Project Setting

The Project consists of four property areas. The Touquoy property is located 60 km northeast of the Provincial capital, Halifax, in Halifax County, and is centred on the former mining village of Moose River Gold Mines. The Beaver Dam property is also located in Halifax County, approximately 85 km northeast of Halifax. The Fifteen Mile

Stream property is situated 100 km northeast of Halifax in Halifax County, while the Cochrane Hill property is located 13 km north of Sherbrooke in Guysborough County.

All properties can be accessed via paved or gravel roads. The closest international airport is the Halifax Stanfield International Airport about 25 km north of Halifax. Where needed, supplies can be shipped through the Port of Halifax.

Northern temperate zone climatic conditions are present, and mining operations are conducted year-round. Mineral exploration programs can efficiently be undertaken during the period of May through late November, while winter programs can be accommodated with appropriate allowance for weather delays.

1.4 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

Atlantic Gold currently holds 32 Exploration Licences and one Mineral Lease associated with the Moose River Consolidated Mine with a collective area of 194.96 km^2.

The tenures that host the operating or planned mining operations, Mineral Resources and Mineral Reserves include:

- The Touquoy property consists of one Mineral Lease (ML 11-1) comprising 49 claims and covering 793 ha, and one adjoining Exploration Licence (EL 10377) comprising 64 claims and covering 1,036 ha;
- Exploration Licence 50421 at the Beaver Dam property covers an area of approximately 1,230 ha;
- The Fifteen Mile Stream property consists of three Exploration Licences (EL 52901, EL 10406 and EL 05889), covering a surface area of approximately 728 ha;
- Mineral tenure at the Cochrane Hill property consists of EL 51477, covering a total area of 1,230 ha.

Atlantic Gold (through a wholly owned subsidiary, Atlantic Mining NS Corp. (formerly DDV Gold Ltd or DDV Gold) has an effective 63.1% interest in the Touquoy property through direct ownership of 60% and its 7.9% beneficial interest in Moose River Resources Inc. (MRRI), and has 100% ownership interest in the remaining deposits, and the surrounding exploration properties.

All of the private land required for the development of the Touquoy Mine was acquired prior to the start of operations. A Crown land lease to seven parcels of Crown land was granted in June 2014. The lease is for a 10-year term, renewable for a further 10 years. Negotiations will be required with the surface rights holders prior to any mining development at Beaver Dam, Fifteen Mile Stream and Cochrane Hill.

The key royalties that are likely to be payable based on the current deposit outlines are as follows:

- Touquoy: 1% net smelter royalty (NSR) on all metals produced payable to Maverix Metals Inc. (formerly Corner Bay Minerals Inc.);
- Beaver Dam: A variable NSR payable to Acadia Mineral Ventures Limited. Royalty amounts are based on the average grade of mined material and range from 0.6% at an average grade of 4.7 g/t Au or less, up to 3% at an average grade of 10.9 g/t Au or more. Some $300,000 is available as credit against future royalties at a maximum of 50% per royalty payment, payable twice a year;
- Fifteen Mile Stream: a 1% NSR over EL (formerly Special Licence 90/11), payable to Metalla Royalty & Streaming Ltd, and a 3% NSR payable to Mr. Scott Grant of Pictou, Nova Scotia, with Atlantic Gold able to purchase up to 2% of that royalty from Mr. Grant for $500,000 for the first percentage point and $1,000,000 for the second percentage point, or pro-rata for parts thereof;
- Cochrane Hill: 3% NSR on all metals produced payable to Mr. Scott Grant. Up to 2% of the NSR is available for purchase for $1.5 M.

Two additional royalties are current, one at Beaver Dam, the second at Fifteen Mile Stream; however, the ground holdings subject to the royalties are remote from the current Mineral Resource estimate outlines for the two deposits.

In Nova Scotia, a water withdrawal approval is required to be sought from Nova Scotia Environment in the event that more than 23,000 L/d is to be extracted from a surface water course. Since a positive water balance prevails throughout the Province, except possibly in the driest of months (July and August) such approvals are generally granted, subject to acceptable conditions.

The Touquoy property claims are held by DDV Gold under an agreement between Atlantic Gold NL, DDV Gold and MRRI. DDV Gold will receive 100% of the Touquoy cash-flow until all exploration, pre-production, capital, financing and other expenditures plus interest have been recouped. Thereafter DDV Gold shares 40% of pre-tax profits with MRRI. This profit-sharing arrangement applies to all production from within the 12 claims comprising the “Development Block”. Having since secured project financing, DDV Gold’s profit-sharing obligation reduces to 25% in respect of all claims not comprising the 12 Development Block claims.

The mineral rights for Beaver Dam, Fifteen Mile Stream and Cochrane Hill are wholly-owned by Atlantic Gold, subject to the above-mentioned royalties.

1.5 Geology and Mineralization

The known deposits within the Project area are considered to be examples of turbidite-hosted mesothermal gold deposits.

The Meguma Terrane of Nova Scotia hosts the Moose River Member, Tangier Member, and Taylors Head Member of the basal greywacke-dominated Goldenville Formation. Gold mineralization is generally hosted in argillite and/or greywacke sequences of the Moose River Member and is associated with regional-scale anticlines. Structural repetition due to folding and faulting may result in thickening of gold-bearing units.

Gold occurs as native gold, and has been observed in a number of settings, including along shear cleavage, hair line fractures; in pressure shadows; as inclusions; on the margins of sulphide grains; in thin, bedding-parallel quartz veins and stringers. Mineralization is associated with sulphides, including arsenopyrite, pyrite and pyrrhotite. Lesser chalcopyrite, galena, and sphalerite have been observed.

1.6 History

Companies that have been involved with the Project include Westminer Canada Ltd, Seabright Explorations Inc, NovaGold Resources Inc, Moose River Resources Inc, CanNova Goldfields Inc, M.E.X. Explorations, Acadia Mineral Ventures, Adamas Resources Corp, Aurogin Resources Ltd, Coxheath Gold Holdings, Tempus Corporation, Massval Mines Limited, Northumberland Mines Ltd, Inco Limited; Scotian Mineral Exploration Venture, Acadian Mining, Acadian Gold, Diamond Ventures NL and most recently, Atlantic Gold.

Work completed has included geological mapping and prospecting; soil geochemical surveys; magnetic, very low frequency electromagnetic (VLF-EM), horizontal loop EM and induced polarization (IP) and resistivity geophysical surveys; underground bulk sampling; metallurgical testwork; interface, reverse circulation (RC), and core drilling; Mineral Resource and Mineral Reserve estimates; mining studies; geotechnical, hydrogeological studies, environmental, permitting and social studies; and mine development activities.

The Moose River Consolidated Gold Mine at Touquoy was officially opened on 11 October, 2017, and commenced commercial production on commercial production effective March 1, 2018. Production to 31 December, 2018 was 90,531 gold ounces.

1.7 Drilling and Sampling

Core drilling was used for exploration programs testing geochemical and geophysical anomalies, deposit delineation and infill drilling, metallurgical testwork samples, geotechnical and hydrogeological information. Interface and RC drilling were used in support of definition of certain lithological units (interface programs), condemnation drilling (interface programs) and as step-out and check drilling of mineralization trends (RC programs).

Drilling has used primarily NQ (47.6 mm diameter) core. Some drill holes at Touquoy were HQ (63.5 mm) or PQ (85mm) size. A grade control program at Touquoy in 2006 was completed using BQ (37 mm) size. Drilling performed by Massval and Northumberland at Cochrane hill used AQ (30.5 mm) and BQ sizes.

Drilling completed to 21 December 2018 includes:

- Touquoy: 834 drill holes (43,676 m) were completed in the property area. Of this total, 364 drill holes (33,816 m) support Mineral Resource estimates.;
- Beaver Dam: 764 drill holes (80,393 m) have been completed in the property area. Of this total, 184 drill holes (28,632 m) support Mineral Resource estimates.;
- Fifteen Mile Stream: 883 drill holes (123,365 m) have been completed in the property area. Of this total, 395 drill holes (52,179 m) support the Mineral Resource estimates.;
- Cochrane Hill: 615 drill holes (78,614.5 m) have been completed in the property area. Of this total, 326 drill holes (52,697 m) support Mineral Resource estimates.

Drilled thicknesses are generally greater than true thicknesses, depending on the dip of the mineralization, and the angle of the drilled hole.

Drill core logging procedures during Atlantic Gold's programs were described on a metre-by-metre basis with regards to lithology, texture, sulphide mineralization, alteration, quartz veining, structure, and in some cases magnetic susceptibility. All drill core has been photographed both wet and dry. Core recovery and rock quality designation (RQD) were measured for each hole at the same metre-by-metre intervals. Information was initially captured using logging sheets; later programs used direct computer entry. Core recoveries during the Atlantic Gold programs were very good overall.

Drill collars have been captured using global positioning system (GPS) instruments. Holes drilled under the supervision of Atlantic Gold or its subsidiaries have continuously kept the same method of surveying down hole just beneath the drill casing, at approximately 30 m intervals and at the final hole depth. Survey instruments have included Pajari, Sperry-sun, FlexIT and Reflex tools.

Bulk density (specific gravity) determinations have been performed using the water displacement method. Mineral Resource estimates typically use the one value for ore and waste as follows:

- Touquoy: 2.79 t/m^3;
- Beaver Dam: 2.73 t/m^3;
- Fifteen Mile Stream: 2.78 t/m^3;

- Cochrane Hill: 2.77 t/m^3.

Sample lengths have varied depending on the drill program, ranging from about 1 cm to 4.85 m, averaging about 0.9–1 m. Core has been halved for sampling using mechanical core splitters and core saws. Some pre-Atlantic Gold programs submitted whole core. Atlantic Gold's default sample length was 1.0 m, and all half-core samples were sawn.

The main independent laboratories used for sample preparation and analysis include ALS Chemex and SGS; these laboratories hold accreditations for selected analytical techniques. Samples have been typically crushed and pulverized to P_{85} 75 µm. Gold analyses have included fire assays with an atomic absorption spectroscopy (AAS) finish, fire assays with a gravimetric finish, and screen fire assays.

Initial, pre-Atlantic Gold, assaying at Touquoy used a proprietary sample preparation method, known as KMS-15, which used a Kuryluk Mineral Separator to extract the coarse gold from the sample. The resulting material was fire assayed for gold.

Drill programs to 2002 typically relied on quality assurance and quality control (QA/QC) procedures implemented at the analytical laboratory. Later programs incorporated QA/QC sample submissions including blank, duplicate, and standard reference materials (SRMs).

A number of review and resampling programs have been conducted, including:

- Trial grade control reconciliation from the upper edge of the Touquoy Mine. Atlantic Gold concluded that the KMS-15 method generated data that were higher in average grade compared to other methods such as traditional 30FA and screened fire assay;
- Resampling of selected drill core from earlier exploration efforts;
- Nearest neighborhood comparison of grade control data collected from 2017 and 2018 to KMS-15 method-generated data and historic resource data;
- Comparison of grade control model to resource model in areas where estimations are affected by KMS assays.

For the purposes of the current Touquoy Mineral Resource estimate, it was decided to eliminate the 22% assay downgrade used in the 2015 Mineral Resource estimate for KMS-15 method-generated data. However, panels influenced by KMS-15 method assays were downgraded from Measured to Indicated.

Security procedures prior to Atlantic Gold's involvement in the Project are not known, although check sampling and re-examination of core from a large number of drill holes has not shown any sign of sample tampering. During Atlantic Gold programs, core was typically kept in a secure and locked area with limited access. Samples are typically conveyed from the Project site to the laboratory using commercial transport firms.

Sample preparation, analysis, and security procedures undertaken by Atlantic Gold are generally performed in accordance with exploration best practices and industry standards.

1.8 Data Verification

Internal data verification programs have included review of QA/QC data, re-sampling and sample reanalysis programs, and database verification for issues such as overlapping sample intervals, duplicate sample numbers, or lack of information for certain intervals. Validation checks are performed on data used to support estimation, and comprise checks on surveys, collar co-ordinates, lithology data, and assay data.

A review of the Touquoy database was conducted in 2007 by external consultants, Hellman and Schofield.

The QP made a short tour of the Touquoy pit to view the geology exposed by the mining and to verify the collars of selected recent drill holes. The tour also allowed a good view of the structural complexity of the geology being exposed in the southern wall of the pit. The QP undertook a detailed comparison of nearest neighbour resource and grade control sample composites to verify that these methods of sampling the Touquoy mineralization were generating compatible data sets. The analysis confirmed that the data sets were reasonably closely comparable.

The QP personally reviewed core from two mineralized intersections of drill holes FMS-17-013, FMS-17-059, CH-16-72 and FMS-16-104. These sections indicated significant gold mineralization in the assays. Some visible gold was observed in pyrite in the Fifteen Mile Stream drill holes, and minor visible gold with quartz veining and variable amounts of coarse arsenopyrite was noted in the Cochrane Hill drill holes. The QP located selected drill collars on the ground, and the coordinates were checked using a GPS instrument.

In the opinion of the QP, sufficient verification checks have been undertaken on the databases to provide confidence that the databases are reasonably error free and may be used to support Mineral Resource estimation.

1.9 Metallurgical Testwork

1.9.1 Touquoy and Beaver Dam

A high proportion of the gold contained in the Touquoy mineralization is coarse grained and recoverable by gravity concentration. Metallurgical testwork completed to date on Touquoy and Beaver Dam mill feed material has included: semi-autogenous grind (SAG) milling and associated comminution work, gravity concentration, leaching, carbon adsorption and cyanide detoxification, tailings thickening, and environmental tests.

For block modelling purposes and the Touquoy production schedule, the following formula was derived for calculating gold recoveries:

- % gold recovery = (((h-0.087)/h)*100);

where h = the head grade.

At a head grade of 1.5 g/t Au, this gives a gold recovery of 94.2% and a combined residue grade of 0.10 g/t Au.

Actual Moose River plant recovery data from March 2018 to October, 2018 were reviewed and it was determined that the gold recovery formula used for the 2015 Feasibility Study under-estimated the recoveries from 1.0% to 2.5%. As a simple correction to the 2015 Feasibility Study recovery estimation formula, 1% was added to the recovery formula to reflect the actual experienced recovery. The new updated gold recovery formula is therefore:

- % gold recovery = (((h-0.087)/h)*100+1%);

where h = the head grade.

Using the same approach for Beaver Dam as outlined for Touquoy, and using the average residue grade, the formula becomes:

- % gold recovery = (((h-0.071)/h)*100);

where h = the head grade.

With an average head grade of 1.5 g/t Au, this gives a gold recovery of 95.2%. Considering the very similar recoveries obtained for each deposit and the similar head grades, the average LOM recovery forecast for Touquoy and Beaver Dam is estimated at 94%.

The only known deleterious element at Touquoy is arsenic, levels of which are managed in water discharge from the tailings management facility (TMF) through use of an effluent treatment plant. Ferric sulphate is used in the tailings pump box to deposit a stable arsenic compound in the tailings. A similar management plan will be used for elevated arsenic values at Beaver Dam.

1.9.2 Fifteen Mile Stream and Cochrane Hill

Metallurgical testwork completed to date on Fifteen Mile Stream and Cochrane Hill ore includes: mineralogy, head grade determinations for composites, comminution (SMC, Bond ball mill work index), gravity recoverable gold, conventional rougher tests, open circuit cleaner tests, split circuit flotation tests, circuit performance comparisons, and cyanide leach tests.

In general, the variability and composite samples had higher gold grades than the corresponding mine plan weighted average grade. A comprehensive variability testwork program, based on samples selected according to lithology, location and grade, is being tested at ALS, Kamloops to improve confidence in the metallurgical recovery and variation across the mineralization types. Results are expected mid 2019.

Average recoveries for Fifteen Mile Stream are expected to range from 93% in the first and second years of the mine plan to 79% in the final year of mining when lower-grade material will be processed. The overall average LOM recovery is expected to be 88%.

Average recoveries for Cochrane Hill are expected to range from 93% in the first year of the mine plan to 87% in the final year of mining. The overall average LOM recovery is expected to be 91.4%.

No deleterious elements are expected in the doré. Copper head grades range from 30–140 g/t Cu. Copper reporting to carbon at the Touquoy process plant can be minimised by adjustment of cyanide addition. Alternatively, the copper content will be reduced through the smelting process.

1.10 Mineral Resource Estimation

Multiple indicator kriging (MIK) was used to estimate the Mineral Resources based on an anticipated approach to mill feed material selection in mining. The basic unit of estimation is a panel with horizontal dimensions equal to the average drill hole spacing.

Depending on the deposit, samples were composited to either 1 m or 2 m intervals. Statistical properties of the composites were reviewed in terms of histogram and spatial continuity to identify areas of consistent mineralization style. For a number of the resource models, a single mineralized domain was used. However, in Cochrane Hill, Fifteen Mile Stream Egerton Zone, and Touquoy, distinctly different mineralization styles with clearly different histograms of composite grade were identified and modelled with different parameters. Typically grade capping was not considered to be warranted; however, some high-grade samples in the Fifteen Mile Stream database were top-cut.

Where possible, directional sample variograms and variogram models were generated for the domains, and the resulting data used to inform estimation search criteria.

The resource estimates assume mining ore selection in all deposits will take place on 5m flitches with a minimum mining width of around 5 m. For all deposits, following variance adjustment, the resultant block histograms were assumed to be log-normal in shape. The variance included an adjustment for the information effect introduced by grade control sampling. A grade control drill hole pattern of 10 m by 5 m with a down-hole sampling interval of 2.5 m was assumed for Touquoy, Cochrane Hill and the Fifteen Mile Stream zones of Egerton and Hudson. The assumptions for the remaining deposits of Plenty and Beaver Dam was a 5 m by 5 m pattern, with a down-hole sampling interval of 2.5 m.

Block model validation indicated no major biases in the estimates.

The resource estimate for each panel was initially classified as Category 1, 2 or 3 based on the results of octant data searches in the panel neighbourhood. The number of composites required to inform an estimate varied by deposit and by category. Typically, Category 1 panel estimates were assigned to Measured Mineral Resources, Category 2 to Indicated Mineral Resources and Category 3 to Inferred Mineral Resources. An additional constraint on the Touquoy estimate was applied to take into account the uncertainty associated with the KMS-15 data that were used in the resource estimation. Panel estimates that are significantly affected by KMS-15 data in their neighbourhood and were initially assigned a category 1 flag were downgraded to a category 2 flag. This condition was activated if the weighted proportion of KMS-15 samples in the neighbourhood exceeded 0.20. Approximately 5 Mt of mineralization affected by the KMS-15 sampling was downgraded from Measured to Indicated.

Mineral Resources are reported to various gold cut-off grades.

Mineral Resources at Touquoy and Beaver Dam were initially classified using the 2004 JORC Code, and have been reconciled to the 2014 CIM Definition Standards. Mineral Resources for the Fifteen Mile Stream and Cochrane Hill deposits were reported using the 2014 CIM Definition Standards.

1.11 Mineral Resource Statement

All Mineral Resource Estimates have the effective date of February 15, 2019. The Qualified Person for the estimates is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd, who is independent of Atlantic Gold. Mineral Resources are summarized in Table 1-1 for Touquoy, Table 1-2 for Beaver Dam, Table 1-3, Table 1-4 and Table 1-5 for Fifteen Mile Stream, and Table 1-6 for Cochrane Hill.

Factors that may affect the estimates include: metal price assumptions, changes in interpretations of mineralization geometry and continuity of mineralization zones, changes to MIK panel assumptions, metallurgical recovery assumptions, operating cost assumptions, confidence in the modifying factors, and changes in land tenure requirements or in permitting requirements from those discussed in this Report. In the case of Beaver Dam, Fifteen Mile Stream, and Cochrane Hill, additional assumptions include that surface rights to allow mining infrastructure to be constructed will be forthcoming, and that there will be no delays or other issues arising in reaching agreements with local or regulatory authorities and stakeholders.

Table 1-1: Mineral Resource Statement, Touquoy

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (Au oz x 1,000)
Measured	3.40	1.14	124.3
Indicated	7.86	1.27	320.7
Total Measured and Indicated	***11.26***	***1.23***	***445.1***
Inferred	1.14	1.30	47.8

Notes to accompany Touquoy Mineral Resource table:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported inclusive of Mineral Reserves. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. Mineral Resources are reported at a base case cut-off grade of 0.3 g/t Au. The cut-off grade includes the following considerations: assumption of open pit mining methods; gold price of US$1,400/oz; 94% metallurgical recovery; pit bench face angles that range from 40–65º; mining costs of $13.40/t; processing costs of $11.94/t, and general and administrative (G&A) costs of $1.71/t.
4. Estimates have been rounded, and may result in summation differences.

Table 1-2: Mineral Resource Statement, Beaver Dam

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (Au oz x 1,000)
Measured	5.10	1.28	209.4
Indicated	4.59	1.23	182.1
Total Measured and Indicated	***9.69***	***1.26***	***391.5***
Inferred	1.03	1.41	46.7

Notes to accompany Beaver Dam Mineral Resource table:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported inclusive of Mineral Reserves. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. Mineral Resources are reported at a base case cut-off grade of 0.3 g/t Au. The cut-off grade includes the following considerations: assumption of open pit mining methods; gold price of US$1,400/oz; exchange rate of C$1:US$0.90; 95% metallurgical recovery; pit bench face angles that range from 40–70º; mining costs of $2.90/t mined, and a $0.015/t bench increment; process costs of $13.51/t milled; and general and administrative (G&A) costs of $1.71.
4. Estimates have been rounded, and may result in summation differences.

Table 1-3: Mineral Resource Statement, Fifteen Mile Stream Egerton Zone

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	3.38	1.22	132.9
Indicated	11.18	1.14	410.7
Total Measured and Indicated	***14.57***	***1.16***	***543.5***
Inferred	1.36	1.28	55.8

Notes to accompany Fifteen Mile Stream Mineral Resource tables:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t; process costs (including general and administrative (G&A) cost) of C$11.73/t; process recovery of 95%; and overall pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.

Table 1-4: Mineral Resource Statement, Fifteen Mile Stream Hudson Zone

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	0.81	0.88	22.7
Indicated	0.99	0.70	22.2
Total Measured and Indicated	***1.80***	***0.78***	***44.9***
Inferred	0.43	0.98	13.5

Notes to accompany Fifteen Mile Stream Mineral Resource tables:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t; process costs (including general and administrative (G&A) cost) of C$11.73/t; process recovery of 95%; and overall pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.

Table 1-5: Mineral Resource Statement, Fifteen Mile Stream Plenty Zone

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	1.71	1.08	59.5
Indicated	0.94	0.93	28.2
Total Measured and Indicated	***2.66***	***1.03***	***87.7***
Inferred	0.28	1.69	15.0

Notes to accompany Fifteen Mile Stream Mineral Resource tables:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t; process costs (including general and administrative (G&A) cost) of C$11.73/t; process recovery of 95%; and overall pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.

Table 1-6: Mineral Resource Statement, Cochrane Hill

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (Au oz x 1,000)
Measured	10.78	1.12	387.3
Indicated	6.67	1.02	219.2
Total Measured and Indicated	***17.45***	***1.08***	***606.5***
Inferred	1.82	1.24	72.7

Notes to accompany Cochrane Hill Mineral Resource table:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t, process costs (including general and administrative (G&A) cost) of C$11.73/t; 95% process recovery; and overall pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.

1.12 Mineral Reserves

Proven and Probable Mineral Reserves have been modified from Measured and Indicated Mineral Resources at Touquoy, Beaver Dam, Fifteen Mile Stream and Cochrane Hill and are summarized in Table 1-7. Inferred Mineral Resources are set to waste. Mineral Reserves are supported by the 2019 LOMP.

Open pits are based on the results of Lerchs-Grossman (L–G) sensitivity analysis, and then designed into detailed pit phases to develop pit reserves for production scheduling.

Factors that may affect the Mineral Reserves estimates include metal prices, changes in interpretations of mineralization geometry and continuity of mineralization zones, geotechnical and hydrogeological assumptions, ability of the mining operation to meet the annual production rate, process plant and mining recoveries, the ability to meet and maintain permitting and environmental licence conditions, and the ability to maintain the social licence to operate.

1.13 Mining Methods

Mining is based on conventional open pit methods suited for the project location and local site requirements. The mining fleet will include diesel powered down the hole (DTH) drills with 144 mm bit size for production drilling, diesel-powered RC drills for bench-scale grade control drilling, 5 m^3 bucket size diesel hydraulic excavators and 7 m^3 bucket sized wheel loaders for production loading, and 64 t payload rigid-frame haul trucks and 41 t articulated trucks for production hauling, plus ancillary and service equipment to support the mining operations. In-pit dewatering systems will be established for each pit. All surface water and precipitation in the pits will be handled by submersible pumps.

Mine operations will continue at Touquoy and will move to Beaver Dam once the Touquoy open pit is exhausted in 2023. At Touquoy, ore is hauled to a crusher 700 m north of the pit, which feeds the process plant; and waste rock is deposited into a waste rock storage facility (WRSF) 1,000 m east of the pit, or is used as rock fill in construction of the TMF that is located 800 m east of the pit.

Table 1-7: Proven and Probable Mineral Reserves

Mine Area	Reserve Class	Mill Feed (Mt)	Diluted Gold Grade (g/t Au)
Touquoy	Proven	3.36	1.10
	Probable	7.14	1.28
	Existing Stockpile Reserves	2.41	0.57
Beaver Dam	Proven	3.81	1.54
	Probable	3.09	1.43
Subtotal Touquoy and Beaver Dam	*Proven*	*7.17*	*1.33*
	Probable	*10.23*	*1.33*
	Existing Stockpile Reserves	*2.41*	*0.57*
Cochrane Hill	Proven	10.25	1.08
	Probable	5.13	0.96
Fifteen Mile Stream	Proven	5.58	1.09
	Probable	11.18	1.06
Subtotal Fifteen Mile Stream and Cochrane Hill	*Proven*	*15.83*	*1.08*
	Probable	*16.32*	*1.03*
Subtotal Touquoy, Beaver Dam, Fifteen Mile Stream, Cochrane Hill, and Stockpiles	***Proven***	***22.99***	***1.16***
	Probable	***26.55***	***1.14***
	Existing Stockpile Reserves	***2.41***	***0.57***
Grand Total	***Total Proven and Probable***	***51.95***	***1.12***

Notes to accompany the Mineral Reserves table:

1. The Mineral Reserve Estimates were prepared by Marc Schulte, P.Eng. (who is also the independent Qualified Person for these Mineral Reserve Estimates), reported using the 2014 CIM Definition Standards, and have an effective date of March 13, 2019.
2. Touquoy Proven Mineral Reserves include existing stockpiled ore of 2.41 Mt at 0.57 g/t gold grade. This material is not included in, and is additional to, the Mineral Resource estimate.
3. Mineral Reserves are mined tonnes and grade, the reference point is the mill feed at the primary crusher.
4. Mineral Reserves are reported at a cut-off grade of 0.30 g/t Au for Touquoy, Fifteen Mile Stream and Cochrane Hill, and 0.50 g/t Au for Beaver Dam.
5. Cut-off grade assumes US$1,300/oz. Au at a currency exchange rate of 0.77 C$ per US$; 99.9% payable gold; $5.00/oz. offsite costs (refining and transport), a 2% royalty; and uses a 92% metallurgical recovery. The cut off-grade covers processing costs of $11.00/t at Touquoy, $8.22/t at Fifteen Mile Stream, $8.64/t at Cochrane Hill, and $18.00/t at Beaver Dam and general and administrative (G&A) costs of $2.50/t.
6. Mining recovery of 98.4% and external mining dilution of 1.6% at 0.20 g/t Au grade is applied in addition to the modelled in-block dilution.
7. As Touquoy is an ongoing operation, a surveyed topographic surface dated December 31, 2018 is used as the basis for the Mineral Reserves.
8. Numbers have been rounded as required by reporting guidelines.

At Beaver Dam, ore will be hauled to a crusher that will be located 600 m south of the pit, and then crushed ore will be hauled by on-highway haulers from Beaver Dam to the process plant at Touquoy operations; and waste rock will be deposited into WRSFs to be situated 650 m south and 1,650 m west of the pit. Mine planning and mining cost estimates are limited to the mining and delivery of ore to the crusher and waste rock to the planned destinations. The haul of ore from Beaver Dam to Touquoy is not covered under the mine plan or mining costs.

Two independent stand-alone open pit operations at Fifteen Mile Stream and Cochrane Hill will run concurrently with the Touquoy and Beaver Dam operations. At Fifteen Mile Stream, ore will be hauled to a crusher that will be located 1,500 m southeast of the pit, which will feed the process plant. Waste rock will be split into potentially acid-generating (PAG) and non-potentially acid generating (NPAG) material and deposited into WRSFs to be situated 700 m south of the pit or will be used as rock fill in construction of the TMF to be located 1,700 m east of the pit.

At Cochrane Hill, ore will be hauled to a crusher to be situated 1,200 m east of the pit, which will feed the process plant. Waste rock will be split into PAG and NPAG material and will be deposited into a WRSFs to be located 700 m north of the pit or will be used as rock fill in construction of the TMF that will be situated 1,300 m southeast of the pit.

Ultimate pit limits are split into phases or pushbacks to target higher economic margin material earlier in the mine life:

- The Touquoy pit is split into north, south and east phases with the higher-grade, lower strip ratio north phase mined ahead of the south and east phase pushbacks. From the start of 2019 a 4.5-year pit production schedule is developed;
- The Beaver Dam ultimate pit is subdivided into two phases, south and north, but for considerations of vertical advance the pit is mined as one phase from top to bottom. The Beaver Dam material adds another 3.5 years to the pit production schedule;
- At Fifteen Mile Stream, the Egerton–MacLean pit is split into south and north phases with the higher-grade and lower strip ratio south phase mined ahead of the north phase. The Hudson and Plenty pits are mined as one phase each. Starting in 2021 an 8.5-year mine production schedule is developed;
- The Cochrane Hill pit is split into south and north phases with the higher-grade south phase mined ahead of the north phase. A starter phase is also designed to provide waste rock construction materials to the starter tailings dam. Starting in 2022 an eight-year mine production schedule is developed.

During the pre-stripping phase of mine operations, all ore mined in the pit will be stockpiled. Throughout the life of operations, all ore grading between 0.30 and 0.50 g/t Au will be stockpiled. As of December 31, 2018, the existing Touquoy stockpiles hold

2.4 Mt of ore grading 0.57 g/t Au. The stockpiles will accommodate and additional 1.5 Mt at Touquoy, 4.8 Mt at Cochrane Hill, and 6.0 Mt at Fifteen Mile Stream. The stockpiled Mineral Reserves are planned to be re-handled back to the crusher once the pits are exhausted.

Mining operations will be based on 365 operating days per year with two 12 hour shifts per day. An allowance of 12 days of no mine production has been built into the mine schedule to allow for adverse weather conditions.

Maintenance on mine equipment will be performed in the field with major repairs to mobile equipment in the shops located near the plant facilities.

Annual mine operating costs per tonne mined range from $2.60–$4.10/t with a LOM average of $3.00/t mined (including capitalized pre-production). Mine operations will include ore control and production drilling, blasting, loading, hauling, and pit, haul road and WRSF maintenance functions. Mobile equipment maintenance operations will also be managed by the Owner and are included in the mine planning and costs. Lease and finance charges on mobile equipment are also included in the mine operating cost estimate.

After mining is completed, the mining equipment will be removed, and the pits will be allowed to fill with water producing ponds. Contouring and re-vegetation of the fill areas will be completed. All mine buildings will be removed.

The summarized mine schedule is shown in Table 1-8. Figure 1-1 summarizes the proposed ore and waste schedule for the 2019 LOMP.

1.14 Recovery Methods

The Touquoy process plant is located east of Moose River, northeast of the Touquoy open pit and northwest of the TMF. The process design assumes a conventional flowsheet, including crushing, grinding, gravity recovery, carbon-in-leach (CIL), cyanide destruction, desorption/electrowinning/refining and tailings management.

The Touquoy process plant is designed for an ore treatment rate of 2.0 Mt/a or 250 t/h based on an availability of 8,000 h/a, or 91.3%.

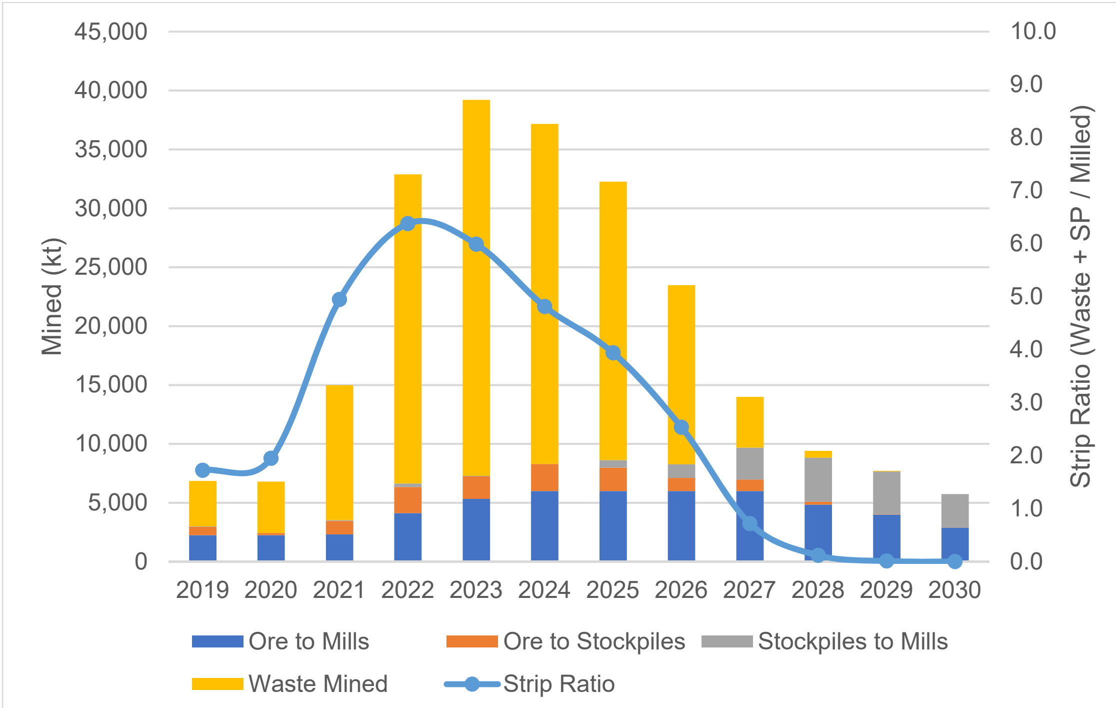
Currently, processing rates for Touquoy ore are in the order of 2.24 Mt/a representing a 12% increase over design which is reflected in the 2019 LOMP for Touquoy operations.

Touquoy personnel continue to improve plant efficiencies and costs over and above design and have achieved significant reductions in cyanide consumption compared to design whilst maintaining high recoveries.

Table 1-8: Summarized Mine Production Schedule

Item	**Unit**	**LOM**	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total ore milled	*kt*	*51,954*	*2,240*	*2,240*	*2,315*	*4,115*	*5,330*	*6,000*	*6,000*	*6,000*	*6,000*	*4,844*	*4,000*	*2,869*
Gold grade	*g/t*	*1.12*	*1.42*	*1.51*	*1.29*	*1.40*	*1.44*	*1.41*	*1.31*	*1.10*	*0.92*	*0.74*	*0.54*	*0.42*
Total ore mined from pit	kt	49,540	2,927	2,435	3,374	6,031	7,191	8,292	7,324	5,946	4,271	1,338	411	0
Gold grade	g/t	1.15	1.22	1.42	1.15	1.10	1.21	1.17	1.14	1.07	1.03	1.10	1.17	0.00
Total waste mined	*kt*	*150,508*	*3,859*	*4,365*	*11,454*	*26,247*	*31,920*	*28,879*	*23,637*	*15,207*	*4,310*	*580*	*51*	*0*
Strip ratio (waste/ore milled)		2.9	1.7	1.9	4.9	6.4	6.0	4.8	3.9	2.5	0.7	0.1	0.0	0.0
Cumulative strip ratio			1.7	1.8	2.9	4.2	4.8	4.8	4.6	4.3	3.7	3.3	3.1	2.9
Total material mined	*kt*	*200,048*	*6,786*	*6,800*	*14,828*	*32,278*	*39,110*	*37,171*	*30,960*	*21,154*	*8,581*	*1,918*	*462*	*0*
Cumulative material mined	kt		6,786	13,586	28,414	60,692	99,802	136,973	167,933	189,087	197,668	199,586	200,048	200,048
Total material moved	kt	215,255	6,816	6,800	14,903	32,578	39,160	37,171	31,610	22,312	11,288	5,662	4,086	2,869

Figure 1-1: Mine Production Schedule



Note: Figure prepared by Moose Mountain, 2019.

The crushing circuit is designed to operate at 60% availability since it operates outdoors and uses modular mobile equipment. It will accept Touquoy ore for the first five years of operation and thereafter ore from the Beaver Dam deposit at the same treatment rate using the same unit operations. The process equipment is sized to treat either of the ore types. The main difference between the ores is that the Beaver Dam ore is harder and has a higher abrasion index.

Two stand-alone 2 Mt/a capacity concentrators are proposed for Fifteen Mile Stream and Cochrane Hill. Both plants include primary, secondary and tertiary crushing, followed by grinding by a ball mill in a closed circuit with hydrocyclones. Centrifugal gravity concentrators will recover primary cyclone underflow gravity recoverable gold (GRG). Fifteen Mile Stream has relatively softer ore with higher GRG than Cochrane Hill ore. Fifteen Mile Stream ore shall be ground to P_{80} of 150 µm to maximize the recovery of GRG. The primary cyclone overflow will report to conventional flotation to recover both free and sulfide gold. Gold concentrate will be thickened and pressure-filtered before being transported by truck to the Touquoy process plant. The final tailings will be pumped to a TMF.

Cochrane Hill has relatively harder ore with lower GRG than Fifteen Mile Stream. A split flotation circuit with HydroFloat™ will be employed to minimize operating cost with much coarser grind of 350 µm P_{80}. The fines will report to conventional flotation cells and the coarse will report to HydroFloat™ cells to produce gold concentrate. Gold concentrate will be thickened and pressure-filtered before being transported by truck to the Touquoy process plant. The final tailings from both fines conventional flotation and HydroFloat™ circuit will be pumped to a TMF.

An additional trade-off study was completed to asses various comminution circuit options for Fifteen Mile Stream. The study examined the relative merits of a two-stage cone crushing and ball milling (3CB) circuit versus a semi-autogenous grind (SAG) mill in closed circuit with pebble crusher and ball milling (SABC) circuit. Three options were analyzed:

- Option 1: primary jaw crusher followed by SABC;
- Option 2: primary jaw crusher followed by 3CB, to design standards common in the industry;
- Option 3: Semi-mobile crushing plant followed by single stage ball milling, similar to the current plant at Touquoy.

Capital and operating costs for the circuit options at a nominal plant capacity were developed. Atlantic Gold made the decision to proceed with a feasibility study based on a SABC circuit as this alternative offered the lowest operating cost accompanied by an intermediate capital cost when compared to three-stage crushing. In addition, the SABC circuit can offer advantages to overcome materials handling issues, as it can provide operational flexibility, higher availability and lower maintenance costs. A similar assessment of comminution options is also recommended for Cochrane Hill for the recommended feasibility study.

Plant operation will require reagent storage, air, and water services at each site.

1.15 Project Infrastructure

The Touquoy property can be accessed via 110 km of sealed road from Halifax to Moose River. The administration area is accessed via a 1.3 km gravel access road from Mooseland Road. Major onsite roads at Touquoy include the ore haulage and waste haulage roads. Access to the Beaver Dam administration area will be via the 7.5 km Beaver Dam road from Provincial Highway 224 in combination with the upgraded 30 km corridor used for ore haulage from Year 6. Ore will be transported from the Beaver Dam site to the Touquoy mine site by semi-trailer trucks using a 9-axle B-train configuration carrying a 50 t payload. The trucks will travel a total distance of 30 km between the two sites, over four, either upgraded or new sections of road. A well-maintained bituminized road (Provincial Highway 374), which connects several large towns in Pictou County (Stellarton, New Glasgow) with the coastal community of Sheet Harbour, will provide access to the Fifteen Mile Stream site. The administration office and plant site will be accessed via a 5 km mine access road. In addition to the mine access road, three major ex-pit haul roads to haul ore and waste material will be constructed using the mine fleet during the pre-production period. A well-maintained bituminized road (Provincial Highway 7) linking the village of Sherbrooke and the town of Antigonish will provide access to the Cochrane Hill site. A 2 km site access road will be constructed to link the site facilities to Provincial Highway 7. To allow development of the proposed open pit, and to prevent the need to shut down the public highway during blasting operations, a 2.9 km section of Provincial Highway 7 will be relocated approximately 300 m to the west. In addition to the mine access road, three major ex-pit haul roads to haul ore and waste material will be constructed.

Built infrastructure supporting the Touquoy Mine operations includes administration offices, control room complex, mill maintenance office, process plant building, reagent storage, laboratory, workshop and warehouse and the main plant motor control centre room. As ore will be transported to Touquoy for processing, building infrastructure at Beaver Dam will be limited. Building infrastructure will consist of a small workshop and warehouse facility. The infrastructure requirements for Fifteen Mile Stream and Cochrane Hill will include administration offices, gatehouse, mining office and change room, process plant, plant office and change room, plant workshop, and reagents and consumables storage.

At Touquoy, the power supply comes from a connection to the Provincial distribution grid. The power demand at Beaver Dam is insufficient to justify providing permanent grid supply. Therefore two (duty/standby) self-contained, skid-mounted 500 kW diesel powered generators will provide the required 600 V electrical power for Beaver Dam surface consumers. The Fifteen Mile Stream site will be connected to the power grid by a 1 km overhead power line connected to the 69 kV line that runs adjacent to the planned Fifteen Mile Stream mine site. The closest point of power supply for the Cochrane Hill site is the 25 kV circuit 57C-426 located at the Salmon River Substation. To connect the site to the substation it is necessary to upgrade a 4 km section of overhead single-phase line, and to build an additional 9 km of overhead three phase line to supply the site with 25 kV power.

Concentrates from Fifteen Mile Stream and Cochrane Hill will be transported to the Touquoy process plant along a combination of existing public and private roads. The trucks will complete approximately 6–8 return trips per day at the design production rate.

1.16 Environmental, Permitting and Social Considerations

1.16.1 Touquoy

An Environmental Assessment Registration Document (EARD) was submitted to Nova Scotia Environment (NSE) in March 2007 for the Touquoy gold project, or what is now effectively known as the Touquoy Mine portion of the Moose River Consolidated Gold Operation. Subsequently an Environmental Focus Report was requested by the Minister of Environment and this was submitted in November 2007. Ministerial Environmental Approval for the then Touquoy gold project was granted in February 2008.

The three critical permits required to proceed to mine development, operation and reclamation are the Environmental Assessment Registration and Industrial Approval authorized pursuant to the Nova Scotia *Environment Act*, and the Mineral Lease mandated under the Nova Scotia *Mineral Resources Act*. NSE gave approval of the Environmental Assessment Registration for the Touquoy Mine on February 1, 2008, and granted an Industrial Approval to construct, operate and reclaim on March 24, 2014. Nova Scotia Department of Natural Resources (NSDNR) (now Nova Scotia Energy & Mines (NSEM) granted a Mineral Lease on August 1, 2011.

Other subsidiary and specific permits, including, but not limited to, wetland alteration, water withdrawal approval, public road reclamation and re-alignment, were sought as required, and granted to allow the mine to proceed to production.

Atlantic Gold obtained additional approvals through the applicable Provincial regulatory processes, including an updated Industrial Approval. The Touquoy Gold Mine was commissioned and reached commercial operation on March 1, 2018, as per its approvals.

Runoff from each of the active mine areas is directed into the tailings pond, primarily as a source of process water. Active mine areas include the open pit area, the mill site, the waste rock storage area and the TMF. Mine water from the open pit is also pumped to the tailings pond. Monitoring consists of a network of surface water and groundwater stations throughout the site as prescribed by the Conditions of Industrial Approval issued by NSE.

A detailed reclamation plan was developed as part of the project. The general concept for reclaiming the project site is to remove all buildings and facilities that can be dismantled and return the site to a state that is stable and concordant with the pre-existing conditions or future land use as identified in consultation with stakeholders and regulators. The Touquoy Industrial Approval has conditions that require a security bond to cover reclamation activities, including closure and post-post operation and reclamation monitoring and final closure documentation. The cost of reclamation for Touquoy was established at $10.4 M. The security bond is submitted to the Province progressively; and $8.3 M out of the total $10.4 M estimate has been paid. The remaining $2.1 M is payable in the fall of 2019. The reclamation cost will be re-evaluated six months prior to mine closure, when a Final Reclamation Plan and cost estimate will be submitted to the Province for approval.

There are no First Nations (Mi'kmaq) communities within the Touquoy site boundaries. The closest reserve is Beaver Lake (IR 17), approximately 15 km to the northeast of Touquoy.

No significant archaeological sites were identified during surveys.

1.16.2 Beaver Dam

The Beaver Dam, Cochrane Hill, and Fifteen Mile Stream properties are all subject to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), based on a trigger of 600 t/d or more of production, and a Class 1 Environmental Assessment under the Nova Scotia *Environment Act*, to be conducted concurrently.

The two main environmental approvals required for the project are:

- Federal and Provincial Ministerial Environmental Approval. The terms and conditions generated from the Environmental Assessment will help to guide the requirements for the Industrial Approval Application;
- Provincial Industrial Approval. The Industrial Approval documentation will detail the environmental controls required for the life of the project (pre-construction to post-reclamation) and will include such items as monitoring, environmental controls and management plans.

The Beaver Dam Environmental Impact Statement (EIS) was submitted to the Canadian Environmental Assessment Agency (CEAA) and NSE on June 12, 2017. CEAA and NSE issued Information Requests (Round 1) in August 2017. A revised EIS was submitted by Atlantic Gold on February 28, 2019, and accepted by CEAA, meeting concordance with the Information Requests (Round 1).

Once the Environmental Assessment Registration is approved, as generated from this process, then an Industrial Approval to construct, operate and reclaim will be sought from NSE, and a Mineral Lease will be sought from NSEM.

Following approval of the Beaver Dam Mine EA by CEAA and NSE, an additional three months' work is required to prepare and submit support documents for the Industrial Approval and other approvals such as water withdrawal for pit dewatering, and wetland and watercourse alterations. Preparation of some aspects of the Industrial Approval support documents will be undertaken concurrent with the EA review.

Surface water runoff will be directed to settling ponds where water will be treated prior to release to the environment and/or used for dust suppression at the site.

Reclamation Plan requirements in Nova Scotia include the need to submit a Conceptual Plan at the Environmental Assessment (EA) stage, an interim Reclamation Plan as part of the Industrial Approval stage with updates approximately every three years, and a Final Reclamation Plan to be submitted six months prior to mine closure. A Conceptual Plan was submitted for Beaver Dam as part of the EIS submission. A reclamation security bond will be estimated and negotiated with the Province during the Industrial Approval process. Provisions have been made for this bond in the feasibility study project costs for Beaver Dam. It is anticipated that the bond will be posted to the Province progressively as the project advances.

Destruction of habitat in watercourses and wetlands will require the appropriate alteration permits including Provincial wetland and watercourse permitting processes and expected Fisheries Authorization through Fisheries and Oceans Canada (DFO).

A landowner lease and a Crown land lease must be acquired for the Beaver Dam Mine site and the planned haul road.

The Beaver Dam Mine will be located near the community of Marinette, Halifax County, Nova Scotia, although it is more than 5 km from the nearest domicile. There are no First Nations (Mi'kmaq) communities within the site boundaries. The closest reserve is Beaver Lake (IR 17), 5.5 km from the mine site and 3 km from the haul road. Sheet Harbour IR36 is located 20 km south of the Project.

A review of the Maritime Archaeological Resource Inventory shows no recorded archaeological sites in the project area.

1.16.3 Fifteen Mile Stream

The Fifteen Mile Stream and Cochrane Hill sites have been previously worked as underground mines or have been exploration targets for many years and the Province is aware of the potential for inclusion of the deposits in the larger Moose River Consolidated mining operation.

Environmental permits required to support advanced exploration and environmental baseline studies for Fifteen Mile Stream and Cochrane Hill have been received for the drilling programs completed to date. Additional permits as needed, will be requested from NSE, NSLF and the Provincial Crown Lands group to support future exploratory, geotechnical, and hydrogeological drilling programs.

The main permit required once the EA approval has been received is the Industrial Approval. Crown land permitting will be required for both properties, including the Integrated Resource Management process (IRM). Mineral leases will also be required for both projects, through the NSDEM. In addition, a surface water withdrawal permit, wetland permit, watercourse permits, will be required. There will be a requirement for fisheries authorizations from DFO. The proposed road realignment at Cochrane Hill will need to be approved through the Nova Scotia Transportation Infrastructure Renewal (NSTIR) process.

Baseline environmental studies in respect of the Fifteen Mile Stream Egerton–MacLean deposit commenced in June 2017 and were completed in October 2018 (16 months of seasonally-relevant data). Results will be incorporated into an EIS to be submitted to provincial and federal regulators in Q2, 2019, and to the public, for registration. Further baseline environmental studies will be targeted in future to support the development of the Plenty and Hudson deposits, which will be permitted and developed subsequent to the approval of the Egerton–MacLean deposit.

The environmental assessment review process concludes once the Environmental Assessment (EA) Report is issued by CEAA, and the federal Minister of Environment issues a favourable EA decision statement based on this report that will include enforceable conditions. A simultaneous EA approval provided by the Province will then allow Atlantic Gold to apply for a provincial Industrial Approval and Mineral Lease from NSE and NSDEM, respectively, which will allow it to construct, operate and reclaim the Project.

A total of 16.8 Mt of ore will be milled during the life of the mine at Fifteen Mile Stream to produce a concentrate for shipment to Touquoy. The milling process will produce tailings, which will be disposed of in the Fifteen Mile Stream TMF.

The proposed Egerton–MacLean open pit lies below Seloam Brook, which will necessitate diversion of Seloam Brook around the open pit limits prior to commencement of mining. Seloam Brook will be re-routed into a permanent constructed stream diversion approximately 1,500 m long. Runoff from the active mine areas will be collected and conveyed to the supernatant pond in the TMF, and reused as a source of process water. If runoff complies with applicable water quality criteria, it will be discharged from the site to minimize water accumulation within the TMF. The open pit will be dewatered by pumping and the water recirculated to the TMF.

Surplus water from the TMF supernatant pond will be pumped to a dedicated water treatment plant for treatment and discharged to Anti-Dam Flowage via a gravity discharge pipeline. The water treatment plant for treatment has been included for removal of arsenic and pH adjustment prior to discharge, if required.

Conceptual closure plans will be included in the Fifteen Mile Stream EIS submission. The general concept is to remove all facilities that can be dismantled and return the site to a state that is concordant with the pre-existing conditions or future land use as identified in consultation with stakeholders and regulators.

Environmental permits required to support advanced exploration and environmental baseline studies for Fifteen Mile Stream have been received for the drilling programs completed to date. Additional permits as needed, will be requested from NSE, NSLF and NSEM to support future exploratory, geotechnical, and hydrogeological drilling programs.

Fifteen Mile Stream is located along Provincial Highway 374, near Trafalgar, Halifax County, Nova Scotia, in the Liscomb Game Sanctuary. The area is very rural, consisting of sparsely distributed residences ranging from a few permanent homes to seasonal camps. There are no residences within the study area. The proposed mine site is approximately 5 km from the nearest residence, a seasonal cottage, and more than 10 km from the nearest permanent residence.

There are no First Nations (Mi'kmaq) communities within the site boundaries. The closest Mi'kmaq community to the Fifteen Mile Stream study area is the Beaver Lake IR17 (Millbrook First Nation) located about 30 km southwest. Sheet Harbour IR36 (Millbrook First Nation) is located 30 km to the south.

Public consultation and information sharing and discussions with the Mi'kmaw community is required as part of the EA process and follows similar processes and builds from the Touquoy and Beaver Dam experience. An initial meeting with the Mi'kmaq Rights Initiative Office (KMKNO) to introduce the project, and on-going engagement with Millbrook First Nation was held in March 2018. An initial public engagement session was held in March 2018 in Sheet Harbour, located 30 km south of the project to introduce the proposed Fifteen Mile Stream mine to the local community. A second public open house was held in Sheet Harbour in March 2019 to present the technical summary information pre-submission of the EIS. A session with KMKNO was completed to share technical conclusions for the Project in April 2019. A Community Liaison Committee (CLC) for the Fifteen Mile Stream project was established in 2018 as a means of engaging with the community. A local community office has been established in the community of Sheet Harbour. The office provides an opportunity for interested community members to share their interests and concerns with Atlantic Gold personnel. The office is to be staffed part-time, based on an established and publicized schedule.

Archaeological screening and reconnaissance surveys were carried out at various times between 2017 and 2018 at the Fifteen Mile Stream site. These surveys consisted of a visual inspection of the ground surface and did not involve sub-surface testing. The archaeological background research and field reconnaissance identified numerous sites which exhibited high potential for both Mi'kmaw use and historic archaeological resources. Seven archaeological sites associated with historical mining activities were identified within the Fifteen Mile Stream study, two of which will be impacted by the open pit. Two areas of archaeological potential were identified near the shoreline of Anti Dam Flowage and Seloam Lake. Where avoidance is not possible, the impacted sites will be subjected to intensified historical research to provide a more comprehensive context for interpreting features.

1.16.4 Cochrane Hill

Baseline environmental studies in respect of the Cochrane Hill deposit commenced in 2015 and re-initiated in June 2017 and were completed in fall 2018 (13 months of seasonally-relevant data). Results will be incorporated into an EIS to be submitted to Provincial and Federal regulators in Q3 2019, and to the public, for registration.

The environmental assessment review process concludes once the Environmental Assessment (EA) Report is issued by CEAA, and the federal Minister of Environment issues a favourable EA decision statement based on this report that will include enforceable conditions. A simultaneous EA approval provided by the Province will then allow Atlantic Gold to apply for a provincial Industrial Approval and Mineral Lease from NSE and NSDEM, respectively, which will allow it to construct, operate and reclaim the Project.

A total of 15.2 Mt of ore will be milled during the life of the mine at Cochrane Hill to produce a concentrate for shipment to Touquoy. The milling process will produce tailings, which will be disposed of in the Cochrane Hill TMF.

Runoff from the active mine areas will generally flow towards the north and be directed to water management ponds around the mine site. Active mine areas will include the open pit area, mill site, waste rock and till stockpiles and the ore stockpile. Water from these areas will be directed to the supernatant pond within the TMF to be reused as a source of process water. Runoff downstream of the TMF will flow towards Cargill Lake.

If runoff complies with applicable water quality criteria, it will be discharged from the site to minimize water accumulation within the TMF. Surplus water will be pumped from the TMF to maintain freeboard within the facility and to prevent surplus water accumulation within the TMF supernatant pond. Surplus water from the TMF will be treated at an effluent treatment plant (ETP), located near the planned plant site, and discharged from the site to Archibald Lake via a discharge pipeline.

Conceptual closure plans will be included in the Cochrane Hill EIS submission. The general concept for reclaiming these project sites is to remove all facilities that can be dismantled and return the site to a state that is concordant with the pre-existing conditions or future land use as identified in consultation with stakeholders and regulators.

Environmental permits required to support advanced exploration and environmental baseline studies for Cochrane Hill have been received for the drilling programs completed to date. Additional permits as needed, will be requested from NSE, NSLF and NSEM to support future exploratory, geotechnical, and hydrogeological drilling programs.

Cochrane Hill is located within 1 km of the community of Melrose, Guysborough County, Nova Scotia. Further study of potential impacts to neighbouring residences and potential receptors is being completed as part of the environmental assessment process. There are no First Nations (Mi'kmaq) communities within the site boundaries. The closest and only nearby Mi'kmaq community to Cochrane Hill is the Paq'tnkek Mi'kmaw Nation located 23 km east of Antigonish and 44 km northeast of the proposed mine site. The Pictou Landing First Nation is located approximately 80 km northwest of the proposed mine site.

Public consultation and information sharing and discussions with the Mi'kmaq community is required as part of the EA process and follows similar processes and builds from the Touquoy and Beaver Dam experience. Initial meetings with the Mi'kmaq Rights Initiative Office (KMKNO) and the Pictou Landing First Nation occurred in 2018 and 2019. A meeting with the Paq'tnkek First Nation is to be scheduled in the near future. An initial public engagement session was held in March 2018 in the Village of Sherbrooke located 13 km south of the project to introduce the planned Cochrane Hill mine to the local community. A second open house is planned for later in 2019 to present the technical summary information pre-submission of the EIS. During 2018 and 2019, Atlantic Gold has participated in many meetings with community groups and individuals in and around Sherbrooke. A CLC for the Cochrane Hill project was established in 2018 as a means of engaging with the community. A local community office has been established in the community of Sherbrooke. The office provides an opportunity for interested community members to share their interests and concerns with

Atlantic Gold personnel. The office is to be staffed part-time, based on an established and publicized schedule.

Archaeological screening was conducted to evaluate the archaeological potential within the proposed development limits as part of the EIS preparation. Preliminary work has been completed and follow-up reporting is underway.

1.17 Markets and Contracts

There are many markets in the world where gold is bought and sold, and it is not difficult to obtain a market price at any particular time. The gold market is very liquid with a large number of well-informed potential buyers and sellers active at any given time. A contract was entered into for the transportation, security, insurance, and refining of doré gold bars from Touquoy, and doré is currently shipped to a customer for refining. It is expected that doré produced from Beaver Dam, Fifteen Mile Stream and Cochrane Hill would be subject to similar contracts to that in place for Touquoy.

The financial analysis that supports Mineral Reserves uses a gold price of US$1,300/oz and an exchange rate of C$1 = US$0.75.

In order to mitigate gold price risk, Atlantic Gold entered into margin-free gold forward sales contracts. The ounces associated with these forward gold sales contracts are delivered during production.

There are major contracts currently in place to support the Touquoy Mine operations, in addition to the refining contract. These contracts cover items such as bulk reagents, operational and technical services, process equipment maintenance support, earthworks projects, transportation and logistics, and administrative services.

Atlantic Gold may enter into additional operational contracts including, but not limited to, equipment maintenance and ore haulage between Touquoy and Beaver Dam, Fifteen Mile Stream and Cochrane Hill, depending upon operational requirements. These will be reviewed on a continual basis as the project moves forward. Contracts would be negotiated and renewed as needed. Contract terms would be in line with industry norms, and typical of similar contracts in Nova Scotia that Atlantic Gold is familiar with.

1.18 Capital Cost Estimates

The capital cost estimate for Moose River Consolidated Mine includes four separate cost estimates, one each for Touquoy, Beaver Dam, Fifteen-Mile Stream and Cochrane Hill:

- The Touquoy cost estimate represents the 2019 capital budget for the operation as developed by Atlantic Gold;

- The Beaver Dam capital cost estimate is based on the developed 2015 Feasibility Study, escalated to first quarter 2019, and has an accuracy range of -15%, +25% of final cost. Updates to the 2015 Beaver Dam capital cost estimate include scope additions such as a new jaw crusher in place of relocating the existing crusher from Touquoy, as well as escalating the 2015 Feasibility Study cost elements to first quarter 2019;
- The estimates for Fifteen Mile Stream and Cochrane Hill estimates are based on the developed 2018 Pre-Feasibility Study, updated for scope and escalation to first quarter 2019, and have an accuracy range of -15%, +25% of final cost.

The overall capital cost estimate is summarized in Table 1-9.

Sustaining capital cost estimates are provided in Table 1-10.

1.19 Operating Cost Estimates

Operating costs were calculated based on manpower, process and maintenance consumables, transport, and G&A costs. Operating costs incurred and revenue from production realized during the period prior to achieving commercial production were capitalized within the Owner's costs. The operating cost estimate on a life-of-mine basis is provided in Table 1-11.

1.20 Economic Analysis

The results of the economic analyses discussed in this section represent forward-looking information as defined under Canadian securities law. The results depend on inputs that are subject to a number of known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented here. Information that is forward-looking includes:

- Mineral Resource and Mineral Reserve estimates;
- Assumed commodity prices and exchange rates;
- The proposed mine production plan;

Table 1-9: Capital Cost Summary

Area	Touquoy Total Cost ($ M)	Beaver Dam Total Cost ($ M)	Fifteen Mile Stream Total Cost ($ M)	Cochrane Hill Total Cost ($ M)
Direct Costs				
Mine area	1.3	1.3	26.3	29.8
Process plant	1.7	4.9	55.9	55.2
On-site infrastructure	—	5.3	15.1	13.6
Off-site infrastructure	—	10.7	5.7	6.6
Growth	—	—	0.7	0.7
Subtotal Direct Costs	*3.0*	*22.2*	*103.7*	*106.0*
Indirect Costs				
Indirect cost (including EPCM, field indirect, freight, vendor, first fill and spare parts)	—	1.3	16.8	15.8
Owner's costs	1.9	2.4	9.2	8.8
Subtotal Indirect Costs	*1.9*	*3.7*	*26.0*	*23.0*
Contingency	—	1.8	12.7	13.8
Total Direct and Indirect Capital Costs	***4.9***	***27.7***	***142.4***	***144.4***

Note: Figures have been rounded and may not sum.

Table 1-10: Sustaining Capital

Area	Touquoy ($ M)	Beaver Dam ($ M)	Fifteen Mile Stream ($M)	Cochrane Hill ($M)
Mine	1.2	—	0.2	0.7
TMF	4.7	—	13.5	13.1
Process	3.4	0.4	2.6	2.0
Owners	8.0	7.9	11.6	9.3
Total Sustaining Capital	***17.3***	***8.3***	***28.0***	***25.2***

Note: Figures have been rounded and may not sum.

Table 1-11: Summary Operating Costs

Area	Unit	Touquoy	Beaver Dam	Fifteen Mile Stream	Cochrane Hill
Mining	$/t milled	7.07	17.97	9.56	11.84
Processing	$/t milled	11.01	12.46	7.20	8.24
Transportation	$/t milled	-	6.07	0.59	0.88
G&A	$/t milled	3.87	4.34	3.01	3.01
Total Cost	***$/t milled***	***21.95***	***40.84***	***20.36***	***23.97***
Overall average annual costs	***$M/a***	***49.2***	***81.6***	***40.7***	***47.9***

Note: Figures have been rounded and may not sum. Overall average annual costs include stockpile rehandle and processing.

- Projected recovery rates;
- Sustaining costs and proposed operating costs;
- Assumptions as to closure costs and closure requirements;
- Assumptions as to environmental, permitting and social risks.

Additional risks to the forward-looking information include:

- Changes to costs of production from what is assumed;
- Unrecognized environmental risks;
- Unanticipated reclamation expenses;
- Unexpected variations in quantity of mineralised material, grade, or recovery rates;
- Geotechnical and hydrogeological considerations during mining being different from what was assumed;
- Failure of plant, equipment, or processes to operate as anticipated;
- Accidents, labour disputes and other risks of the mining industry.

All dollar amounts in the analysis are expressed in Q1 2019 Canadian dollars, unless otherwise specified. The economic analysis includes the entire project life, comprising two years of construction and over 10 of years of mining and milling. The net present value (NPV) at 5% is discounted to Q1, 2019. Corporate sunk costs to that point in time, including costs for exploration, technical studies, and permitting, are excluded from initial capital but have been considered in the estimation of tax depreciation pools.

The cashflow results attributable to Atlantic Gold are summarized in Table 1-12. No internal rate of return (IRR) or payback period is reported as the project generates a positive cash flow from Year 1.

Table 1-12: Economic Analysis

Item	Unit	Value
Pre-tax NPV (5%)	C$ M	849
Post-tax NPV (5%)	C$ M	629
Total LOM gold production	oz Au	1,735,000
LOM strip ratio	Waste:ore	2.9:1
Average grade	g/t Au	1.12

Note: NPV = net present value.

1.21 Sensitivity Analysis

A sensitivity analysis was performed examining capital costs, operating costs, foreign exchange rate and gold price (Figure 1-2). The Project is most sensitive to fluctuations in gold price and foreign exchange rate assumptions, and less sensitive to variations in capital and operating costs. The gold grade is not presented in the sensitivity graph because the impact of changes in the gold grade mirror the impact of changes in the gold price.

1.22 Interpretation and Conclusions

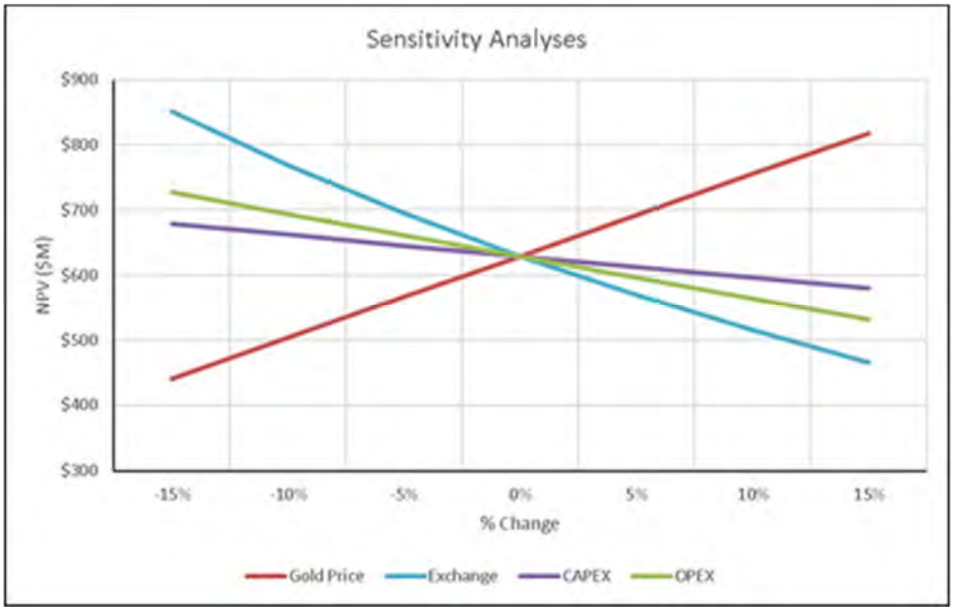
Under the assumptions presented in this Report, the mine plan shows positive economics and can support declaration of Mineral Reserves.

1.23 Recommendations

A two-stage (phase) work program has been proposed. Stage 1 comprises exploration drilling. Stage 2 consists of a feasibility study, and mining, process, and tailings management studies and related testwork, together with project environmental studies and permitting activities. Stage 2 can be undertaken concurrently with the Stage 1 work, and the Stage 2 work is not dependent on the results of Stage 1.

The Stage 1 program is estimated at $4.01–$7.7 M, depending on the number of metres drilled. It includes regional exploration between known deposit locations in the Touquoy–Beaver Dam–Fifteen Mile Stream corridor, and infill drilling of Inferred Mineral Resource blocks within the Fifteen Mile Stream and Cochrane Hill deposits to potentially support conversion of Inferred Mineral Resources to higher-confidence categories.

Figure 1-2: After-Tax Sensitivity Analysis



Note: Figure prepared by Moose Mountain, 2019.

Stage 2 is estimated at $8.25–$10.25 M. It consists of a feasibility study on the Fifteen Mile Stream and Cochrane Hill deposits, and concurrent permitting activities for the Beaver Dam, Fifteen Mile Stream and Cochrane Hill projects. Trade-off and other studies needed to support the feasibility study are included in the Stage 2 recommendations, and cover aspects of mining (geological and structural geology interpretations, condemnation drilling, geotechnical assessment of proposed WRSF sites, review of alternative project development options); process (comminution testing, materials handling, variability, cleaner concentrate dewatering (settling and filtration), tailings slurry rheology, and cyanidation leach testwork); TMF (geotechnical and hydrogeological site investigations of foundation conditions, testing of representative tailings and overburden samples for each project to verify design assumptions, embankment seepage and stability analyses, closure and reclamation planning). Permitting activities recommended include advancing the project through the environmental and industrial approval permitting process; ongoing site monitoring and baseline data collection; land acquisition; and stakeholder engagement.

2.0 INTRODUCTION

2.1 Introduction

Mr. Paul Staples, P.Eng., Mr. Neil Schofield, MAIG, Mr. Marc Schulte P.Eng., Mr. Tracey Meintjes, P.Eng., Mr. James Millard P.Geo., Mr. Jeff Parks P.Geo., and Mr. Daniel Fontaine P.Eng., have prepared an NI 43-101 Technical Report (the Report) on the Moose River Consolidated Mine (the Project) for Atlantic Gold Corporation (Atlantic Gold). The Moose River Consolidated Operation is located in Nova Scotia, Canada (Figure 2-1).

The Project as currently defined includes the operating Touquoy Gold Mine and the Beaver Dam, Fifteen Mile Stream and Cochrane Hill deposits.

2.2 Terms of Reference

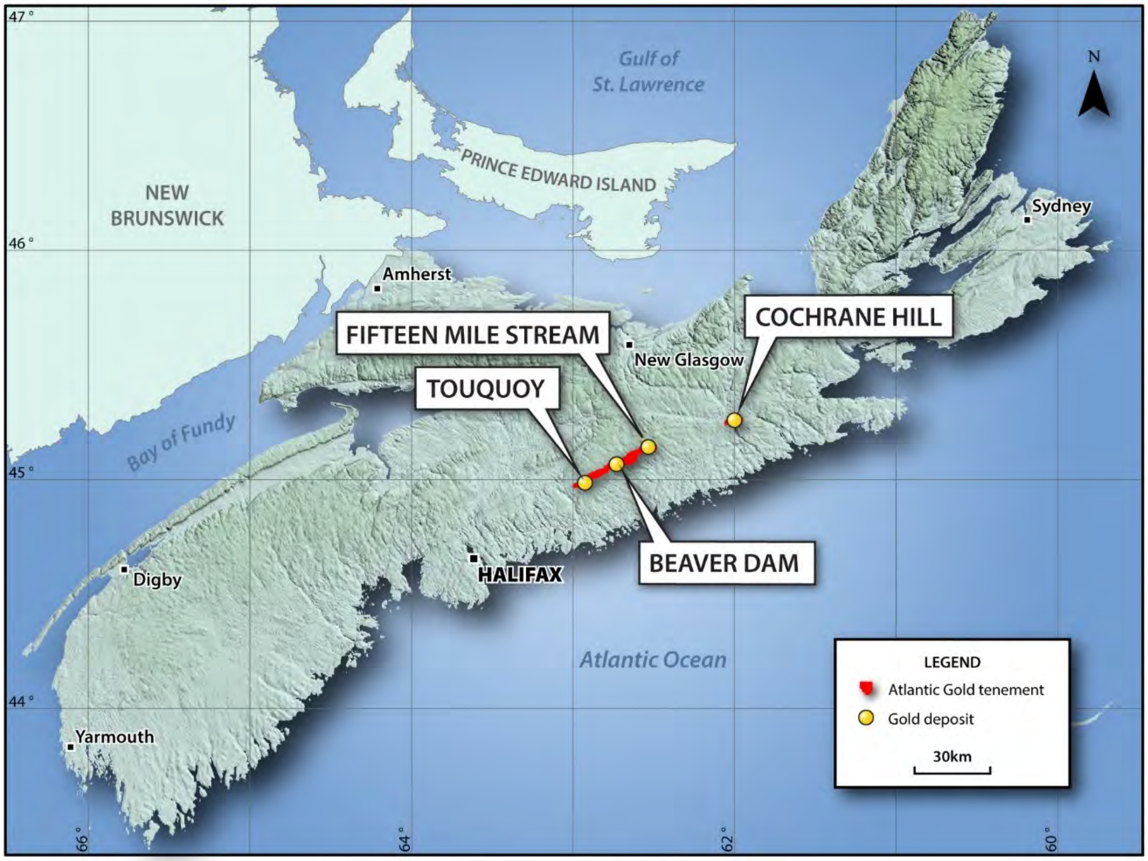
The Report has been prepared in support of disclosures in Atlantic Gold's news release dated 25 March 2019 entitled "Updated MRC Production Schedule, mineral reserves increase by 401,000 ounces or 27%, mine life increases to 10+ years, total mineral reserves of 1.9 million ounces, compound annual growth rate of production of 21%, Cochrane hill pit open at depth and to the east further mine life potential at 149 and other regional targets".

A portion of this Report is supported by information from a feasibility study completed in 2015 (2015 Feasibility Study) on the Touquoy and Beaver Dam deposits, a pre-feasibility study completed in 2018 (the 2018 Pre-Feasibility Study) that incorporated the Fifteen Mile Stream and Cochrane Hill deposits as an expansion to the current Touquoy operations and planned Beaver Dam Mine. A life-of-mine (LOM) plan (LOMP) was prepared in 2019 for all four deposits (the 2019 LOMP).

Mineral Resource and Mineral Reserve estimates were performed in accordance with the 2003 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines, and reported in accordance with the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (2014 CIM Definition Standards).

Units used in the report are metric units unless otherwise noted. Monetary units are in Canadian dollars (C$) unless otherwise stated.

Figure 2-1: Project Location Plan



Note: Figure prepared by Atlantic Gold, 2017.

2.3 Qualified Persons

The following serve as the qualified persons for this Technical Report as defined in National Instrument 43-101, Standards of Disclosure for Mineral Projects, and in compliance with Form 43-101F1:

- Mr. Paul Staples, P.Eng., Vice President and Global Practice Lead, Minerals and Metals, Ausenco Solutions Canada Inc (Ausenco);
- Mr. Neil Schofield, MAIG, Manager and Principal Consultant, FSSI Consultants (Australia) Pty Ltd (FSSI Consultants);
- Mr. Marc Schulte, P.Eng., Mining Engineer, Moose Mountain Technical Services (Moose Mountain);

- Mr. Tracey Meintjes, P.Eng., Principal, Moose Mountain;
- Mr. James Millard, P.Geo., Manager Environmental and Permitting, Atlantic Gold;
- Mr. Daniel Fontaine, P.Eng., Specialist Engineer and Associate, Knight Piésold Ltd (Knight Piésold).

2.4 Site Visits and Scope of Personal Inspection

Mr. Paul Staples visited the Touquoy site on 29 January, 2018 and again on 7 March, 2019. During the 2018 site visit, he inspected maps of the deposit areas. He drove to the Fifteen Mile Stream site, where he observed the exploration drill program in action, viewed selected core samples, and drove around the area of the planned open pit. Mr. Staples then drove on to the Cochrane Hill site, and observed the areas planned for the tailings management facility (TMF) and open pit.

Mr. Neil Schofield most recently visited site between March 11 and March 16, 2019 as part of the process of updating the Mineral Resource estimates for all projects and to discuss and review new resource and production data from the Touquoy Mine. All deposits other than Beaver Dam were visited and a number of drill hole collar locations were checked and grade control practices were reviewed. Mr. Schofield also visited site between April 10 and April 16, 2018 to discuss resource and grade control sampling and modelling issues. Mr. Schofield previously visited site between April 16 and April 17, 2017. During the visit, drill hole collars at Cochrane Hill and Fifteen Mile Stream were inspected and collar surveys were checked with a global positioning system (GPS) instrument. Drill core of two recently-drilled holes at Cochrane Hill and Fifteen Mile Stream with significant intersections of gold mineralization and visible gold observations were examined. During the visit, five days were spent with the mine geology team discussing sampling methods and Mineral Resource estimation for grade control. Mr. Schofield also visited site in July 2017, at the completion of the Cochrane Hill and Fifteen Mile Stream drilling programs to discuss the revised resource estimates for these deposits. Mr Schofield had previously visited the Touquoy and Beaver Dam properties from 14 to 15 July, 2014. During this visit, he inspected mineralized core from the properties at the Moose River Project office.

Mr. Marc Schulte visited the Touquoy property from January 7–13, 2018. During that visit he viewed the existing open pit, stockpile and tailings operations, inspected proposed pit and stockpile expansion locations, and the locations of existing and proposed infrastructure. Mr. Schulte visited the Beaver Dam, Cochrane Hill and Fifteen Mile Stream areas on 31 August, 2017. During that visit he viewed the general topography, inspected the deposit areas where any proposed pit would be excavated, and potential stockpile locations, and the locations of existing and proposed infrastructure.

Mr. Tracey Meintjes visited the Touquoy site on October 26, 2016 and September 1, 2017. During the site visits he reviewed core samples from the property areas, the general topography, mine, process and infrastructure locations, and observed the construction progress. Mr. Meintjes visited the Cochrane Hill and Fifteen Mile Stream sites on 31 August, 2017. During that visit, Mr. Meintjes viewed the general topography, inspected the deposit areas, and reviewed potential locations for various mine and process facilities and infrastructure.

Mr. James Millard is based at both the Touquoy Mine site and the Atlantic Gold Halifax office, and was working at these locations at the Report effective date. In his role as Manager Environment and Permitting, Mr. Millard is accountable for the execution of the environmental impact statements and supporting work including environmental studies, and community, Indigenous, and regulatory engagement, for the Cochrane Hill and Fifteen Mile Stream projects. Mr. Millard is also accountable for environmental compliance and community relations for the Touquoy Mine and Beaver Dam Mine project. Mr. Millard has visited the Fifteen Mile Stream and Cochrane Hill areas periodically during 2018 and 2019 as part of his normal duties and responsibilities. During these visits he has inspected or monitored the study areas in the vicinity of proposed infrastructure, especially areas with accessible water bodies and wetlands. Mr. Millard also visited lands immediately adjacent to study areas where there are existing residential structures. He travelled the proposed haul routes where concentrate is to be trucked from Fifteen Mile Stream and Cochrane Hill to Touquoy. His most recent visit to Cochrane Hill was on April 4, 2019 and to Fifteen Mile Stream on December 7, 2018.

Mr. Jeff Parks visited the Touquoy and Beaver Dam properties on a number of occasions, during December 2015 and May 2016 respectively. During those visits, he conducted field work related to the water withdrawal application for Touquoy and reviewed surface water studies for the Beaver Dam environmental assessment. His most recent site visits were on November 2, 2017 to review locations for monitoring well locations at Beaver Dam with the land owner, and on 9 May, 2018 to perform a safety audit on the drilling program that was underway at the time.

Mr. Daniel Fontaine has visited the Fifteen Mile Stream and Cochrane Hill deposits on a number of occasions, most recently to the Fifteen Mile Stream area on July 3 and November 16, 2018, and the Cochrane Hill area on July 4, 2018. During the July 2018 visits to Fifteen Mile Stream and Cochrane Hill he performed general inspections of the sites and proposed locations for mine waste and water management infrastructure. During the November 2018 site visit, Mr. Fontaine performed a field review of the in-progress geotechnical investigations for the TMF.

2.5 Effective Dates

There are a number of effective dates pertinent to the Report, as follows:

- Date of the last supply of drill data used in Mineral Resource estimation: 21 December, 2018;
- Date of last information on ongoing drill programs: 22 April, 2019;
- Effective date of the Mineral Resource estimates: 15 February, 2019;
- Effective date of the Mineral Reserve estimates: 13 March, 2019;

The overall Report effective date is taken to be the date of the completion of the financial analysis that supports the Mineral Reserve estimates for Cochrane Hill and Fifteen Mile Stream, which is 25 March, 2019.

2.6 Information Sources and References

Reports and documents listed in Section 2.7, Section 3, and Section 27 of this Report were used to support preparation of the Report. Additional information was provided by Atlantic Gold personnel as requested.

2.7 Previous Technical Reports

Atlantic Gold has previously filed the following technical reports on the Project:

- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., Parks, J., and Fontaine, D., 2018: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, FSSI Consultants (Australia) Pty Ltd., Moose Mountain Technical Services, GHD Limited, and Knight Piésold Ltd for Atlantic Gold Corporation, effective date 24 January, 2018;
- Staples, P., Schofield, N., Schulte, M., Meintjes, T., Millard, J., and Parks, J., 2017: Moose River Consolidated Phase 2 Project, Nova Scotia, Canada, NI 43-101 Technical Report: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd. for Atlantic Gold Corporation, effective date 20 July, 2017;
- Parks, J., Schulte, M., Schofield, N., Meintjes, T., and Scott, K., 2015: NI 43-101 Technical Report Feasibility Study for Moose River Consolidated Project, Nova Scotia: report prepared by Ausenco Engineering Canada Inc, GHD Limited, Moose Mountain Technical Services, and FSSI Consultants (Australia) Pty Ltd for Atlantic Gold Corporation, effective date 2 July, 2015;

- Schofield, N., 2015a: Technical Report of the Fifteen Mile Stream Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Atlantic Gold Corporation, effective date 18 February, 2015;
- Schofield, N., 2015b: Technical Report of the Beaver Dam Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Atlantic Gold Corporation, effective date 2 March, 2015;
- Schulte, M., Schofield, N., and Thomas, J., 2014: NI 43-101 Technical Report Preliminary Economic Assessment Nova Scotia, Canada: report prepared by Moose Mountain Technical Services, FSSI Consultants (Australia) Pty Ltd, and JAT Metconsult Ltd for Atlantic Gold Corporation, effective date 14 October, 2014.

Prior to acquisition by Atlantic Gold, Spur Ventures Inc (Spur Ventures) had filed the following technical reports:

- Schofield, N., 2014a: Technical Report of the Cochrane Hill Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Spur Ventures Inc, effective date 1 August, 2014;
- Schofield, N., 2014b: Mineral Resource Estimate for the Touquoy Gold Project, Halifax County, Nova Scotia: report prepared by FSSI Consultants (Australia) Pty Ltd for Spur Ventures Inc, effective date 1 August, 2014.

3.0 RELIANCE ON OTHER EXPERTS

The Ausenco QP has fully relied upon, and disclaims responsibility for, information supplied by Atlantic Gold staff and experts retained by Atlantic Gold related to tailings management facilities for the Touquoy and Beaver Dam sites as follows:

- Wislesky, I., 2007: Touquoy Gold Project Feasibility Study Tailings Disposal Facility Nova Scotia: report prepared by Golder Associates;
- Merit Engineers, 2010: Definitive Feasibility Study, Touquoy Gold Project: report prepared for Atlantic Gold;
- Barrett, J., 2015a: Constructability of Touquoy Tailings Management Facility Dams: memorandum prepared by Stantec;
- Barrett, J., 2015b: Touquoy Mine Tailings Management Facility – Embankment Core Construction Alternatives: memorandum prepared by Stantec;
- Stantec, 2015: Feasibility Level Tailings Management Facility Design – Touquoy Mine: document prepared for Atlantic Gold, July, 2015;
- Stantec, 2016a: Touquoy Mine Tailings Management Dam Design – Seepage Assessment: report prepared for DDV Gold, 29 February 2016;
- Stantec, 2016b: Touquoy Mine Tailings Management Facility Construction Specifications: report prepared for DDV Gold, 24 March, 2016;
- Stantec, 2018: Operations, Maintenance, and Surveillance Manual, Touquoy Gold Project Tailings Management Facility – Atlantic Mining NS Corporation: report prepared for Atlantic Gold, 25 May, 2018.

This information is used in Section 20.8.1 and Section 20.8.2 of the Report.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Introduction

The properties that comprise the Moose River Consolidated Operations are contained within two packages of tenements, in four areas, namely the Touquoy, Beaver Dam, Cochrane Hill, and Fifteen Mile Stream areas. Within the broader property holdings, individual property groupings are described as follows:

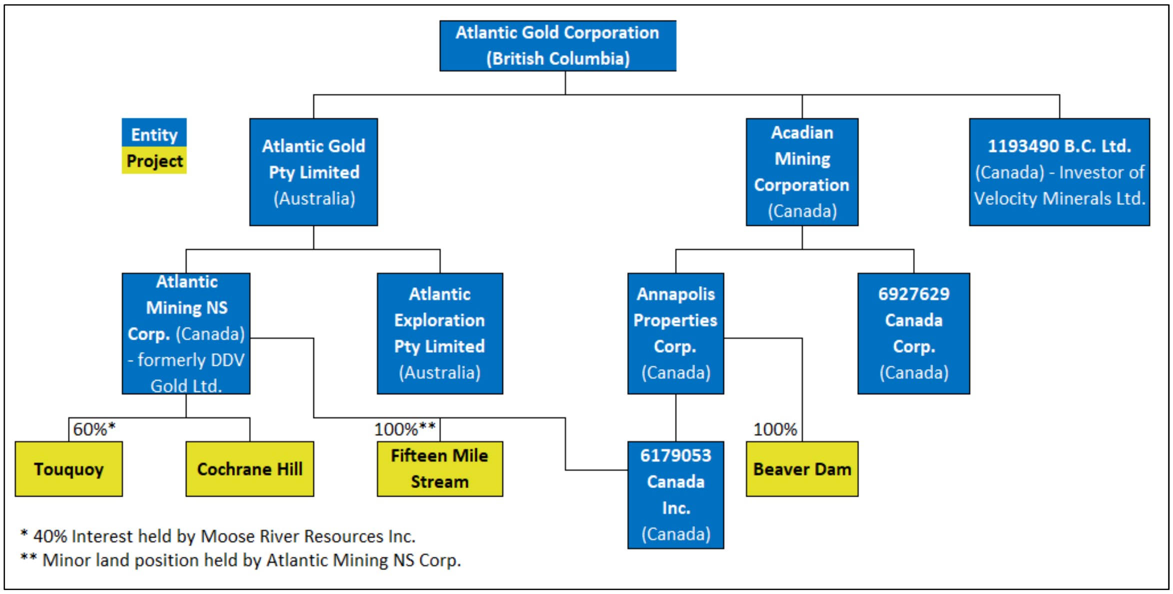
- Touquoy: centred on 44º59' north latitude and 62º57' west longitude. It is situated on NTS sheets 11D/15C, and is approximately 60km east–northeast of Halifax;
- Beaver Dam: centred on 521319 E/4990700 N (UTM NAD 83 Zone 20). It is situated on NTS map sheet 11E/2A, and is about 85 km northeast of Halifax;
- Fifteen Mile Stream: centred on 45°08'30" north latitude and 62° 32' west longitude. It is situated on NTS sheets 11E01/C and 11E02/D, and is about 100 km northeast of Halifax;
- Cochrane Hill: centred on 45º15' north latitude and 62º0' west longitude. It is situated on NTS sheets 11E/1D, 11E/8A, 11F/4C and 11F/5B, and is approximately 35 km south of Antigonish.

4.2 Project Ownership

4.2.1 Corporate Ownership History

Spur Ventures changed its name to Atlantic Gold Corporation in 2014. Atlantic Gold NL merged with Atlantic Gold Corporation in August 2014. Atlantic Gold acquired Acadian Mining Corporation (Acadian) in September 2014. The current corporate structure is provided in Figure 4-1.

Figure 4-1: Atlantic Gold Ownership Structure



Note: Figure prepared by Atlantic Gold, 2019.

4.2.2 Property Ownership

The following details the property ownership:

- Touquoy (60%): Atlantic Mining NS Corp. (formerly DDV Gold Ltd or DDV Gold), an indirectly wholly-owned subsidiary of Atlantic Gold; a 40% interest is held by Moose River Resources Inc. (MRRI). Atlantic has a 7.9% beneficial interest in MRRI;
- Beaver Dam (100%): Annapolis Properties Corporation, an indirectly wholly-owned subsidiary of Acadian, which in turn is an indirectly wholly-owned subsidiary of Atlantic Gold;
- Fifteen Mile Stream (100%): 6179053 Canada Inc, a wholly-owned subsidiary of Annapolis Properties Corporation, an indirectly wholly-owned subsidiary of Acadian, which in turn is an indirectly wholly-owned subsidiary of Atlantic Gold;
- Cochrane Hill (100%): Atlantic Mining NS Corp., an indirectly wholly-owned subsidiary of Atlantic Gold;
- Touquoy, Beaver Dam, Fifteen Mile Stream Corridor: Regional exploration properties within the corridor are owned by various entities controlled by Atlantic Gold Corporation. Ownership interests for these properties are provided in Section 4.3.

4.3 Mineral Tenure

4.3.1 Introduction

Mineral exploration and mining licences are issued by the Nova Scotia Department of Natural Resources (NSDNR) under the Mineral Resources Act of 2016. The licences are defined on a graticular grid system based on latitude and longitude. Each 1:50,000 scale topographic map is divided into quarter sheets, and then subdivided into 108 mineral tracts. Each tract contains sixteen 16.2 ha mineral claims. Each claim is identified by a specific reference map, tract and claim designation (e.g. 11E/16 A - Tract 1 - Claim A; see Figure 4-2). Individual mineral claims are 0.4 km^2 in size. No formal survey of licence is required.

Exploration licences are granted for two-year terms, and are renewable indefinitely, provided certain annual conditions are met. Exploration licences can contain a maximum of 80 bordering mineral claims. The minimum amount of work that must be carried out in the evaluation of the mineral potential of a claim (assessment work) is $200 per year during the first four years of the licence. This requirement increases to $600 per year for years 5 to 10, to $800 for years 11 to 16 and to $1,600 for all subsequent years. Expenditures in excess of this amount can be carried forward and used to renew a licence in subsequent years. Assessment credits submitted for any particular year have a maximum lifespan of 10 years.

Mining licences are granted for 20-year terms and can be renewed an indefinite number of times at the discretion of the Minister for Natural Resources.

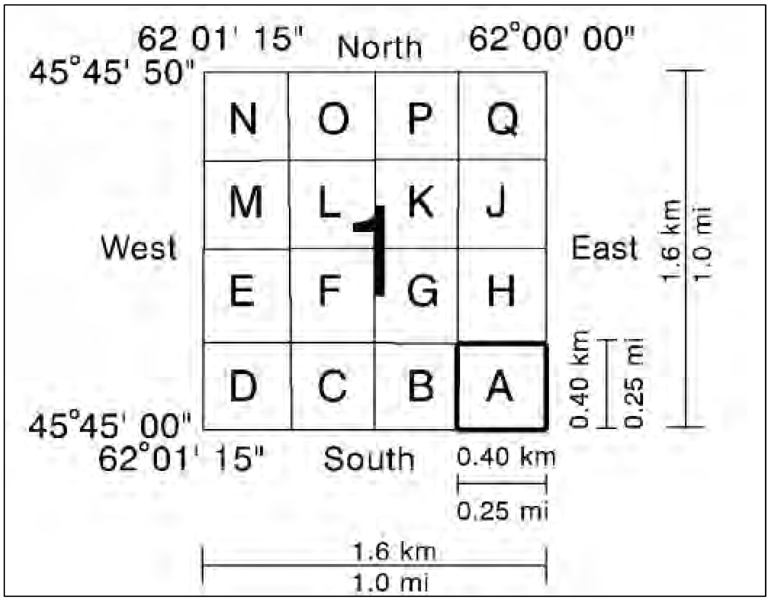
4.3.2 Mineral Licences

Atlantic Gold currently holds 32 Exploration Licences and one Mineral Lease (Table 4-1) in the five property areas, with a collective area of 194.96 km^2. Tenure details are provided in Table 4-2 and summarized in Figure 4-3 and Figure 4-4. Note only tenure details associated with the Atlantic Gold's Moose River Consolidated Mine are shown.

Individual property tenure maps are provided as Figure 4-5 (Touquoy), Figure 4-6 (Beaver Dam), Figure 4-7 (Fifteen Mile Stream) and Figure 4-8 (Cochrane Hill). The tenure that hosts Mineral Resources and Mineral Reserves is discussed in more detail in the following sub-sections.

Atlantic Gold is also actively exploring in other areas of Nova Scotia. Those mineral tenures are at a grassroots exploration stage.

Figure 4-2: Example Claim/Tract Layout



Note: Figure from Nova Scotia Department of Natural Resources, Information Circular ME 58, Fourth Edition, revised April 2008.

Table 4-1: Mineral Tenure Summary Table

Licence	Location	Project	Holder	Granted	Next Anniversary	No. Claims	km^2	Exp Cond $	Credits $
Touquoy									
ML 11-1	Moose River	Touquoy	Atlantic Mining NS Corp	1-Aug-11	1-Aug-19	49	7.93	—	—
10377	Moose River	Moose River	Atlantic Mining NS Corp	27-Jul-83	27-Jul-19	64	10.36	51,200	877
Beaver Dam									
50421	Beaver Dam	Beaver Dam	Annapolis Properties Corp	13-May-76	13-May-19	76	12.3	60,800	475,553
51852	Beaver Dam South	Beaver Dam	Annapolis Properties Corp	7-Dec-15	7-Dec-19	7	1.13	1,400	2,813
Cochrane Hill									
9259	Cochrane Hill	Cochrane Hill	Annapolis Properties Corp	24-Sep-10	24-Sep-18	8	1.29	1,600	1,100
10249	Crows Nest	Cochrane Hill	Annapolis Properties Corp	21-Jul-02	21-Jul-19	8	1.29	6,400	4,463
51476	Melrose	Cochrane Hill	Atlantic Mining NS Corp	22-Aug-14	22-Aug-19	28	4.53	5,600	2,470
51477	Cochrane Hill	Cochrane Hill	Atlantic Mining NS Corp	11-Sep-99	11-Sep-19	76	12.3	60,800	11,920
Fifteen Mile Stream									
5889	Plenty	Fifteen Mile Stream	Atlantic Mining NS Corp	5-Nov-01	5-Nov-19	6	0.97	4,800	1,010
6440	Plenty	Fifteen Mile Stream	Atlantic Mining NS Corp	2-Nov-04	3-Nov-19	6	0.97	2,400	17,407
10406	Fifteen Mile Stream	Fifteen Mile Stream	6179053 Canada Inc.	22-Dec-79	22-Dec-19	31	5.02	24,800	50,668
51573	East Lake	Fifteen Mile Stream	Annapolis Properties Corp	5-Jan-03	5-Jan-19	39	6.31	31,200	9
52901	Fifteen Mile Stream	Fifteen Mile Stream	6179053 Canada Inc.	11-Dec-90	11-Dec-19	8	1.29	6,400	1,190,000
Touquoy–Beaver Dam–Fifteen Mile Stream Corridor									
6331	Kent Lake	Touquoy–Beaver Dam	Annapolis Properties Corp	27-Oct-05	27-Oct-19	18	2.91	7,200	217
6439	Plenty	Fifteen Mile Stream	Atlantic Mining NS Corp	2-Nov-04	2-Nov-19	2	0.32	800	1,554
8220	Diamond Lake	Fifteen Mile Stream–Beaver Dam	Annapolis Properties Corp	25-Apr-08	25-Apr-19	43	6.96	17,200	3,711
8592	Union Dam	Fifteen Mile Stream–Beaver Dam	Annapolis Properties Corp	27-Apr-09	27-Apr-19	6	0.97	1,200	14,273
8641	Jed Lake	Touquoy–Beaver Dam	Annapolis Properties Corp	7-Jul-09	7-Jul-19	49	7.93	9,800	17,537
10407	Lake Fraser Brook	Fifteen Mile Stream–Beaver Dam	Atlantic Mining NS Corp	12-Jul-12	12-Jul-19	10	1.62	2,000	13,021

50980	Kent Lake	Touquoy–Beaver Dam	Annapolis Properties Corp	7-Jul-09	7-Jul-19	47	7.6	9,400	99,624
51412	West Lake	Touquoy–Beaver Dam	Atlantic Mining NS Corp	4-Mar-07	4-Mar-19	21	3.4	8,400	27,832
51475	Upper Dam Flowage	Fifteen Mile Stream–Beaver Dam	Atlantic Mining NS Corp	10-Aug-14	10-Aug-19	61	9.87	12,200	3,980
51690	Fifteen Mile Stream East	Fifteen Mile Stream	Atlantic Mining NS Corp	13-Jul-17	13-Jul-19	45	7.28	9,000	7,800
51860	Fifteen Mile Stream North	Fifteen Mile Stream	6179053 Canada Inc.	22-Sep-17	22-Sep-19	28	4.53	5,600	—
51934	Fifteen Mile Stream–Beaver Dam	Fifteen Mile Stream–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	24-Oct-19	75	12.14	15,000	—
51935	Fifteen Mile Stream–Beaver Dam	Fifteen Mile Stream–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	24-Oct-19	56	9.06	11,200	—
51936	Touquoy–Beaver Dam	Touquoy–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	24-Oct-19	62	10.03	12,400	—
51937	Touquoy–Beaver Dam	Touquoy–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	24-Oct-19	16	2.59	3,200	—
51938	Fifteen Mile Stream–Beaver Dam	Fifteen Mile Stream–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	23-Oct-19	80	12.94	16,000	—
51939	Fifteen Mile Stream–Beaver Dam	Fifteen Mile Stream–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	23-Oct-19	74	11.97	14,800	—
51940	Touquoy–Beaver Dam	Touquoy–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	24-Oct-19	76	12.3	15,200	—
51941	Touquoy–Beaver Dam	Touquoy–Beaver Dam	Atlantic Mining NS Corp	24-Oct-17	24-Oct-19	29	4.69	5,800	—
52250	Lake Fraser Brook	Fifteen Mile Stream–Beaver Dam	Annapolis Properties Corp	15-May-18	15-May-19	1	0.16	200	—
							194.96		

Note: For licences with renewal dates in 2018 and first quarter 2019, assessment credits that have been applied have not yet been processed and formally approved by the Nova Scotia Mines Department.

Table 4-2: Mineral Tenure Details Table

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
Touquoy								
ML 11-1	Atlantic Mining NS Corp	1-Aug-11	Moose River	11D15C	80	N	1	Halifax
ML 11-1	Atlantic Mining NS Corp	1-Aug-11	Moose River	11D15C	81	Q	1	Halifax
ML 11-1	Atlantic Mining NS Corp	1-Aug-11	Moose River	11D15C	87	AFGHJKLOPQ	10	Halifax
ML 11-1	Atlantic Mining NS Corp	1-Aug-11	Moose River	11D15C	88	ABCDEFGHJKLMNOPQ	16	Halifax

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
ML 11-1	Atlantic Mining NS Corp	1-Aug-11	Moose River	11D15C	89	DEMN	4	Halifax
ML 11-1	Atlantic Mining NS Corp	1-Aug-11	Moose River	11D15C	105	ABCDEFGHKLM	11	Halifax
ML 11-1	Atlantic Mining NS Corp	1-Aug-11	Moose River	11D15C	106	ABCGHJ	6	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11E2B	7	CDEFLMO	7	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11E2B	8	ABCGHJ	6	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	83	NO	2	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	84	PQ	2	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	85	ABH	3	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	86	ABCDEFGHJK	10	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	87	CDEMN	5	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	103	LMNO	4	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	104	DEFGJKLMNOPQ	12	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	105	JNOPQ	5	Halifax
10377	Atlantic Mining NS Corp	27-Jul-83	Moose River	11D15C	106	DEFKLOPQ	8	Halifax
Beaver Dam								
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	58	EFKLOPQ	7	Halifax
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	59	EFGHJKLMNOPQ	12	Halifax
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	60	EFGHJKLMNOPQ	12	Halifax
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	61	ABCDEFGH	8	Halifax
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	62	ABCDEFGHJKLM	12	Halifax
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	63	ABCDEFGHJKLMPQ	14	Halifax
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	64	DEFKLMNOPQ	10	Halifax
50421	Annapolis Properties Corp	13-May-75	Beaver Dam	11 E 02 A	65	N	1	Halifax
51852	Annapolis Properties Corp	7-Dec-15	Beaver Dam	11E2A	58	CD	2	Halifax
51852	Annapolis Properties Corp	7-Dec-15	Beaver Dam	11E2A	59	ABCD	4	Halifax
51852	Annapolis Properties Corp	7-Dec-15	Beaver Dam	11E2A	60	A	1	Halifax

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
Cochrane Hill								
51477	Atlantic Mining NS Corp	11-Sep-99	Cochrane Hill	11E1D	97	ABCDEFGHJKLMNOPQ	16	Guysborough
51477	Atlantic Mining NS Corp	11-Sep-99	Cochrane Hill	11E1D	98	HJKLMNOPQ	9	Guysborough
51477	Atlantic Mining NS Corp	11-Sep-99	Cochrane Hill	11E8A	1	ABCDEFGHJKLMNOPQ	16	Guysborough
51477	Atlantic Mining NS Corp	11-Sep-99	Cochrane Hill	11E8A	2	ABCDHJQ	7	Guysborough
51477	Atlantic Mining NS Corp	11-Sep-99	Cochrane Hill	11F5B	11	JKLMNOPQ	8	Guysborough
51477	Atlantic Mining NS Corp	11-Sep-99	Cochrane Hill	11F5B	12	ABCDEFGHJKLMNOPQ	16	Guysborough
51477	Atlantic Mining NS Corp	11-Sep-99	Cochrane Hill	11F4C	108	CDEF	4	Guysborough
9259	Annapolis Properties Corp	24-Sep-10	Cochrane Hill	11F04C	108	JKLMNOPQ	8	Guysborough
51476	Atlantic Mining NS Corp	22-Aug-14	Melrose	11E8A	23	AHJQ	4	Guysborough
51476	Atlantic Mining NS Corp	22-Aug-14	Melrose	11E8A	24	ABCDEFGHJKLMNOPQ	16	Guysborough
51476	Atlantic Mining NS Corp	22-Aug-14	Melrose	11E8A	25	ABCD	4	Guysborough
51476	Atlantic Mining NS Corp	22-Aug-14	Melrose	11E8A	26	A	1	Guysborough
51476	Atlantic Mining NS Corp	22-Aug-14	Melrose	11F5B	13	DEM	3	Guysborough
10249	Annapolis Properties Corp	21-Jul-02	Crows Nest	11E01D	99	JKLOPQ	6	Guysborough
10249	Annapolis Properties Corp	21-Jul-02	Crows Nest	11E08A	3	AB	2	Guysborough
Fifteen Mile Stream								
52901	6179053 Canada Inc	11-Dec-84	Fifteen Mile Stream	11 E 02 D	23	ABCDEFGH	8	Halifax
6440	Atlantic Mining NS Corp	2-Nov-04	Fifteen Mile Stream	11E2D	22	GHJQ	4	Halifax
6440	Atlantic Mining NS Corp	2-Nov-04	Fifteen Mile Stream	11E2D	23	MN	2	Halifax
51573	Annapolis Properties Corp	11-Apr-05	Fifteen Mile Stream	11 E 02 A	100	MNOP	4	Halifax
51573	Annapolis Properties Corp	1-Oct-02	Fifteen Mile Stream	11 E 02 A	101	JKPQ	4	Halifax
51573	Annapolis Properties Corp	1-Oct-02	Fifteen Mile Stream	11 E 02 D	2	M	1	Halifax
51573	Annapolis Properties Corp	1-Oct-02	Fifteen Mile Stream	11 E 02 D	3	CDEFGHJKLMNOP	13	Halifax
51573	Annapolis Properties Corp	1-Oct-02	Fifteen Mile Stream	11 E 02 D	4	ABCDEFGHJKLMQ	13	Halifax
51573	Annapolis Properties Corp	1-Oct-02	Fifteen Mile Stream	11 E 02 D	5	AB	2	Halifax

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
51573	Annapolis Properties Corp	1-Oct-02	Fifteen Mile Stream	11 E 02 D	22	AB	2	Halifax
5889	Atlantic Mining NS Corp	5-Nov-00	Fifteen Mile Stream	11E2D	2	JKLNO	5	Halifax
5889	Atlantic Mining NS Corp	5-Nov-00	Fifteen Mile Stream	11E2D	3	Q	1	Halifax
10406	6179053 Canada Inc	22-Dec-79	Fifteen Mile Stream Regroup	11 E 01 C	12	LMNO	4	Halifax
10406	6179053 Canada Inc	22-Dec-79	Fifteen Mile Stream Regroup	11 E 01 C	13	CDEF	4	Halifax
10406	6179053 Canada Inc	22-Dec-79	Fifteen Mile Stream Regroup	11 E 02 D	1	JKLMNOPQ	8	Halifax
10406	6179053 Canada Inc	22-Dec-79	Fifteen Mile Stream Regroup	11 E 02 D	2	PQ	2	Halifax
10406	6179053 Canada Inc	22-Dec-79	Fifteen Mile Stream Regroup	11 E 02 D	23	J	1	Halifax
10406	6179053 Canada Inc	22-Dec-79	Fifteen Mile Stream Regroup	11 E 02 D	24	ABCDEFGHJKLM	12	Halifax
Touquoy–Beaver Dam–Fifteen Mile Stream Corridor								
51937	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	85	JQ	2	Halifax
51937	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	86	LMNOPQ	6	Halifax
51937	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	107	ABCDEFGH	8	Halifax
51941	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	89	OPQ	3	Halifax
51941	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	90	LMNOP	5	Halifax
51941	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	102	ELMNO	5	Halifax
51941	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	103	ABCDEFGHKJKPQ	12	Halifax
51941	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11D15C	104	ABCH	4	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	4	LMNO	4	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	5	EFGHJKLMNOPQ	12	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	6	CDEFGHJKLMPQ	12	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	7	ABGH	4	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	20	AH	2	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	21	CDEFGHJKLMPQ	12	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	22	EMNOPQ	6	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	23	N	1	Halifax

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	26	CDEFGJKLMOPQ	12	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	27	ABCDFGH	7	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	28	A	1	Halifax
51940	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	47	ABC	3	Halifax
8641	Annapolis Properties Corp	7-Jul-09	Jed Lake	11 E 02 B	6	NO	2	Halifax
8641	Annapolis Properties Corp	7-Jul-09	Jed Lake	11 E 02 B	7	JKNPQ	5	Halifax
8641	Annapolis Properties Corp	7-Jul-09	Jed Lake	11 E 02 B	8	DEFKLMOPQ	9	Halifax
8641	Annapolis Properties Corp	7-Jul-09	Jed Lake	11 E 02 B	17	A	1	Halifax
8641	Annapolis Properties Corp	7-Jul-09	Jed Lake	11 E 02 B	18	ABCDEFGHJK	10	Halifax
8641	Annapolis Properties Corp	7-Jul-09	Jed Lake	11 E 02 B	19	ABCDEFGHJKLMNOPQ	16	Halifax
8641	Annapolis Properties Corp	7-Jul-09	Jed Lake	11 E 02 B	20	BCDEFG	6	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	8	N	1	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	9	ABCGHJPQ	8	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	17	BCDEFGHJKLQ	11	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	18	LMNOPQ	6	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	28	N	1	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	29	ELMNOPQ	7	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	30	BCDEFGHJKLMQ	12	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	31	ABCDGH	6	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	44	ABCGH	5	Halifax
51936	Atlantic Mining NS Corp	24-Oct-17	Touquoy–Beaver Dam	11E2B	45	CDEFL	5	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	20	JKLMNOPQ	8	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	21	NO	2	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	26	N	1	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	27	EJKLMNOPQ	9	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	28	BCDEFGHJKLMOPQ	14	Halifax

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	29	ABCDFGHJK	9	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	30	A	1	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	46	A	1	Halifax
50980	Annapolis Properties Corp	7-Jul-09	Kent Lake	11 E 02 B	47	DE	2	Halifax
6331	Annapolis Properties Corp	27-Oct-05	Kent Lake	11 E 2 B	46	BGHJKQ	6	Halifax
6331	Annapolis Properties Corp	27-Oct-05	Kent Lake	11 E 2 B	47	LMNOPQ	6	Halifax
6331	Annapolis Properties Corp	27-Oct-05	Kent Lake	11 E 2 B	50	ABCGHJ	6	Halifax
51412	Atlantic Mining NS Corp	4-Mar-07	West Lake	11E2A	61	JKLMOPQ	7	Halifax
51412	Atlantic Mining NS Corp	4-Mar-07	West Lake	11E2B	49	KLMNOP	6	Halifax
51412	Atlantic Mining NS Corp	4-Mar-07	West Lake	11E2B	72	BCDEFGJK	8	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	37	EFGHJKLMNOPQ	12	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	38	EFGHJKLMNOPQ	12	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	39	EFGHJKLMNOPQ	12	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	40	NO	2	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	55	EFGHJKLMNOPQ	12	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	56	EFGHJKLMNOPQ	12	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	57	ABCDEFGHJKQ	11	Halifax
51939	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	58	A	1	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	61	N	1	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	81	LMNOPQ	6	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	82	EFGHJKLMNOPQ	12	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	83	EFGHJKLMNOPQ	12	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	84	BCDGHJKQ	8	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	88	ABCDGH	5	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2B	72	LMNOPQ	6	Halifax
51935	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2B	73	ABCDGH	6	Halifax

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
10407	Atlantic Mining NS Corp	12-Jul-12	Lake Fraser Brook	11E2A	64	ABCH	4	Halifax
10407	Atlantic Mining NS Corp	12-Jul-12	Lake Fraser Brook	11E2A	65	CDEFGH	6	Halifax
8220	Annapolis Properties Corp	25-Apr-08	Diamond Lake	11 E 02 A	66	FGHJKLMNOPQ	11	Halifax
8220	Annapolis Properties Corp	25-Apr-08	Diamond Lake	11 E 02 A	79	ABCDEFGH	8	Halifax
8220	Annapolis Properties Corp	25-Apr-08	Diamond Lake	11 E 02 A	80	ABCDEFGHMN	10	Halifax
8220	Annapolis Properties Corp	25-Apr-08	Diamond Lake	11 E 02 A	81	ABCDEFGHJK	10	Halifax
8220	Annapolis Properties Corp	25-Apr-08	Diamond Lake	11 E 02 A	82	ABCD	4	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	79	JKLMNOPQ	8	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	80	JKLOPQ	6	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	89	ABGH	4	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	90	ABCDEFGHJKLMNOPQ	16	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	91	MNO	3	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	101	EFLMNO	6	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	102	ABCDEFGHJKLQ	12	Halifax
51475	Atlantic Mining NS Corp	10-Aug-14	Upper Dam Flowage	11E2A	103	ABCDGH	6	Halifax
8592	Annapolis Properties Corp	27-Apr-09	Union Dam	11 E 02 A	89	CFJKLQ	6	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	89	DEMNOP	6	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	102	MNOP	4	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	103	EFJKLMOPQ	9	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	104	ABCDFGHJ	8	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	4	NOP	3	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	5	CDEFGHJKLMPQ	12	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	6	ABCDEFGHL	9	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	7	AB	2	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	20	A	1	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	21	ABCDEFGHJ	9	Halifax

Licence	Holder	Granted	Location	NTS	Tract	Claims	No.	County
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	22	EFKLMNOP	8	Halifax
51934	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2D	27	ABCD	4	Halifax
6439	Atlantic Mining NS Corp	2-Nov-04	Plenty	11E2D	22	CD	2	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E1B	108	EFLMNO	6	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	91	BCDEFGHJKLPQ	12	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	92	JKLMNOPQ	8	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	93	N	1	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	97	EFGHJKLMNOPQ	12	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	98	EFGHJKLMNOPQ	12	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	99	EFGHJKLMNOPQ	12	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	100	BCDEFGHJKLQ	11	Halifax
51938	Atlantic Mining NS Corp	24-Oct-17	Fifteen Mile Stream–Beaver Dam	11E2A	101	ABCDGH	6	Halifax
51860	6179053 Canada Inc	22-Sep-17	Fifteen Mile Stream North	11E2D	26	LMNO	4	Halifax
51860	6179053 Canada Inc	22-Sep-17	Fifteen Mile Stream North	11E2D	27	FGHJKLNOPQ	10	Halifax
51860	6179053 Canada Inc	22-Sep-17	Fifteen Mile Stream North	11E2D	46	ABCDEFGHKLMNO	13	Halifax
51860	6179053 Canada Inc	22-Sep-17	Fifteen Mile Stream North	11E2D	47	D	1	Halifax
51690	Atlantic Mining NS Corp	13-Jul-17	Fifteen Mile Stream	11E1C	11	ABCDEFGHJKLMOPQ	15	Halifax
51690	Atlantic Mining NS Corp	13-Jul-17	Fifteen Mile Stream	11E1C	12	ABCDEFGHJK	10	Halifax
51690	Atlantic Mining NS Corp	13-Jul-17	Fifteen Mile Stream	11E1C	14	ABCFGH	6	Halifax
51690	Atlantic Mining NS Corp	13-Jul-17	Fifteen Mile Stream	11E2D	1	ABCDEFGH	8	Halifax
51690	Atlantic Mining NS Corp	13-Jul-17	Fifteen Mile Stream	11E2D	2	ABCD	4	Halifax
51690	Atlantic Mining NS Corp	13-Jul-17	Fifteen Mile Stream	11E2D	3	AB	2	Halifax
52250	Annapolis Properties Corp	15-May-17	Fifteen Mile Stream–Beaver Dam	11E2A	64	G	1	Halifax

Note: all tenures are exploration licences unless otherwise indicated.

Figure 4-3: Tenure Plan, Touquoy-Beaver Dam-Fifteen Mile Stream Property Holdings

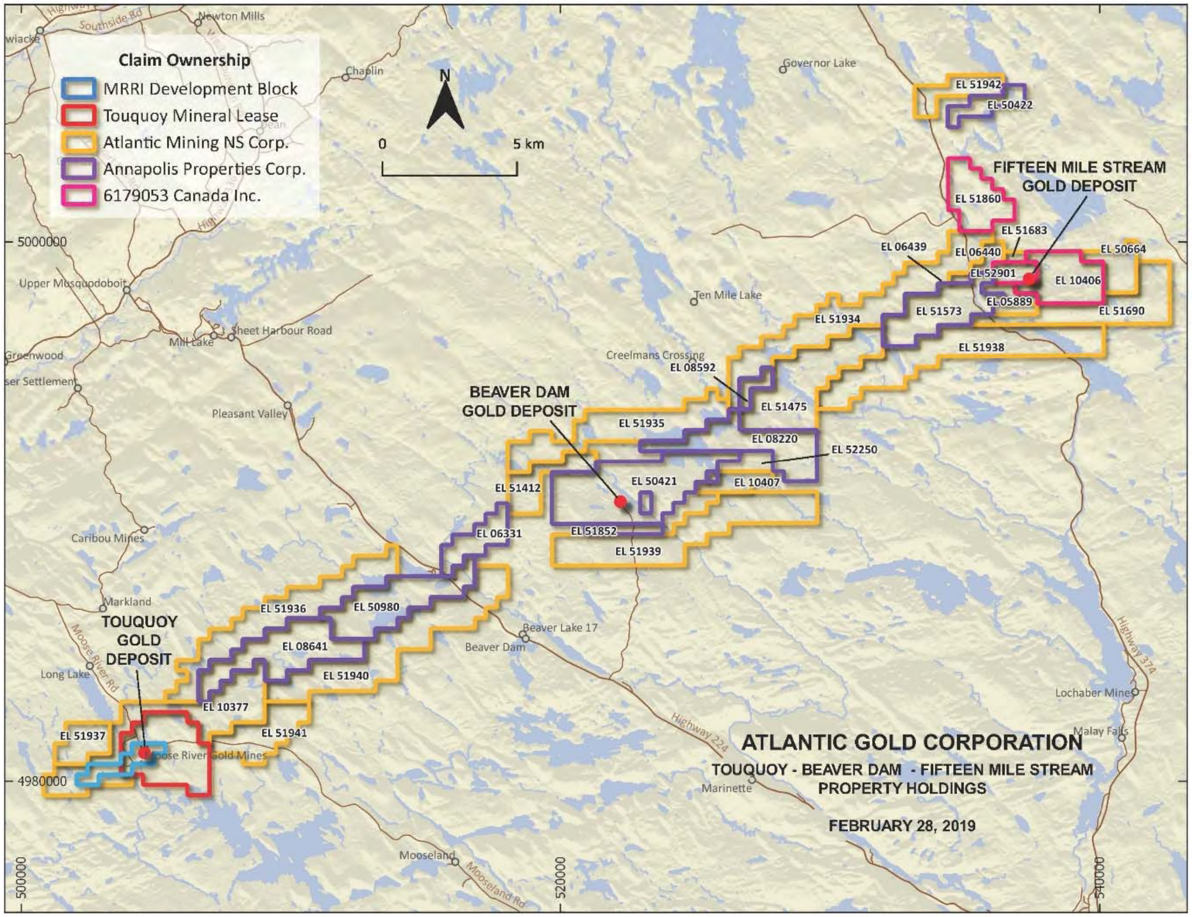


Figure prepared by Atlantic Gold, 2019

Figure 4-4: Tenure Plan, Cochrane Hill Property Holdings

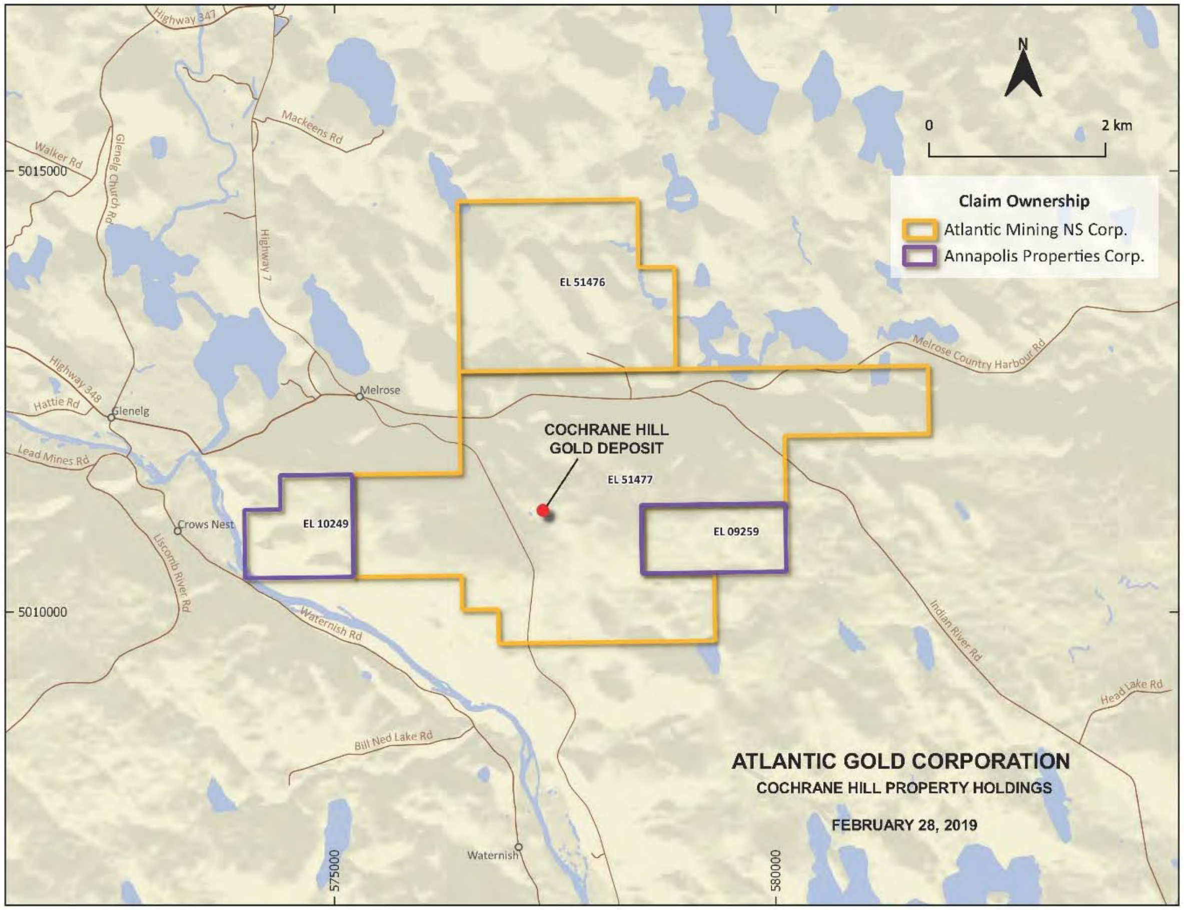


Figure prepared by Atlantic Gold, 2019

Figure 4-5: Tenure Plan, Touquoy

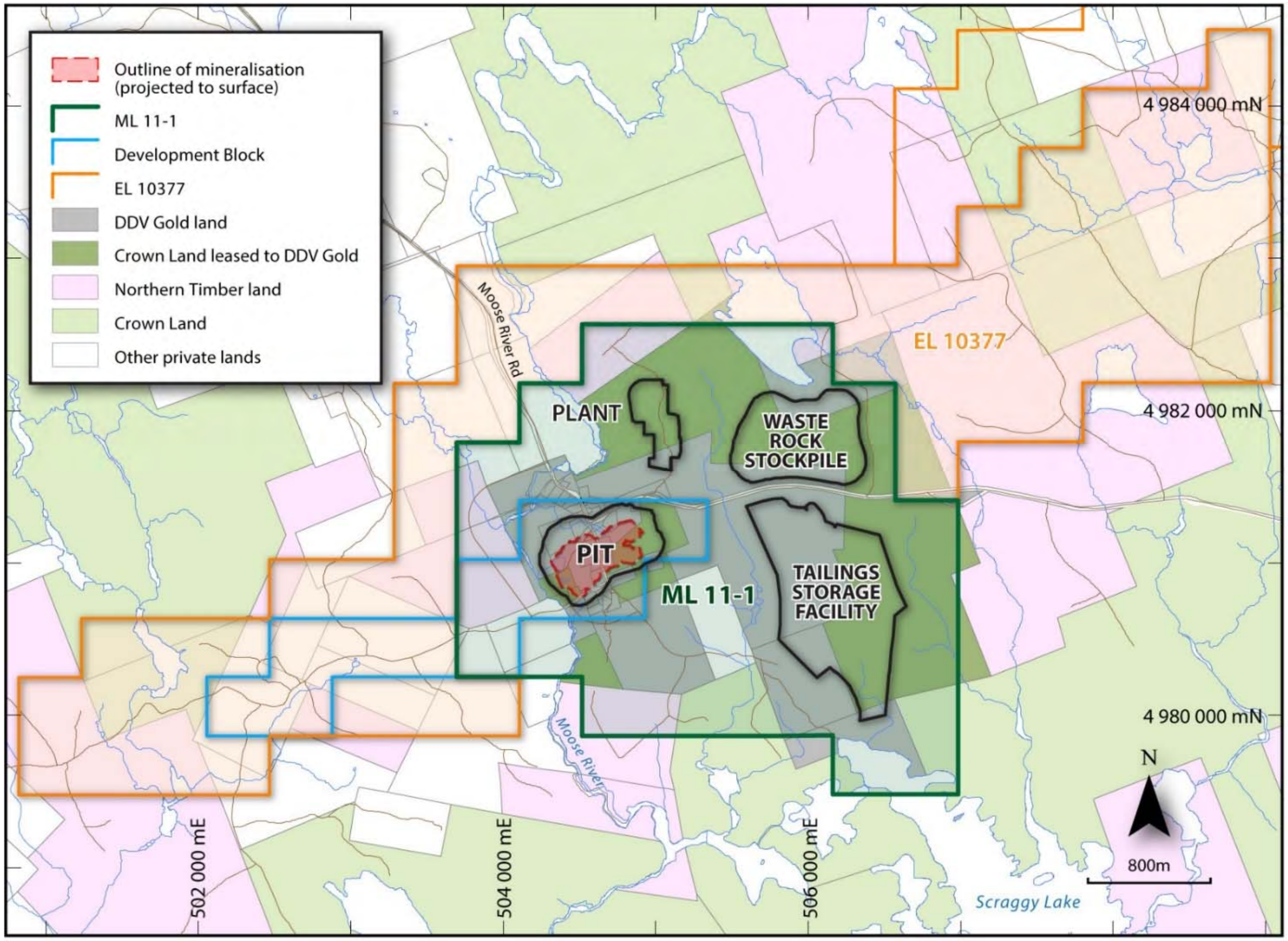


Figure prepared by Atlantic Gold, 2017

Figure 4-6: Tenure Plan, Beaver Dam

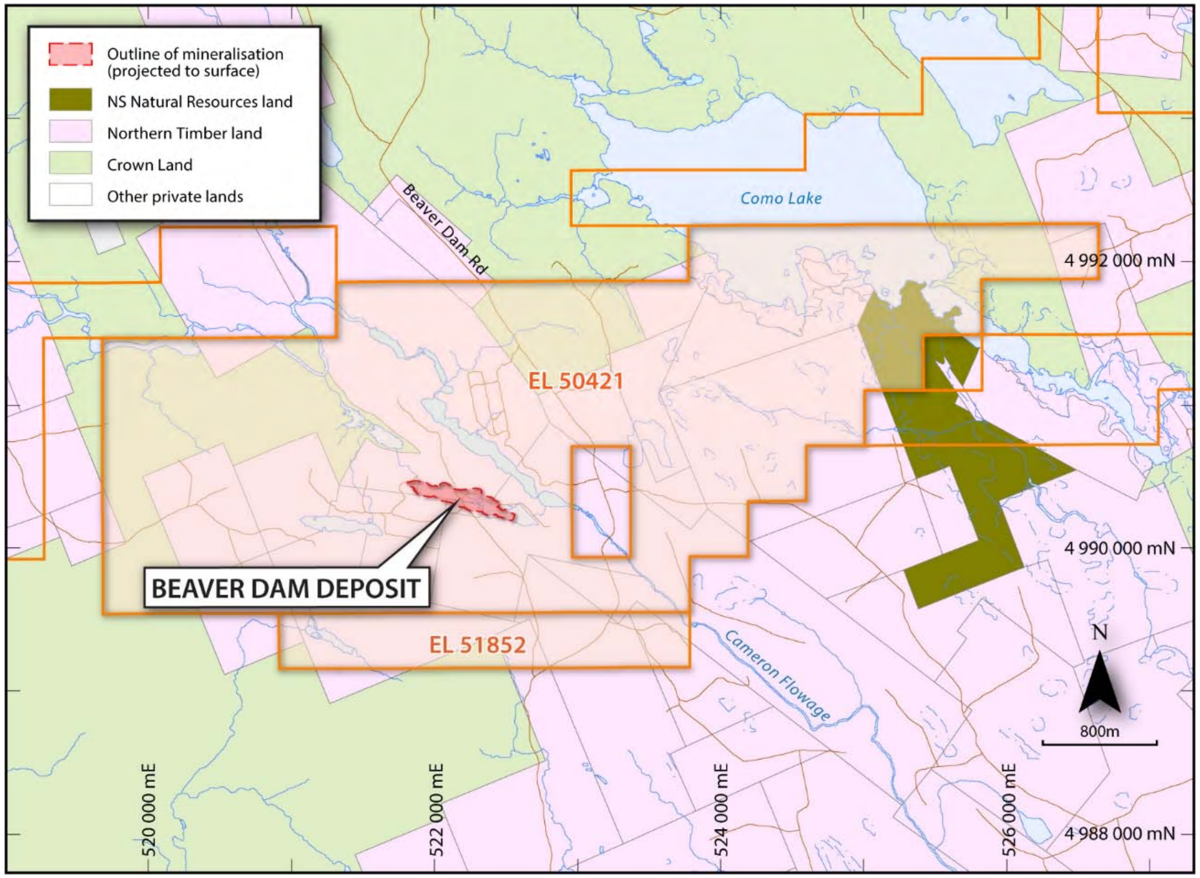


Figure prepared by Atlantic Gold, 2018.

Figure 4-7: Tenure Plan, Fifteen Mile Stream

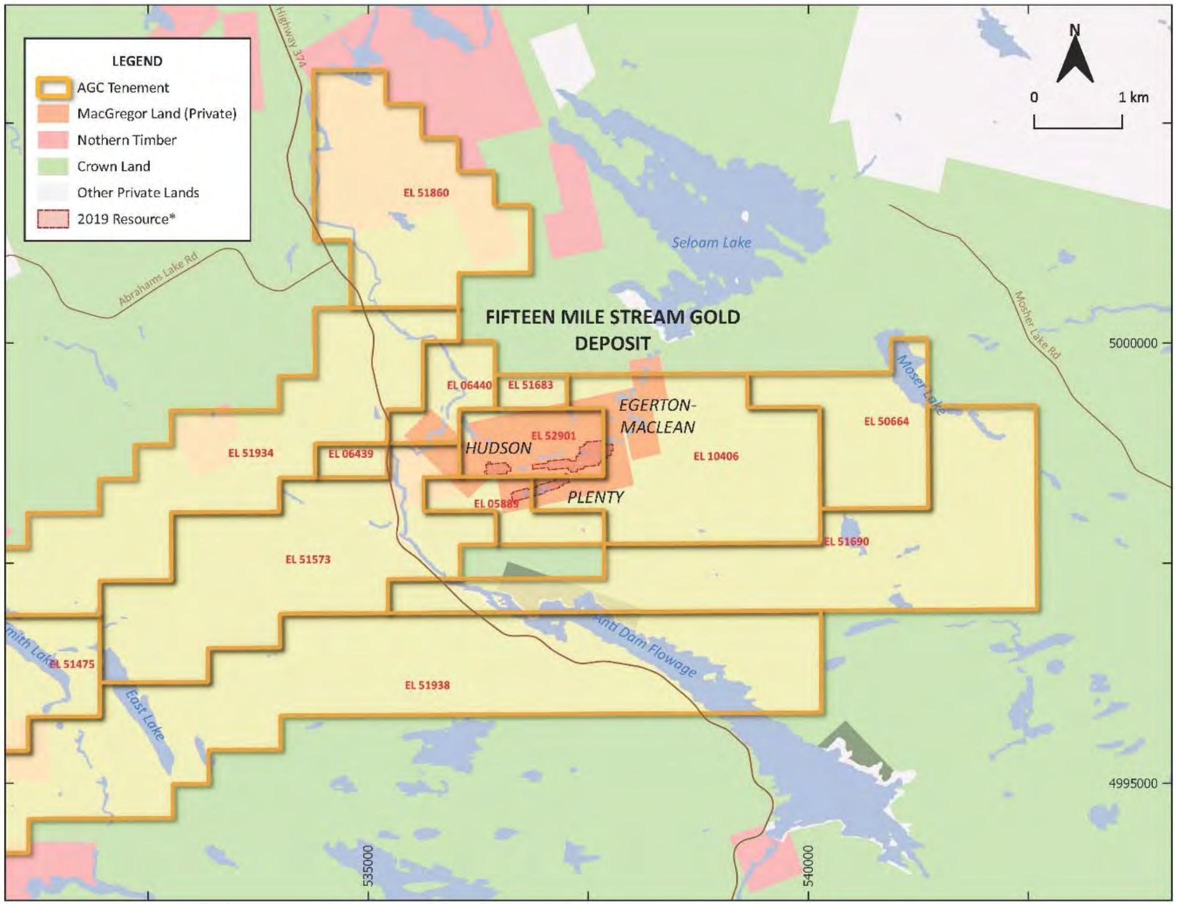


Figure prepared by Atlantic Gold, 2019. AGC = Atlantic Gold. * Resource outline based on Measured and Indicated blocks from the 2019 block model.

Figure 4-8: Tenure Plan, Cochrane Hill

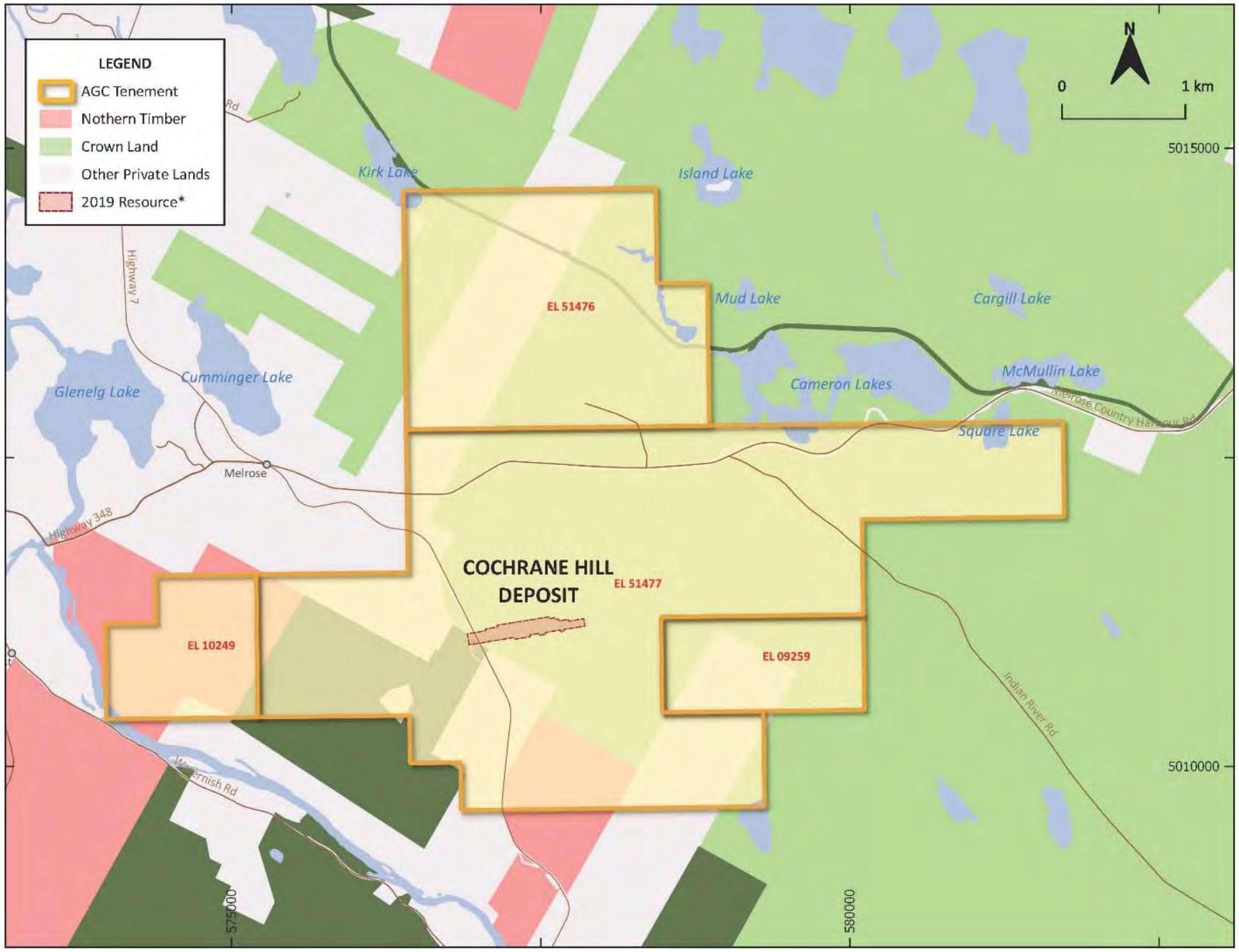


Figure prepared by Atlantic Gold, 2019. AGC = Atlantic Gold. * Resource outline based on Measured and Indicated blocks from the 2019 block model.

Touquoy

The Touquoy property consists of one Mineral Lease (ML 11-1) comprising 49 claims and covering 793 ha, and one adjoining Exploration Licence (EL 10377) comprising 64 claims and covering 1,036 ha.

Yearly work commitments apply only to EL 10377, and amount to $51,200. There are sufficient work credits to maintain this Exploration Licence until its 2019 anniversary without further assessment work being filed. The annual claim renewal fee for EL 10377 is $20,480 and for ML 11-1 is $5,924.

Information on agreements pertaining to the Touquoy property is discussed in Section 4.7.1.

Beaver Dam

Exploration Licence 50421 comprises 76 contiguous claims which cover an area of approximately 1,230 ha. Exploration Licence 50421 is an amalgamation of EL 05920 and EL 06175 which was reissued as EL 50421 in August 2014. Exploration Licence 05920 represented the amalgamation of three pre-existing Exploration Licences 00047, 04790 and 04516. The Exploration Licences were regrouped in 2003 as EL 05920 and reissued by the NSDNR in 2005.

Since Exploration Licence 50421 is in its 42nd year of issue, yearly work commitments are $60,800 per year. There are sufficient work credits to maintain this Exploration Licence until its 2020 anniversary without further assessment work being filed. The annual claim renewal fee totals $24,320.

The mineral rights for Beaver Dam are wholly-owned by Atlantic Gold, subject to royalties (refer to Section 4.5.2).

Fifteen Mile Stream

The property consists of three Exploration Licences (EL 52901, EL 10406 and EL 05889). The licences comprise a total of 45 contiguous claims covering a surface area of approximately 728 ha. Annual work commitments total $36,000. There are sufficient work credits to maintain EL 52901 until its 2021 anniversary, EL 10406 until its 2021 anniversary and EL 05889 until its 2019 anniversary, without further assessment work being filed. The annual claim renewal fee for all three Exploration Licences totals $13,440.

The mineral rights for Fifteen Mile Stream are wholly-owned by Atlantic Gold, subject to royalties (refer to Section 4.5.3).

Cochrane Hill

Mineral tenure consists of one Exploration Licence EL 51477 comprising 76 contiguous "map-staked" mineral claims for a total area of 1,230 ha. Annual work commitments total $60,800. There are sufficient work credits to maintain this Exploration Licence until its 2019 anniversary without further assessment work being filed. The annual claim renewal fee totals $12,160.

The mineral rights for Cochrane Hill are wholly-owned by Atlantic Gold, subject to royalties (refer to Section 4.5.4).

4.4 Surface Rights

4.4.1 Introduction

Under the current Mineral Resources Act, prospectors and exploration companies must obtain permission from the landowner (whether private or Crown) prior to accessing licences.

4.4.2 Touquoy

Atlantic Gold through DDV Gold holds (i.e. holds fee simple title to and possesses) all of the private land required for the development of the Touquoy mining operation.

A Crown land lease to seven parcels of Crown land was granted in June 2014. The lease is for a 10-year term, renewable for a further 10 years.

4.4.3 Beaver Dam

Atlantic Gold does not hold any of the surface titles for the land on which the Beaver Dam deposit occurs. The primary landholder in the area is Northern Pulp Nova Scotia Corporation, which owns several parcels of land comprising a large portion of the Beaver Dam property. The remaining parcels of land which make up the Beaver Dam property are owned by the Crown.

Negotiations will be required with the surface rights holders prior to any mining development.

4.4.4 Fifteen Mile Stream

The two main landowners in the property area are MacGregor Properties Ltd. (MacGregor) of Halifax, and the Crown. Three of the four main zones of mineralization, the Egerton–MacLean, Hudson and Plenty zones, occur on the MacGregor lands and the 149 East Zone is situated on land owned by the Crown.

An agreement to explore, develop and mine is in place with MacGregor. Acadian signed an Access Agreement and Option to Lease with MacGregor on April 8, 2010, which provides Acadian with exclusive rights to conduct exploration on the MacGregor land and thereafter the option to lease the lands for mining. The exploration period timeframe extends until December 31, 2019 and the lease period timeframe extends from the lease commencement date until December 31, 2034. If a mine is operating on the area on December 31, 2034, then the lease period may be extended by agreement.

Negotiations will be required with the Crown prior to any mining development.

4.4.5 Cochrane Hill

About 777 ha or 65% of the area of the main Exploration Licence (51477) is held as ungranted Crown lands by the Province of Nova Scotia and the remaining peripheral 35% area is held by nine different parties. The Cochrane Hill deposit is located entirely within the Crown lands.

Negotiations will be required with the surface rights holders prior to any mining development.

4.5 Royalties

4.5.1 Touquoy

The property was subject to a 3% net smelter royalty (NSR) on all metals produced payable to Maverix Metals Inc. (formerly Corner Bay Minerals Inc.) within three years of the commencement of production. Atlantic Gold had the right to buy back 2% out of the 3% for $2.5 M. This buy back was completed in 2018. A 1% NSR remains on the property. An annual pre-production royalty of $10,000 was payable, but became extinct when commercial production was achieved.

4.5.2 Beaver Dam

Previous Exploration Licence 00047 (the area of which includes the Beaver Dam deposit and which licence has since been re-grouped with other licences into the current EL 50421) was acquired from WMC International Ltd in 2002 and is subject to a variable NSR payable to Acadia Mineral Ventures Limited. Royalty amounts are based on the average grade of mined material and range from 0.6% at an average grade of 4.7 g/t Au or less, up to 3% at an average grade of 10.9 g/t Au or more. Some $300,000 is available as credit against future royalties at a maximum of 50% per royalty payment, payable twice a year.

Former Exploration Licence 04516 (which was acquired from Mr. Henry Schenkels in 2002 and which has also since been re-grouped into EL 50421) is subject to a sliding-scale NSR royalty based on the gold price. Royalties range from 0% at a gold price of

US$265.01/oz Au or less, up to 2% at gold prices of US$320/oz Au or greater. Additional royalties exist for any other commodities produced on this licence including silver, copper, lead and zinc, although future recoveries of these metals is currently considered highly unlikely. The area of this former licence, is, however, located to the north of, and remote from, the Beaver Dam deposit. Under the current development scenario, production from Beaver Dam is therefore outside the influence of this royalty.

4.5.3 Fifteen Mile Stream

Metalla Royalty & Streaming Ltd, hold a 1% NSR over EL 52901 and EL 10406. EL 05889 is subject to a 3% NSR, payable to Mr. Scott Grant of Pictou, Nova Scotia, with Atlantic Gold able to purchase up to 2% of that royalty from Mr. Grant for $500,000 for the first percentage point and $1,000,000 for the second percentage point, or pro-rata for parts thereof.

Former Exploration Licence 06135, now part of EL 10406, is subject to a 1% NSR payable to Meguma Resource Enterprises Inc. Atlantic Gold may purchase the NSR for $250,000. The area of this former licence is, however, located to the south of and remote from the Fifteen Mile Stream deposit. The area of the current Mineral Resource estimate is therefore outside the influence of this royalty.

4.5.4 Cochrane Hill

The property is subject to a 3% NSR on all metals produced payable to Mr. Scott Grant. Up to 2% of the NSR is available for purchase for $1.5 M.

4.5.5 Nova Scotia

A royalty of 1% of the net value received by the producer is payable to the Province of Nova Scotia on all gold production.

4.6 Water Rights

In Nova Scotia, a water withdrawal approval is required to be sought from Nova Scotia Environment in the event that more than 23,000 L/d is to be extracted from a surface water course. Since a positive water balance prevails throughout the Province, except possibly in the driest of months (July and August) such approvals are generally granted, subject to acceptable conditions.

4.7 Property Agreements

4.7.1 Touquoy

The Touquoy property claims are held by DDV Gold under an agreement between Atlantic Gold, DDV Gold and MRRI dated 12 September 2006, as amended, and restated on 27 April 2016. DDV Gold has an effective 63.1% interest in the Touquoy property through direct ownership of 60% and its 7.9% beneficial interest in MRRI. DDV Gold as the operator and manager of the Touquoy property sole funds all pre-production, capital and exploration expenditure.

DDV Gold will receive 100% of the Touquoy cash-flow until all pre-production, capital, exploration and other expenditures plus interest have been recouped. Thereafter, DDV Gold shares 40% of pre-tax profits with MRRI. This profit-sharing arrangement applies to all production from within the 12 claims comprising the "Development Block" (refer to Figure 4-5). Having since secured project financing DDV Gold's profit-sharing obligation reduces to 25% in respect of all claims not comprising the 12 Development Block claims.

At the later of (a) 18 months of production and (b) 3 Mt of throughput of ore, and subject to a minimum gold price condition, DDV Gold will have the option to purchase MRRI's interest at fair market value.

DDV Gold earned its interest in the property from MRRI by expending $2.2 M in exploration and development and making cash payments aggregating $200,000 prior to the completion date of 31 December 2005.

4.7.2 Beaver Dam

The wholly-owned mineral title is not subject to any encumbrances other than the royalties discussed in Section 4.5.

4.7.3 Fifteen Mile Stream

The wholly-owned mineral title is not subject to any encumbrances other than the royalties discussed in Section 4.5.

4.7.4 Cochrane Hill

The wholly-owned mineral title is not subject to any encumbrances other than the royalties discussed in Section 4.5.

4.8 Permitting Considerations

Permitting considerations are discussed in Section 20.

4.9 Environmental Considerations

Environmental considerations are discussed in Section 20.

4.10 Social License Considerations

Social considerations are discussed in Section 20.

4.11 Comments on Section 4

Information from Atlantic Gold experts supports the following:

- Tenures are valid and are in good standing. The tenures are not subject to outstanding liens or encumbrances, and are not pledged in any way;
- Sufficient surface rights are held to allow development of the Touquoy Mine. Negotiations will be required with the surface rights holders prior to any mining development at Beaver Dam, Fifteen Mile Stream, or Cochrane Hill;
- Royalties are payable to third parties for each of the properties, and a royalty is also due to the Province of Nova Scotia;
- A profit-sharing agreement will see DDV Gold sharing 40% of pre-tax profits with MRRI in the 12-claim Development Block at Touquoy. The profit-sharing required for the Touquoy claims outside the Development Block is 25%, since project financing has been secured;
- The mineral rights for Beaver Dam, Fifteen Mile Stream and Cochrane Hill are subject to royalties;
- To the extent known, there are no other significant factors and risks that may affect access, title or right or ability to perform work on the Project.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Accessibility

5.1.1 Road

Touquoy

The Touquoy property is located 60 km northeast of the Provincial capital of Halifax in Halifax County, and is centred on the former mining village of Moose River Gold Mines.

From Halifax and Dartmouth, the Touquoy Property can be reached throughout the year by traveling northeast on Provincial Highway 102 then east on Provincial Highway 224 from Elmsdale to the turn-off into Moose River Rd, a short distance east of Middle Musquodoboit and via Moose River Rd to the former hamlet of Moose River Gold Mines for a total distance of 110 km. Paved and gravel secondary roads also connect the Touquoy property to Provincial Highway 7 near Tangier. Several east–west and north–south trending bush and logging roads also cut the property.

Beaver Dam

The Beaver Dam property is located in Halifax County, approximately 85 km northeast of Halifax.

The Beaver Dam site is easily accessed by the Beaver Dam Mines Road, an unpaved secondary road branching northeastward from Provincial Highway 224. The Beaver Dam Mines Road is a well-maintained and frequently travelled road used by forestry companies actively operating in the area.

Fifteen Mile Stream

The Fifteen Mile Stream property is located 100 km northeast of Halifax.

The site can be accessed from Provincial Highway 374, which connects the towns of New Glasgow and Sheet Harbour and then via the Seloam Lake Road which intersects Provincial Highway 374 approximately 30 km north of Sheet Harbour and links with the property 1.1 km from the highway.

Cochrane Hill

The Cochrane Hill property is located 13 km north of Sherbrooke in Guysborough County.

The property can be reached at any time of the year by travelling east from Halifax on Provincial Highway 107 and then Provincial Highway 7, which swings north at the township of Sherbrooke and traverses the central portion of the property some 13 km north of Sherbrooke for a total distance of 210 km.

5.1.2 Air

The closest international airport is the Halifax Stanfield International Airport about 25 km north of Halifax.

5.1.3 Ports

Where needed, supplies would be shipped through the Port of Halifax.

Sheet Harbour has a deep-water port from which wood chips are currently shipped to various international destinations.

5.2 Climate

Eastern Nova Scotia is characterised by northern temperate zone climatic conditions moderated by proximity to the Atlantic Ocean. Seasonal variations occur, with winter conditions of freezing and/or substantial snowfall expected from late November through late March. Spring and fall seasons are cool, with frequent periods of rain. Summer conditions can be expected to prevail from late June through early September with modest rainfall and daily mean temperatures in the 15–20°C range. Maximum daily summer temperatures to 30°C occur, with winter minimums in the -25°C to -30°C range.

Mining operations are planned to be conducted year-round.

Mineral exploration programs can efficiently be undertaken during the period of May through late November, while winter programs can be accommodated with appropriate allowance for weather delays.

5.3 Local Resources and Infrastructure

5.3.1 Touquoy

The property is located about 70 minutes drive from Halifax/Dartmouth, with its population of approximately 350,000. Halifax provides the majority of goods and services required by the project. The closest population centre to the site is Middle Musquodoboit, with a population of about 1,000 and located 20 km to the northwest.

5.3.2 Beaver Dam

There are no dwellings within 6 km of the Beaver Dam deposit. Goods and services needed are generally sourced from Halifax/Dartmouth.

5.3.3 Fifteen Mile Stream

The property is unpopulated, and the nearest town is Sheet Harbour, which has a population of about 800 people.

5.3.4 Cochrane Hill

There are several population centres within a short driving distance of the Cochrane Hill area, including the town of Sherbrooke, 13 km to the south, which has a population of 1,700 and provides a number of services including secondary schooling and a hospital. The university town of Antigonish, some 40 km to the north, has a population of 14,600 and provides a greater range of services.

5.4 Physiography

5.4.1 Touquoy

Topography at the site, and regionally, is gently undulating, ranging from a low of 100 masl at the western end to a high of 170 masl at the eastern end of the property. Numerous topographic highs in the eastern end of the property represent drumlins cored by clay-rich Lawrencetown Till. Till cover ranges from 0–10 m in local till and as much as 30 m in drumlinized areas.

The area is forested with spruce, fir, maple and birch stands, much of which has been logged.

Drainage is sluggish due to numerous swamps and bogs and is con-trolled by numerous, northwest–southeast trending fault structures. There are three main drainage basins on the property, all draining towards the southwest and the Atlantic Ocean.

The area surrounding the former Moose River Gold Mines is characterized as mostly forested with a low population density. The area supports a long-standing forestry industry. Streams and waterways in the area support trout fishing and other recreational uses.

5.4.2 Beaver Dam

Beaver Dam is an area of low topographic relief with most of the area being around 140 masl with scattered drumlins reaching 160 masl.

Drainage is to the southeast along a number of poorly-drained streams and shallow lakes. There are a number of boggy areas within the property.

Vegetation consists of spruce, fir, and some hardwood. Logging has been widely carried out more recently including clear cutting in the immediate area of the deposit.

5.4.3 Fifteen Mile Stream

Fifteen Mile Stream is an area of low topographic relief, climbing gently to the east from around 110–150 masl with scattered drumlins reaching 170 masl.

Drainage is to the southeast along a number of poorly drained streams and shallow lakes. There are a number of boggy areas within the property.

Vegetation is dominated by stands of balsam fir, spruce, tamarack and hemlock with isolated occurrences of hardwood. Logging has been widespread, more recently including clear cutting in the immediate area of the deposit.

5.4.4 Cochrane Hill

The property straddles Cochrane Hill, a prominent feature in the area with a maximum elevation of 150 m. The Cochrane Hill deposit occurs on the east side of Cochrane Hill, at an elevation of approximately 120 masl. Topographic relief is gentle with elevations ranging from 55 m in the north–central portion to 150 m at Cochrane Hill, in the property centre.

The area is forested with spruce, fir, maple and birch stands, much of which has been logged.

Intermittent swamps are found on the Property and are drained by small streams that flow north or south, then west, and discharge into the St. Mary’s River.

The principal economic activity in the project area is forestry. Coastal settlements to the south support a long-standing lobster and fishing industry and there is some farming on terraces along the valleys of the St. Mary’s River and its tributaries. Streams and waterways in the area support trout fishing and other recreational uses.

5.5 Comments on Section 5

There is sufficient land available within the mineral tenure held by Atlantic Gold for tailings disposal, mine waste disposal, and installations such as the process plant and related mine infrastructure.

A review of the existing power and water sources, manpower availability, and transport options (see Sections 18 and 20), indicates that there are reasonable expectations that sufficient labour and infrastructure will continue to be available to support declaration of Mineral Resources, Mineral Reserves, and the proposed life-of-mine (LOM) plan (LOMP).

6.0 HISTORY

6.1 Introduction

Information from previous technical reports has been used as a basis for the descriptions in this section (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015; Staples et al., 2017; and Staples et al., 2018).

6.2 Exploration History

A summary of the exploration history by property is provided in Table 6-1 to Table 6-4 for each of Touquoy, Beaver Dam, Fifteen Mile Stream and Cochrane Hill.

A feasibility study was completed in 2015 on the Touquoy and Beaver Dam deposits, and a pre-feasibility study completed in 2018 that incorporated the Fifteen Mile Stream and Cochrane Hill deposits as an expansion to the planned Touquoy and Beaver Dam Mines.

The Moose River Consolidated Gold Mine at Touquoy was officially opened on 11 October, 2017, and commenced commercial production effective March 1, 2018.

6.3 Production

6.3.1 Historic Production

Historic gold production from the Touquoy property dates back to the period from 1877 to the First World War. The mines at Moose River were the most significant producers within the current property area with an estimated 21,500 oz Au produced, although production was combined with the Caribou gold mining district, 10 km to the north, in the earlier years, masking the actual production levels. Gold was also produced from the Higgins & Lawlor and Stillwater mines, located about 2 km west of the Moose River mines.

A total of 967 oz Au production is recorded for the Beaver Dam gold district from 1889–1941. A further 2,445 oz Au was recovered from bulk samples taken between 1986 and 1989.

A total of 21,292 oz Au were produced in the Fifteen Mile Stream gold district between 1878 and 1941. No record of the recovered gold ounces from the two NovaGold bulk samples taken in the 1980s is available.

Production in the Cochrane Hill area from 1877–1928 is estimated at about 1,354 oz Au.

6.3.2 Production by Atlantic Gold

Production figures to 31 December, 2018 are summarized in Table 6-5.

Table 6-1: Touquoy History

Year	Company	Work Performed
1877–1936	Major companies included the Moose River Gold Mining Company and the Touquoy Gold Mining Company.	Intermittent gold production from small underground mines and quarries; stamp milling.
1983–1987	Seabright Explorations Inc (Seabright)	Claim staking, exploration activities including magnetic and VLF-EM surveys together with geological mapping, overburden sampling and general prospecting. Drilling conducted from 1986–1988; Mineral Resource estimate. Small decline-based underground exploration program in 1988. Touquoy deposit discovered.
1987–1989	Westminer Canada Ltd (Westminer)	Seabright taken over by Western Mining Corporation and renamed Westminer Canada Ltd. Exploration activities included drilling, updated Mineral Resource estimate, preliminary geotechnical, metallurgical and environmental studies, 57,000 ton bulk sample taken from the northwestern end of the deposit and processed by flotation at the Gays River Mill; preliminary pit designs, capital and operating cost estimate with financial models. Deposit considered sub-economic at the time.
1990	Seabright	Property ownership reverted to Seabright; name change to Corner Bay Minerals Inc. (Corner Bay)
1993–1995	Nova Gold Resources Inc (NovaGold)	Optioned from Corner Bay; completed metallurgical testwork based on an agglomeration/vat leaching process.
1995	Nova Scotia Department of Natural Resources (NSDRR)	Two core holes for metallurgical testwork purposes.
1996	Moose River Resources Inc (MRRI)	Acquired property from Corner Bay; completed core drilling.
1996–1997	CanNova Goldfields Inc (CanNova)	Option from MRRI over areas at the eastern and western ends of EL5870; conducted drilling, till sampling and prospecting.
1998	Adamas Resources Corp (Adamus)	Option from MRRI. Re-examined a drill hole.
2002–2003	Aurogin Resources Ltd (Aurogin)	Option from MRRI. Orientation soil sampling program and metallurgical testwork; percussion and core drilling, Mineral Resource estimate.
2003	Diamond Ventures NL (Diamond Ventures)	Option from MRRI. Diamond Ventures name change to Atlantic Gold.
2004 to date	Atlantic Gold	Geological mapping, core drilling, Mineral Resource and Mineral Reserve estimates, preliminary economic assessment (PEA), feasibility study (FS), mine planning, metallurgical testwork, geotechnical, hydrogeological studies, environmental, permitting and social studies, mine development activities. The Moose River Consolidated Gold Mine at Touquoy was officially opened on 11 October, 2017, and commenced commercial production on commercial production effective March 1, 2018.

Table 6-2: Beaver Dam History

Year	Company	Work Performed
1868		Gold discovered.
1871–1935	Various	Underground mining, stamp milling. Shafts completed included Austen, Redding/Mill.
1954–1957	Lawrence Construction Company Ltd	Trenching.
1975–1983	M.E.X. Explorations (MEX)	Acquired claims. Subsequently concluded agreements with Agassiz Resources and Comiesa Corporation to undertake exploration. Agassiz completed 9 core holes (644 m) and excavated several trenches. Comiesa completed 9 core holes (1,003 m). MEX completed 2 core (213 m) and cleared some ground for a bulk sampling exercise.
1983	Acadia Mineral Ventures (Acadia)	Acadia Mineral Ventures funded MEX exploration in 1983. Work included mapping, geophysical and geochemical surveys, and core drilling (11 drill holes, 758 m).
1985–1988	Seabright	Optioned claims in the Austen Shaft area from Acadia Mineral Ventures. Seabright completed geological mapping and prospecting, soil geochemical surveys, magnetic, VLF-EM, horizontal loop EM and IP and resistivity geophysical surveys together with drilling of 304 shallow RC holes (1,219 m) and 186 core holes (43,027 m). Mineral Resource and Mineral Reserve estimates completed; a Feasibility Study was conducted by Kilborn Engineering in 1987. A 100 m long decline constructed, 135,000 tons mined as a bulk sample, and 41,119 tons at 1.85 g/t Au of bulk sample material milled. Underground drilling, 34 holes (2,290 m), completed. Open pit mine excavated over Papke and Austen zones; production of 10,055 tons, of which 8,822 tons at 2.45 g/t Au was milled at the Gays River plant.
1985	Coxheath Gold Holdings (Coxheath)	Acquired claims to the immediate west and north of the Seabright claims, including the Mill Shaft area. Coxheath completed a VLF survey and geochemical sampling program before optioning the property to Seabright.
1988–1993	Westminer	Seabright acquired by Western Mining Corporation in 1988. Mineral Resource and Mineral Reserve estimates undertaken. Subsequent court action over Mineral Resource and Mineral Reserve estimates that was resolved in 1993 saw withdrawal by Westminer from all Canadian properties.
2002–2013	Tempus Corporation (Tempus)	Acquired property from Seabright. Tempus subsequently underwent name changes to Acadian Gold Corporation, and subsequently, Acadian Mining Corporation (Acadian). Acadian completed an aeromagnetic survey, a till sample survey, follow-up shallow RC drilling, and mineral resource estimates.
2014	Atlantic Gold	Acquired Acadian.
2014 to date	Atlantic Gold	Mineral Resource and Mineral Reserve estimates, PEA, FS, mine planning, metallurgical testwork, geotechnical, hydrogeological studies, environmental, permitting and social studies, mine development activities.

Table 6-3: Fifteen Mile Stream History

Year	Company	Work Performed
1867		Gold discovered.
1874–1938	Various	Underground mining activity; stamp milling.
1938–1941	Provincial Government	
1980	St Joseph Explorations	Claim staking on the northern and western margins of the historically-mined areas at Fifteen Mile Stream; completed humus and soil geochemical surveys.
1981–1999	Pan East Resources (Pan East)	Established ground holding that covered Egerton–MacLean, Mother Seigel and Hudson workings. Optioned to a number of companies including Greenstrike Gold Corp, Novamin Resources, Petromet Resources, and Gunnar Gold. Pan East acquired by Poco Petroleum in 1998 and by Burlington Resources in 1999. Completed airborne VLF-EM and magnetic survey, detailed ground magnetics, VLF-EM and dipole-dipole IP surveys soil humus geochemical survey, soil orientation geochemical survey geological mapping, 134 core drill holes (26,612 m) concentrated on the Egerton-MacLean and Hudson Zones. Discovery of 149 East Zone in 1988.
1985–1990	Novacan Mining Resources Inc/NovaGold	Acquired claims over newly-named Plenty Zone that included the Egerton–MacLean area; relinquished claims in 1990. Completed 97 holes (13,822 m), and an additional 8 holes (1,594 m) in support of bulk sampling in 1988. 4,030 tons of hand-selected open pit material grading 2 g/t Au processed at Westminer's Gays River plant, estimated recovery of 93.7%. A second sample of 1,788 tons processed at Murray Brook Resources Cochrane Hill plant in the same year.
1990–2008	Prospectors	Acquired claims.
2004	6179053 Canada Inc	Acquired claims from Burling-ton Resources Canada Ltd.
2008–2010	DDV Gold Ltd (DDV Gold)	Optioned half the Plenty Zone area from prospectors.
2008–2009	Annapolis Properties Corporation	Acquired 6179053 Canada Inc. Also acquired additional claims covering the other portion of the Plenty Zone and all of the 149 East Zone.
2014 to date	Atlantic Gold	Acquired Acadian, parent company of Annapolis Properties, Completed core drilling, Mineral Resource estimates, PEA, environmental studies, Mineral Reserve estimates, PFS-level studies.

Table 6-4: Cochrane Hill History

Year	Company	Work Performed
1877–1928	Various	Intermittent gold production from small underground mines and quarries; stamp milling.
1930s	Guildford's Ltd., Eastern Mining Syndicate	Underground development, 3 core holes (800 ft).
1960s	Milado Mines	Self-potential and long wire electromagnetic geophysical surveys.
1973–1975	Massval Mines Limited (Massval)	Acquired property. In conjunction with Midas Resources Ltd., and Atlantic Ltd, completed geophysics, prospecting, surface stripping, trenching, and bulk sampling, 44 BQ diameter core holes for a total of 4,912 m.
1979–1984	Northumberland Mines Ltd (Northumberland)	Optioned from Massval. Completed humus geochemical and VLF electromagnetic surveys, airborne magnetic and VLF electromagnetic survey; one core drill hole (91 m) in 1979 and 20 hole, 3,840 m core drilling program in 1981. Bulk sampling and metallurgical testwork. Construction of a cyanide test mill on site; 13,106 tons of material excavated from an 80 m long x 30 m wide x 10 m deep open pit and treated through mill; 512.4 oz Au recovered, for a metallurgical recovery of 76.7%. Completed a 100 ton heap leach test; 600 lb of open pit material tested at Atlantic Research Institute by vat CN leaching, jigging and cyanidation of tails. Mineral Resource estimates.
1984–1987	Inco Limited; Scotian Mineral Exploration Venture (Scominex)	Surface and borehole geophysical testing, drill core re-logging, surface stripping and channel sampling, 15 hole (2,536 m) core drilling program, metallurgical testing. Underground development for bulk sampling, and an additional 16 core holes (2,566 m). Bulk sample consisted of 4,443 tons of material mined in four separate drifts. 2.8 tons of bulk sample grading 2.09 g/t Au processed. 3,400 lbs of muck piles and face sample material sent for analysis. Mineral resource estimates. Inco withdrew in 1987.
1988	Northumberland/NovaGold	Underground development generating 5,000 tons of bulk sample. 1,490 tons treated through plant at a grade of 2.06 g/t Au; selective sample of 370 tons assayed 3.43 g/t Au when processed. Completed geological sampling, panel sampling, surface sampling east of the open pit, and the drilling of 28 underground core drill holes (2,044 m). Mineral resource estimates.
1988–1989	Acadia	Core drilling east of Cochrane Hill deposit.
2002–2004	Scott Grant	Optioned to Scorpio Mining Corporation (Scorpio) who focused on areas to east and west of the Cochrane Hill deposit. During 2004 completed ground magnetics, mapping, prospecting, trenching and till and soil sampling.
2007	DDV Gold	Exploration activities under option from Scorpio. Acquired a 100% interest in the property in August 2012. DDV Gold became a subsidiary of Atlantic Gold.
2007 to date	Atlantic Gold	Geological mapping program and rock chip sampling program, core drilling, Mineral Resource estimates, PEA, environmental studies, Mineral Reserve estimates, PFS-level studies.

Table 6-5: Production Summary

	Units	2017	2018
Tonnes Milled	t	374,322	2,108,420
Grade	g/t	1.08	1.41
Ounces	oz Au	12,995	90,531

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Introduction

Information from previous technical reports has been used as a basis for the descriptions in this section (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015; Staples et al., 2017; and Staples et al., 2018).

7.2 Regional Geology

Mainland Nova Scotia comprises two distinct lithotectonic terranes, the Avalon Terrane to the north and the Meguma Terrane to the south, which are juxtaposed along the crustal-scale Cobequid–Chedabucto Fault Zone.

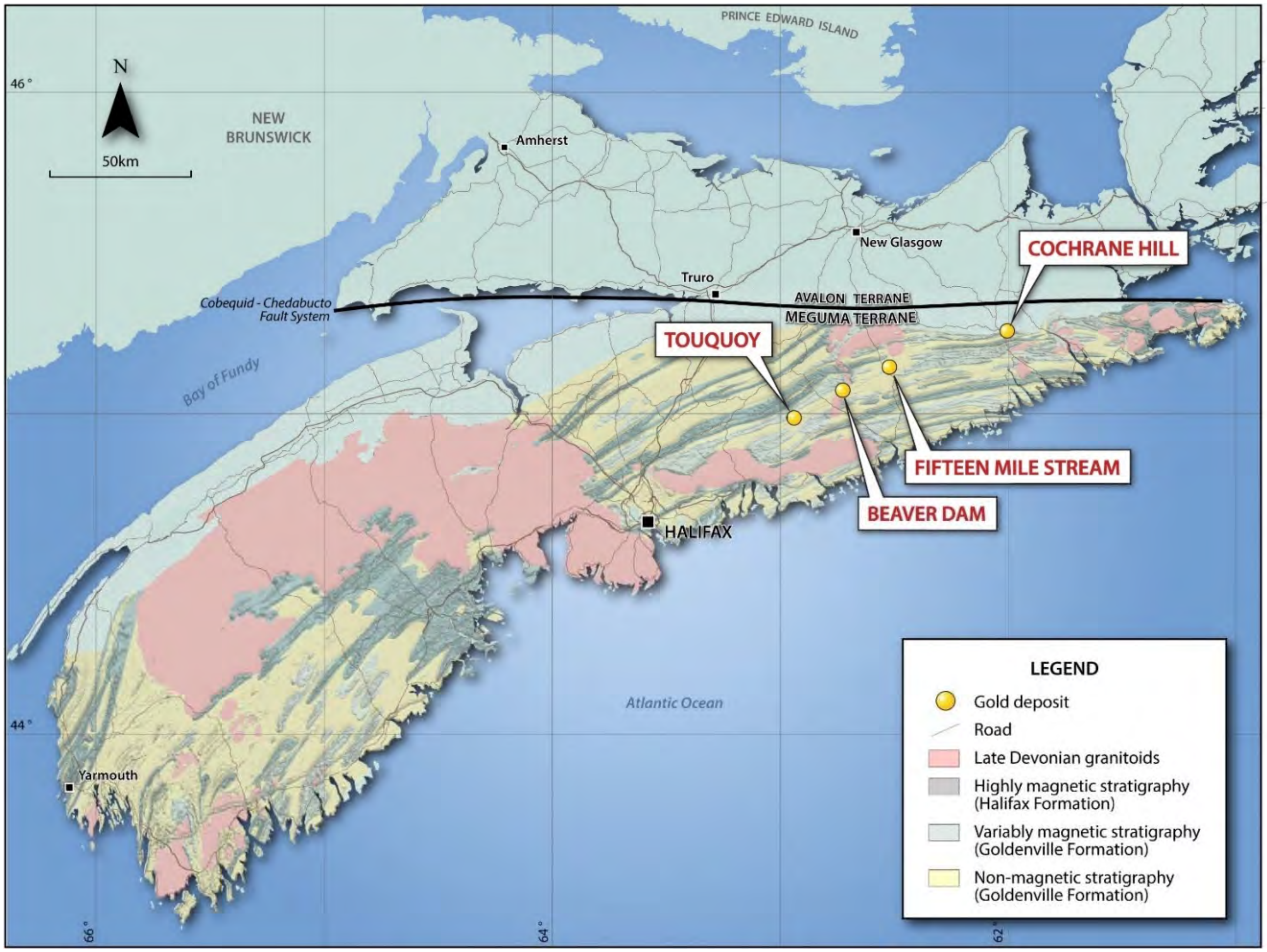
The Neoproterozoic to Early Paleozoic Avalon Terrane comprises multiple volcanic and sedimentary successions, locally intruded by felsic to mafic igneous plutons. Numerous metalliferous deposits have been recognized in the Avalon Terrane, mostly within Precambrian rocks, including carbonate-hosted zinc skarn deposits, stratabound massive sulphide deposits, quartz-vein hosted high-grade gold mineralization in gneiss and diorite, polymetallic volcanic-hosted massive sulphide deposits, and porphyry- and epithermal-style mineralization (Donohoe, 1996).

The Neoproterozoic(?) to Early Devonian Meguma Terrane consists mainly of marine sedimentary rocks (turbidites, shelf clastics) with lesser bimodal volcaniclastic and volcanic rocks. The terrane hosts most of the gold mineralization exploited historically (from 1860 onward) in Nova Scotia with approximately 1.2 Moz Au produced (Bierlein and Smith, 2003). Figure 7-1 is a regional geological map showing the locations of the properties that are the subject of this Report. Juxtaposition of the Meguma and Avalon terranes and metamorphism and folding of the Meguma terrane occurred during the Early to Middle Devonian Neoacadian orogeny. Numerous, late syntectonic to post-tectonic, mainly Middle to Late Devonian, peraluminous, granitic plutons later intruded folded strata of the Meguma terrane (White and Barr, 2012).

7.3 Project Geology

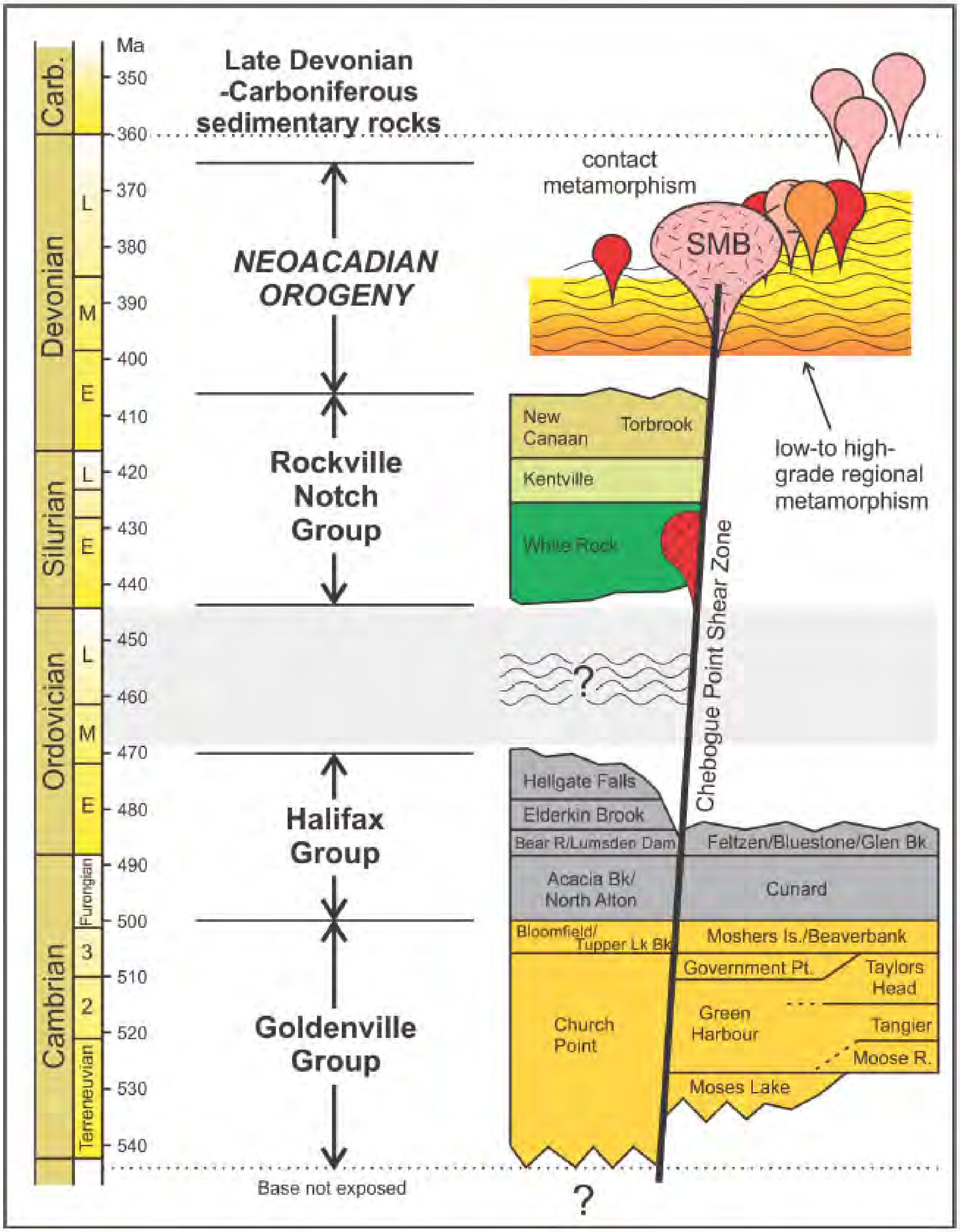
Strata of the Meguma Terrane in eastern mainland Nova Scotia include the basal greywacke-dominated Goldenville Group and the overlying, finer-grained, argillite-dominated Halifax Group (Figure 7-2). All four of the deposits covered in this Report are hosted in the basal Goldenville Group.

Figure 7-1: Regional Geology



Note: Figure prepared by Atlantic Gold, 2017.

Figure 7-2: Stratigraphic Column, Meguma Terrane



Note: Figure from White and Barr, 2012.

ATLANTIC GOLD

The basal contact of the Goldenville Group has not been identified, but the Goldenville Group is at least 5,600 m thick while the overlying Halifax Group averages approximately 4,400 m. These strata were uplifted and deformed into a series of tightly-folded, subparallel, northeast-trending anticlines and synclines during the Neoacadian Orogeny (ca. 410–380 Ma). At the same time the strata were metamorphosed to greenschist and locally amphibolite (staurolite) facies and were later intruded by Middle to Late Devonian granites and minor mafic intrusions.

According to Horne and Pelley (2007) the Goldenville Group in Eastern Mainland Nova Scotia comprises, from oldest to youngest:

- Moose River Formation: metasandstone with relatively thick (up to tens of meters), green–grey, locally banded, metasiltstone intervals;
- Tangier Formation: metasandstone-dominated cycles capped by dark grey slates;
- Taylors Head Formation: massive and tabular/planar metasandstone-dominated with lesser green–grey metasiltstone and rare conglomerate.

7.4 Deposit Descriptions

7.4.1 Touquoy

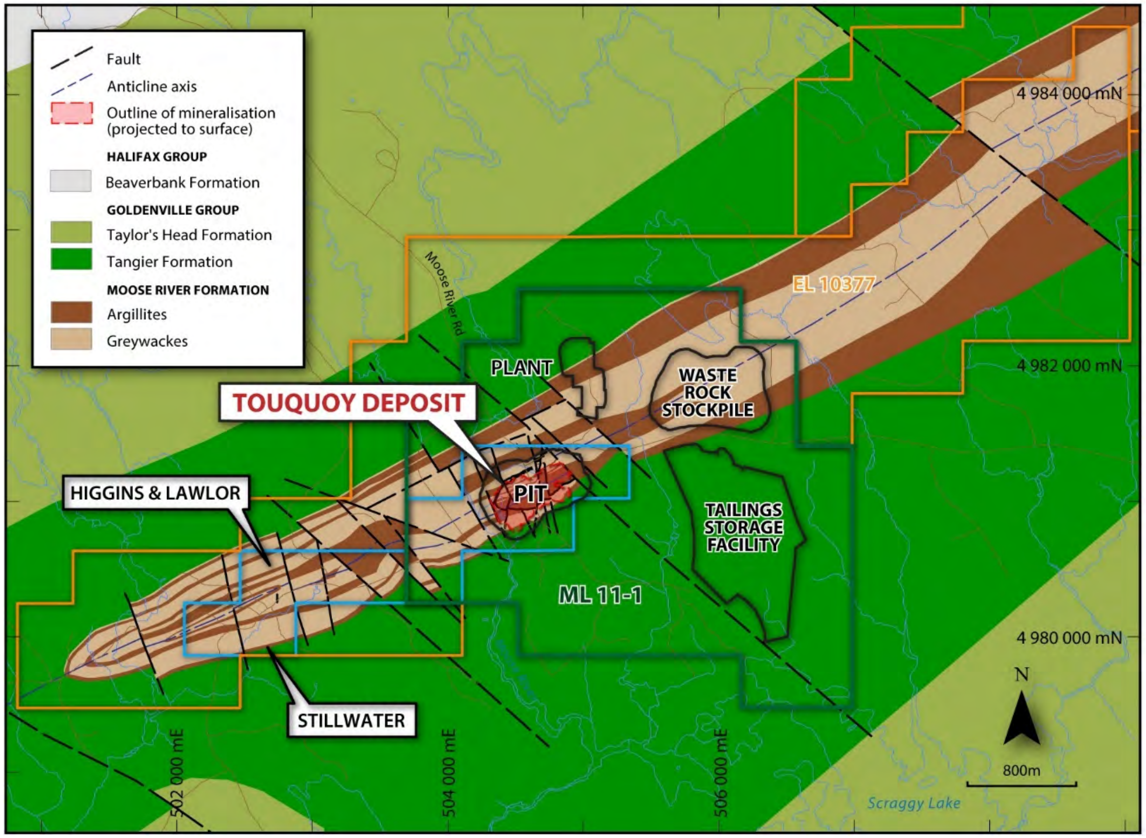
A geology map of the Touquoy property is provided in Figure 7-3 and an inset showing the geology in the Touquoy deposit area is included as Figure 7-4.

Geology

A number of argillite units, separated by greywackes, occur within the Touquoy property. Mineralization is hosted within the Touquoy argillite unit of the Moose River Formation of the Goldenville Group. The argillite is folded around the Moose River–Fifteen Mile Stream Anticline, a regional structure that can be traced for at least 47 km from a position approximately 6 km south west of the Touquoy deposit, to approximately 4 km northeast of Fifteen Mile Stream.

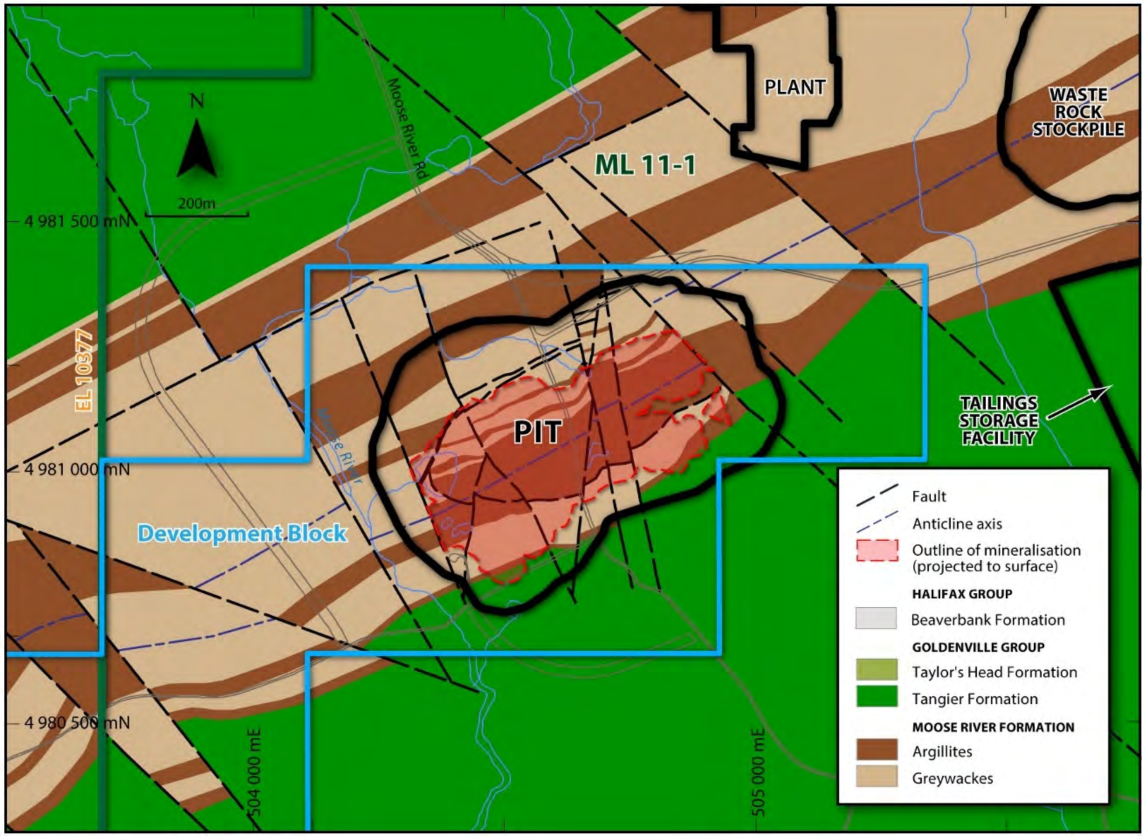
The anticline geometry varies along its length in the property area, from an upright tightly-folded anticline in the vicinity of the Touquoy deposit to multiple tight folds, overturned to the north, in the Stillwater area.

Figure 7-3: Geology Plan, Touquoy Property



Note: Figure prepared by Atlantic Gold, 2017.

Figure 7-4: Inset Geology Plan, Touquoy Deposit



Note: Figure prepared by Atlantic Gold, 2017.

The argillite unit is as much as 180 m thick close to the hinge in the northern limb and appears to thin with depth. It is much thinner in the southern limb, typically 25–60 m wide. In the northern limb, the Touquoy argillite is separated into upper and lower units by a distinctive marker horizon, the rip-up unit, which varies from a thin (<2 m thick) horizon of sparse sandstone rip-up clasts in a finer grained matrix to a fine or medium grained greywacke. The rip-up unit has only rarely been recognized in the southern limb.

Structure

The Moose River–Fifteen Mile Stream Anticline is tightly folded and upright to overturned with both limbs dipping north. The anticline hinge is doubly-plunging, with shallow plunges to both northeast and southwest. It has been disrupted by a number of northwest-trending faults with contrasting fold geometries occurring on opposite sides of some of those faults showing that folding and some of the faulting had similar timing.

Two major faults appear to have a significant effect on mineralization thickness at Touquoy, the curvilinear West Fault and the relatively planar Northeast Fault:

- The West Fault is interpreted to show normal movement such that the anticline to the east of the fault has dropped and argillite on the southern limb of the anticline, west of the West Fault shows relative displacement to the south;
- The Northeast Fault comprises an approximately 10 m to 20 m wide zone with intensely faulted and fragmented intervals separated by weakly sheared or quite coherent intervals. It juxtaposes a sequence of barren or very weakly gold-anomalous argillite and greywacke against the Touquoy argillite and its hanging wall units.

A discrete structure (or structures) parallel to the anticline axial surface and representing a hinge fault or faults has been tentatively identified in several drill sections, and may have a role in localising gold mineralization.

A series of north- to northeast-trending and east- to northeast-trending faults have displaced both stratigraphy and gold mineralization, although it is possible that some of these faults were also active during gold mineralization.

A well-developed axial plane cleavage is recognised within argillite layers while greywacke layers exhibit weakly developed pressure solution cleavage. Flexural slip occurred during folding and disruptions in bedding orientation in the hinge position is interpreted to reflect repetition (crumpling) of the fold hinge, to produce parallel fold axes at Touquoy.

Metamorphism

The Touquoy host rocks have been metamorphosed to lower greenschist facies such that the dominant mineral assemblage in the argillites is quartz, muscovite, chlorite ± albite, with accessory ilmenite and rutile.

Mineralization

Gold mineralization is best developed in the northern limb of the anticline where it broadly conforms to bedding over a strike length of approximately 600 m. Mineralization is less persistent in the anticlinal hinge but is well developed in the southern limb over a strike length of approximately 250 m where a bedding control is less apparent but where mineralization is associated with shearing near the contact between the Touquoy argillite and hanging wall Touquoy greywacke.

A cross-section through the Touquoy deposit is included as Figure 7-5.

Gold occurs as native gold, and has been observed in a number of settings, including along shear cleavage, hair line fractures; in pressure shadows; as inclusions; on the margins of sulphide grains; in thin bedding-parallel quartz veins and stringers where it is often associated with pyrite or pyrrhotite and sometimes with base metal sulphides, particularly galena and chalcopyrite; and on the margins of tightly-folded quartz veins, often at, or close to, fold hinges.

Gold grain size as indicated by petrographic studies varies from 1 µm to >1 mm and gold grains up to 1.5 mm in size have been observed. Sulphide minerals accompanying the gold mineralization are pyrrhotite, usually aligned along the axial plane cleavage (1–2%), arsenopyrite, often as coarse porphyroblasts (1%) and pyrite (<1%). Other sulphides are rare. At a macro scale, there is typically poor correlation between arsenic and gold content.

7.4.2 Beaver Dam

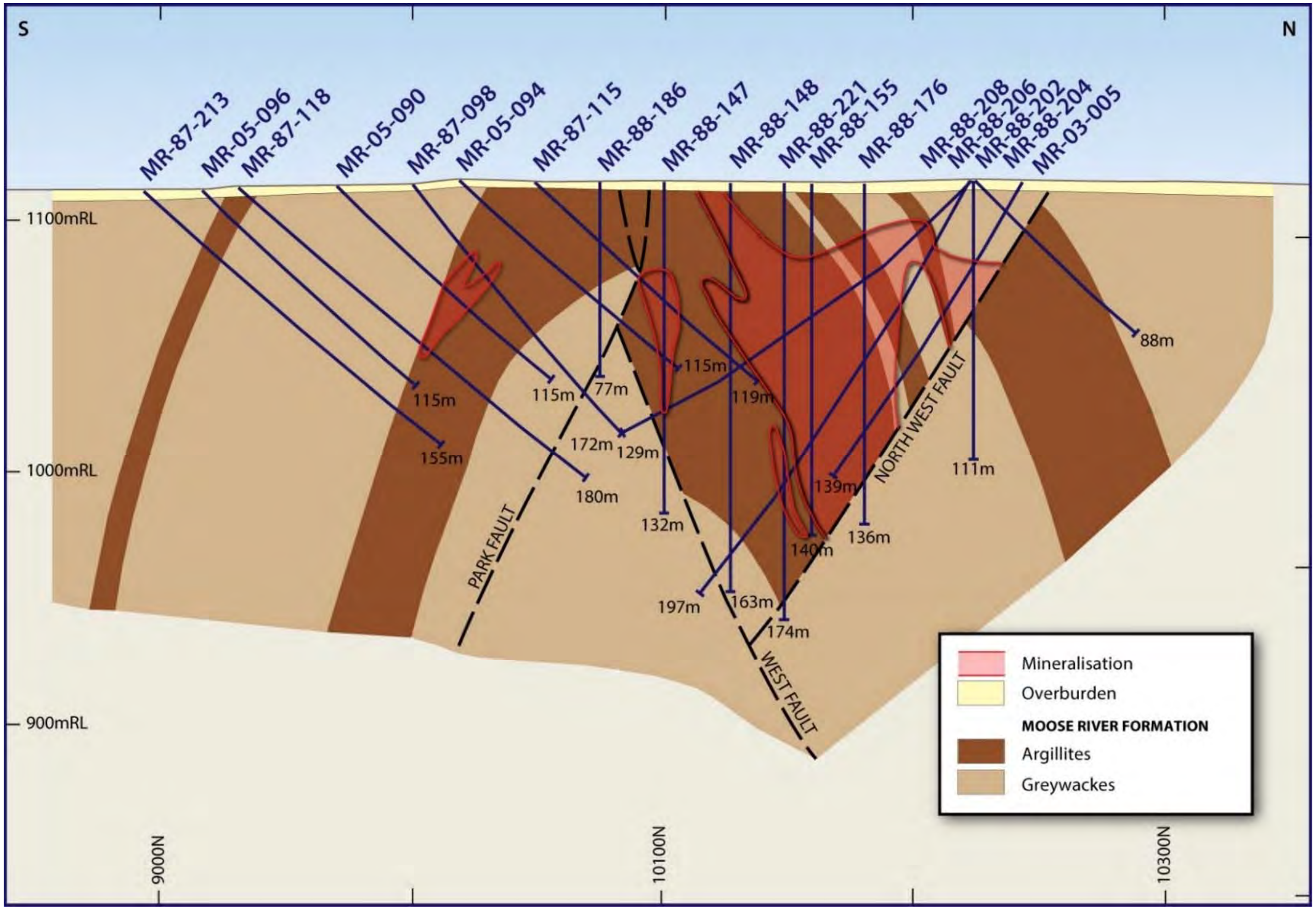
Geology

The Beaver Dam deposit is hosted in the southern limb of a north-dipping overturned anticlinal fold. The Moose River Formation is relatively thick in the vicinity of the Beaver Dam deposit (Figure 7-6).

Structure

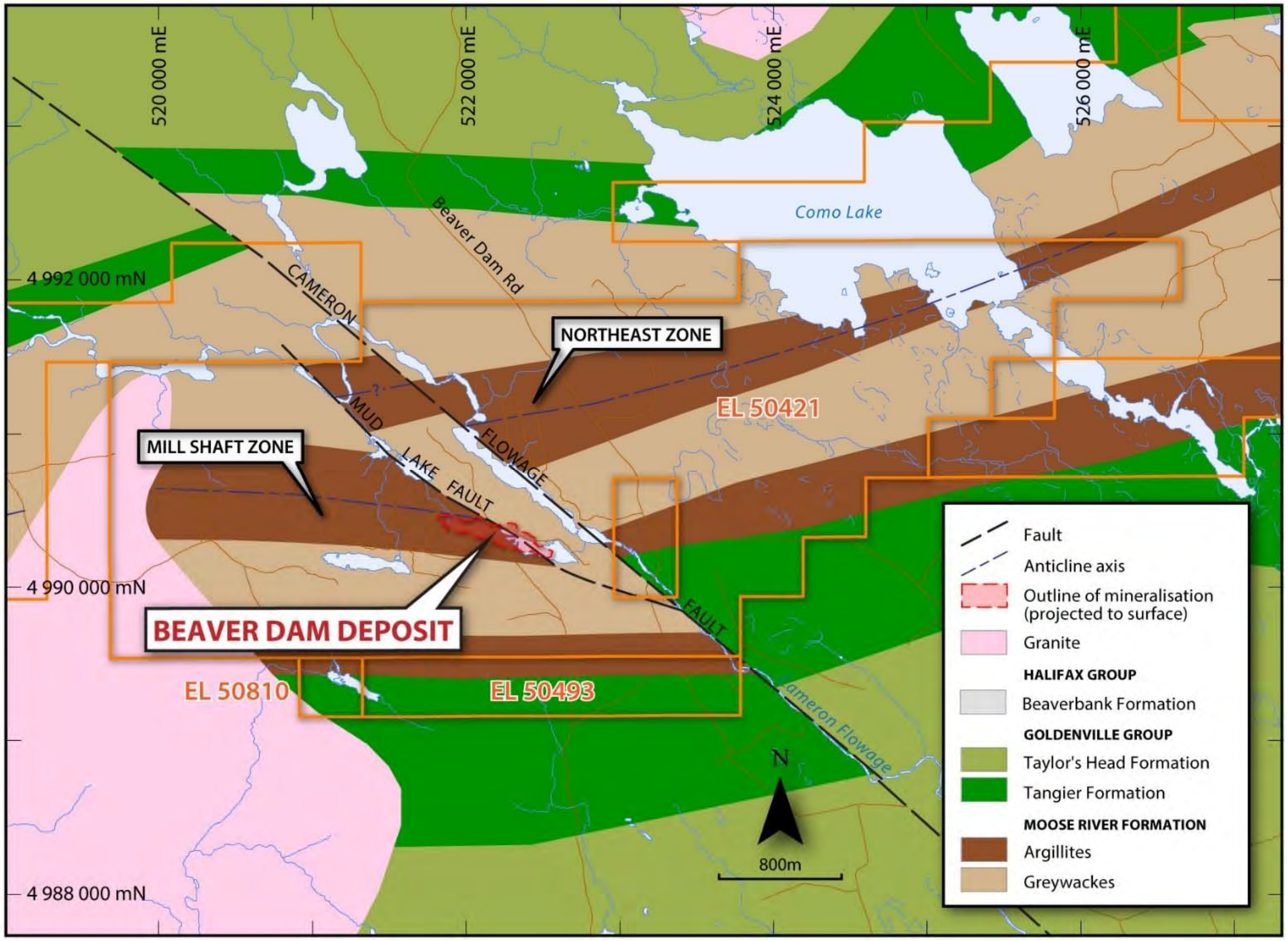
The host stratigraphy is offset into segments by two northwest-trending faults; the sinistral Mud Lake Fault and the dextral Cameron Flowage Fault. The Mud Lake Fault truncates, and forms the eastern boundary to, the Main Zone mineralization.

Figure 7-5: Cross-Section, Touquoy



Note: Figure prepared by Atlantic Gold, 2017.

Figure 7-6: Beaver Dam Geology Map



Note: Figure prepared by Atlantic Gold, 2017.

Metamorphism

Lithologies at Beaver Dam have been metamorphosed to amphibolite facies (biotite grade) increasing to higher (staurolite) grade with proximity to the River Lake Pluton, the contact of which is about 2 km west of the Beaver Dam deposit.

Mineralization

Gold mineralization at Beaver Dam has been recognised over a strike length of approximately 1.4 km, extending from the Main Zone northwest to the Mill Shaft Zone. Historical drilling has shown that mineralization weakens between the Main Zone and Mill Shaft Zone. The eastern end of the main zone is controlled by the Mud Lake Fault and possible offsets to the mineralization have been identified between the Mud Lake and Cameron Flowage faults and in the Northeast Zone, immediately east of the Cameron Flowage Fault.

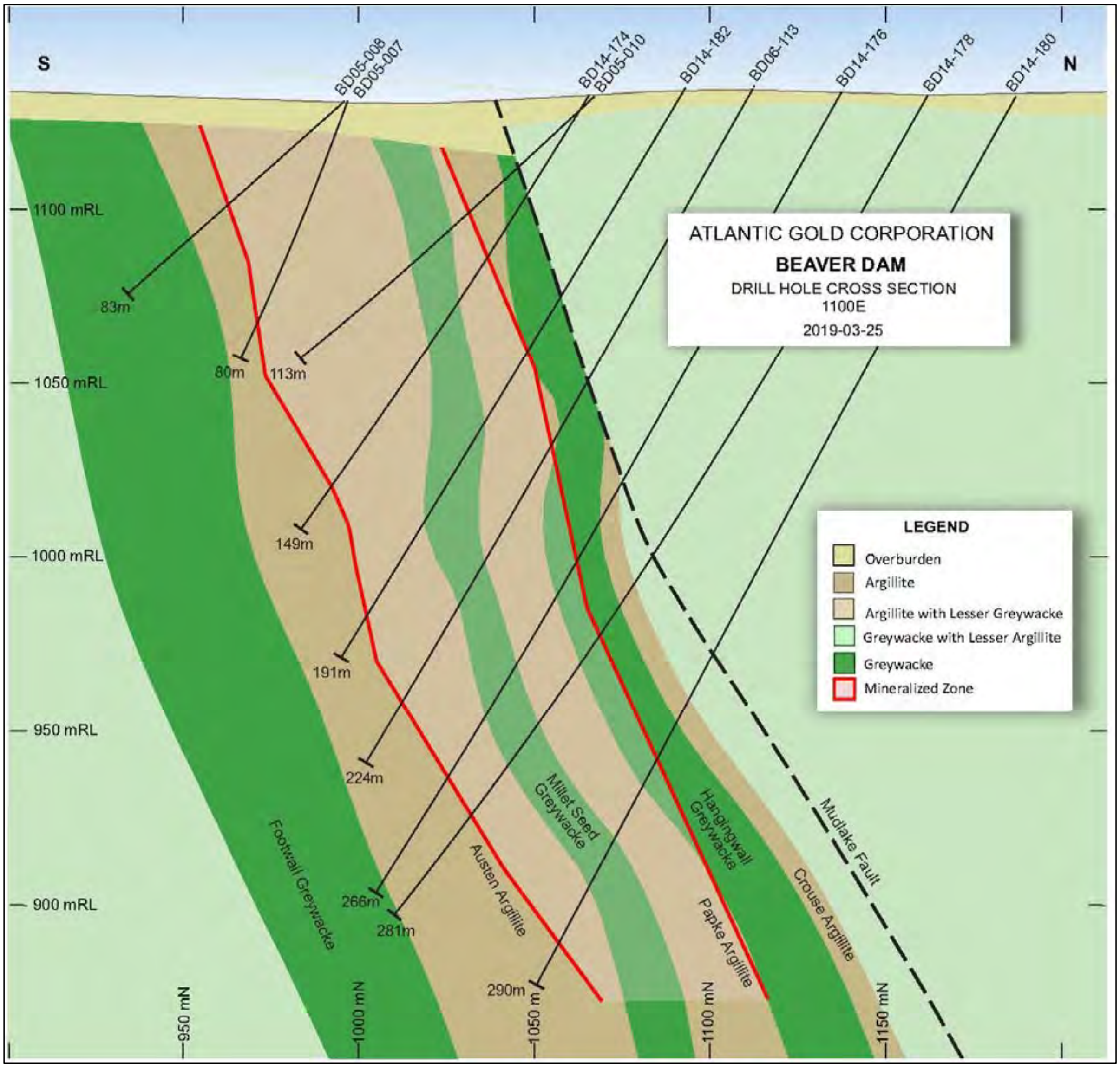
The mineralised zone can reach as much as 100 m in width with better gold grade (e.g., >0.5 g/t) material typically confined to a 5–40 m width or widths within that zone. Mineralization has been identified in historical drill holes at vertical depths of >600 m below surface, and remains open below that depth.

Gold mineralization is hosted within quartz veins and within the argillite and greywacke host rocks. Mineralized quartz veins are typically 0.5–20 cm in thickness, are commonly bedding parallel, but can also include cross-cutting veins. Sulphide assemblages include pyrrhotite, pyrite and/or arsenopyrite with lesser chalcopyrite, galena or sphalerite. Gold commonly occurs within quartz veins as coarse (>1 mm) grains and clusters of finer, but still visible (<1 mm), grains. Coarse gold grains are more likely to be found at vein-wall rock contacts and are often spatially associated with sulphides.

In the immediate vicinity of the deposit the host stratigraphy has been subdivided into several mappable units, from oldest to youngest: the Crouse Mudstone, Hanging Wall Greywacke, Papke Mudstone, Millet Seed Sandstone and Austen Mudstone. The mineralized zone appears to gently cross-cut this macro-stratigraphy. Gold mineralization is often associated with sulphides including pyrrhotite, pyrite, arsenopyrite, and chalcopyrite.

A cross-section through the Beaver Dam deposit is included as Figure 7-7.

Figure 7-7: Cross-Section, Beaver Dam Deposit



Note: Figure prepared by Atlantic Gold, 2019.

7.4.3 Fifteen Mile Stream

Geology

The Fifteen Mile Stream deposit is hosted in folded and faulted strata of the Moose River Formation within the axis and limbs of a north-dipping, doubly-plunging inclined anticline. In this area, the anticline is commonly referred to as the Fifteen Mile Stream anticline; however, it may be equivalent to the Moose River–Beaver Dam anticline that hosts the Touquoy and Beaver Dam gold deposits to the southwest.

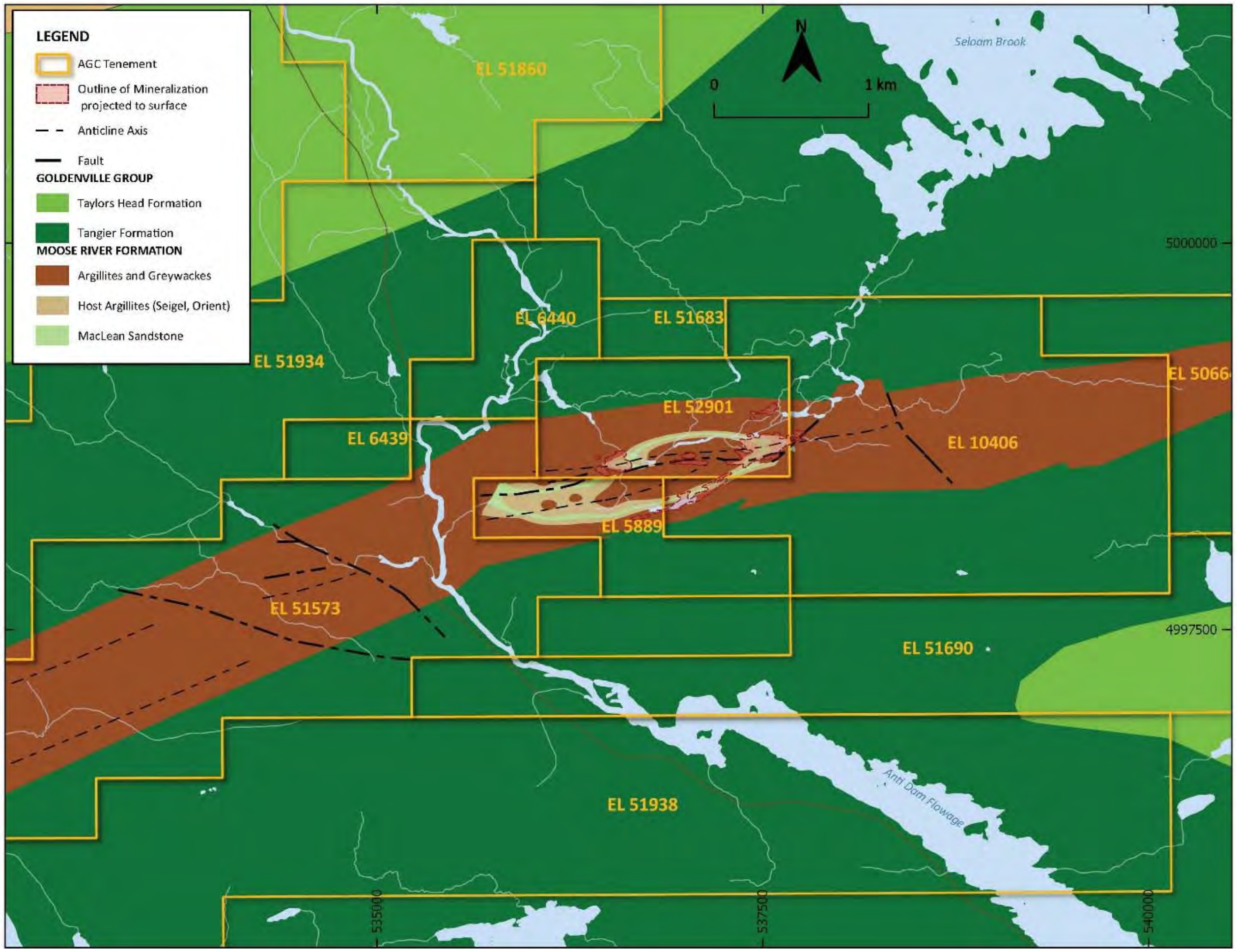
Figure 7-8 is a geology plan of the Fifteen Mile Stream property area.

Fifteen Mile Stream includes three discrete orebodies, termed the Egerton–MacLean, Hudson and Plenty zones. Mineralization in the Egerton–MacLean and Hudson zones is hosted by a succession of meta-mudstone and interbedded greywacke–metamudstone units that crop out on the eastern and western ends of the doubly-plunging Fifteen Mile Stream anticline. The host stratigraphy, from youngest to oldest, comprises:

- Hanging Wall Turbidites: interbedded metasandstone and lesser metamudstone, locally hosting bedding-parallel quartz veins;
- Orient Mudstone: green–grey, typically planar-bedded, silty meta-mudstone and siltstone, locally hosting pyrrhotite, arsenopyrite, and quartz veins;
- MacLean Sandstone: metasandstone with minor interbedded metamudstone; the latter commonly hosting quartz veins;
- Seigel Mudstone: light to dark grey planar-bedded, silty metamudstone that commonly hosts quartz veins and high concentrations of pyrrhotite and, locally, arsenopyrite;
- Footwall Turbidites: metasandstone beds with minor mudstone intervals that locally host bedding-parallel quartz veins.

The Orient and Seigel Mudstones are the principal mineralized units, with lesser mineralization hosted by the MacLean Sandstone and localized mineralization in folded Hanging Wall and Footwall Turbidites.

Figure 7-8: Geology Plan, Fifteen Mile Stream



Note: Figure prepared by Atlantic Gold, 2019.

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Mineralization in the Plenty Zone is hosted by quartz veins and adjacent wall rock in a zone oriented sub-parallel to steeply-dipping host strata on the overturned limb of the Fifteen Mile Stream Anticline. From oldest to youngest, the stratigraphic succession comprises:

- Jackson Argillite: light grey, silty banded metasiltstone to metamudstone;
- Jackson Wacke: clean metasandstone with rare mud clasts;
- Belt Argillite: light and dark grey banded metasiltstone to metamudstone;
- Belt Wacke: metasandstone with minor interbedded metamudstone, commonly with quartz veins along its basal contact;
- Plenty Argillite: light grey, silty banded metasiltstone to metamudstone, minor metasandstone interbeds;
- Striped Argillite: light and dark grey banded metasiltstone to metamudstone, with metasandstone interbeds;
- Greener Wacke: metasandstone dominated, with metasandstone interbeds and common bedding-parallel quartz veins.

Structure

The Fifteen Mile Stream anticline is the dominant structure on the property. The anticline is isoclinal with an approximately east–west-trending axis that dips at about 65–75º to the north and plunges in both east and west. The north limb dips at approximately 50–60° northward, whereas the south limb consists of more steeply north-dipping to vertical (~70–90º) overturned strata.

At the eastern end of the Fifteen Mile Stream deposit, in the Egerton–MacLean Zone, the fold has an average plunge of approximately 25–30° east, based on the interpreted fold geometry defined by stratigraphic and structural data from drill core. The overturned southern limb is also cut by the Seigel Fault Zone, a series of approximately northeast–southwest-trending faults dipping at about 55–65º to the north, resulting in the structural repetition of the mineralized axis and southern limb of the fold. Numerous decimetre- to decametre-scale parasitic folds have been identified within thick mudstone units in the broader hinge zone. Together with localized faulting, this has resulted in structural thickening and repetition of mineralized mudstone units (Orient, Siegel), and thus a wide zone of potentially bulk-mineable mineralization. Metre to decameter-scale, bedding-parallel quartz veins have also been identified at and near the hinge of the fold axis and may represent saddle-reef veins.

The Hudson zone occurs at the western end of the Fifteen Mile Stream deposit where the fold axis plunges at approximately 20º to the west. The fold in the Hudson Zone area is tight with a narrow, angular hinge that lacks the parasitic folds present in the Egerton–MacLean Zone.

Metamorphism

The rocks at Fifteen Mile Stream have undergone regional chlorite–biotite greenschist facies metamorphism. Localized, hornfelsic, biotite porphyroblasts in meta-mudstone suggest that the rocks have also undergone localized contact metamorphism.

Mineralization

Parasitic folding and small-scale faulting in the Fifteen Mile Stream hinge zone are focused in the thick, penetratively-foliated metamudstone units (e.g., Orient, Siegel), rather than in the more competent metasandstones. As a result, gold mineralization and bedding-parallel quartz veins are mainly confined to these metamudstone intervals and along lithological contacts. Metre-scale saddle-reef quartz veins also commonly occur and lithologic boundaries within metamudstone units in the hinge zone, including a thick bedding-parallel quartz vein referred to as the 'Big Bull Vein' in the centre of the property. However, these veins are generally barren, with mineralization instead focused in metamudstone wall rock and in thinner, bedding-parallel, quartz veins.

Gold mineralization the Egerton–MacLean Zone is generally disseminated and hosted by folded and structurally-thickened metamudstone within the anticline hinge-zone. However, coarse visible gold (about 0.1–3 mm diameter, rarely larger) and anomalous gold values also commonly occur within buckled and folded bedding-parallel quartz veins enclosed within mineralized and folded metamudstone. Quartz veins are either massive and milky white, or smoky and laminated, the latter containing vein-parallel wall rock inclusions. Wall rock alteration associated with veins include disseminated carbonitization and local sericitization. Coarse (visible) gold also rarely occurs directly in folded and/or faulted metamudstone, typically within sulphides formed at the intersection between axial-planar cleavage and bedding or in shear zones. Sulphide minerals associated with gold mineralization in metamudstone and quartz veins include arsenopyrite, pyrite, and pyrrhotite. Rare trace amounts of galena and chalcopyrite also occur with gold and other sulphide minerals in bedding-parallel quartz veins.

Mineralization in the Hudson Zone is hosted by the Egerton–MacLean stratigraphy, i.e., within folded Orient and Siegel Mudstones in the Fifteen Mile Stream anticline. Mineralization also occurs in the Seigel Fault Zone and its southern footwall. The lack evidence of parasitic folding and thus structural thickening in the Hudson Zone may limit the overall thickness of the mineralized zone relative to the Egerton–MacLean Zone.

The Plenty Zone, located about 400 m southeast of the Egerton–MacLean Zone, consists of a succession of steeply-dipping (~75–80°) overturned silty metamudstone and metasandstone strata, representing the overturned south limb of the Fifteen Mile

Stream anticline. Here, coarse gold is hosted by an array of bedding-parallel quartz veins surrounded by a ~20 m thick disseminated wall rock envelope.

A cross-section through the Egerton–MacLean deposit is included as Figure 7-9.

7.4.4 Cochrane Hill

Geology

The Cochrane Hill property encompasses a section of the northeast-trending Cochrane Hill anticline which can be traced for at least 28 km from a position approximately 14 km west of the Cochrane Hill deposit, to approximately 12 km east of the Cochrane Hill deposit. The Cochrane Hill anticline is a tight to isoclinal fold in the vicinity of the Cochrane Hill deposit, overturned with both limbs dipping to the north at between 55° and 80°.

The host interbedded argillite and greywacke sequence may either represent sediments of the Moose River Formation or the Tangier Formation. Figure 7-10 is a property geology plan for Cochrane Hill.

Structure

There appears to be very little disruption of the mineralised zone by post-mineralization faulting. Although physical evidence in core is limited, historical geophysical data along with observations from logging geologists suggest a steep northwest-trending fault just west of line 3000E could divide the property into a western domain and an eastern domain, which supports a metallurgical divide as seen in geostatistical evaluations (refer to Section 14).

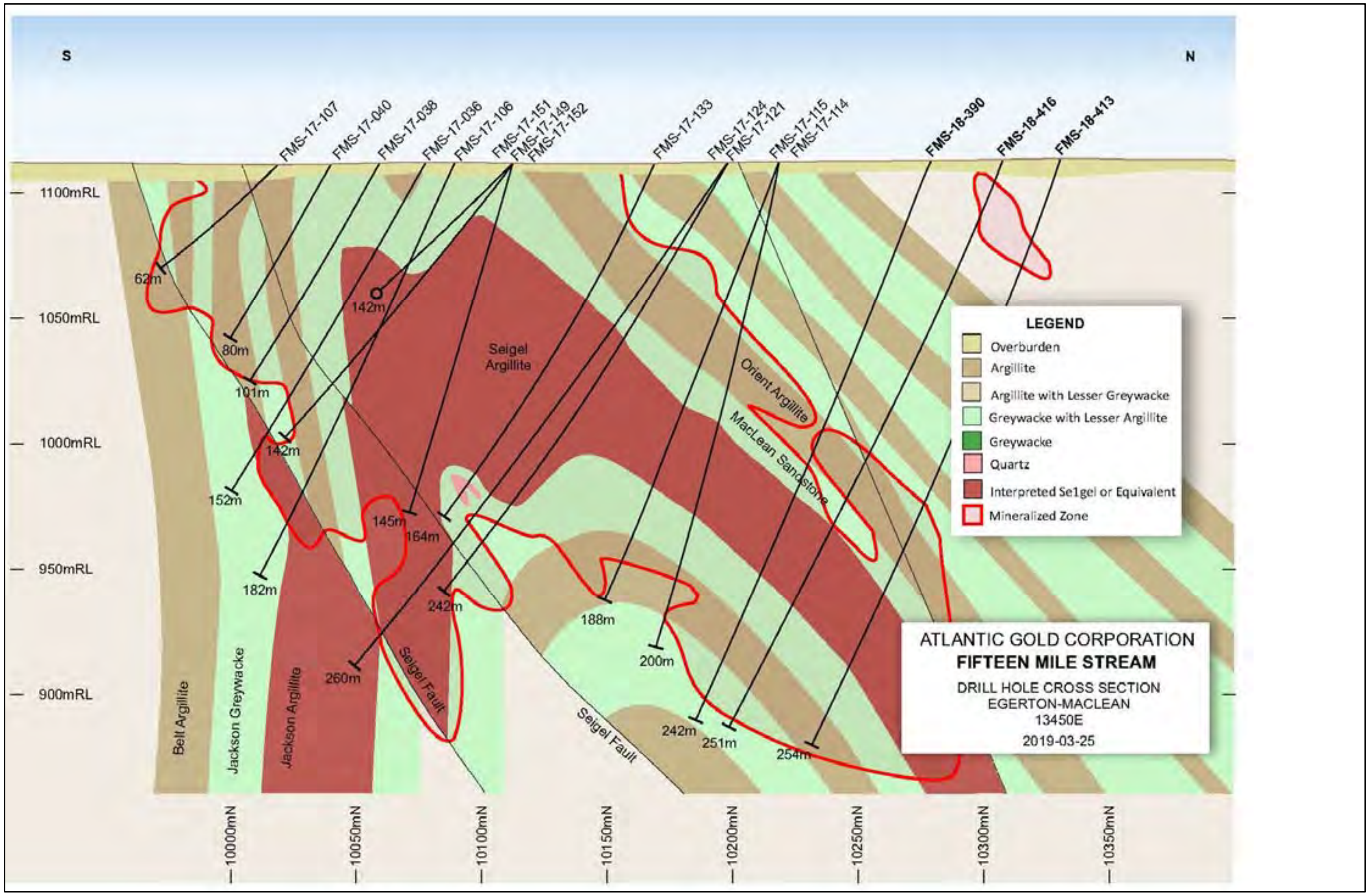
Metamorphism

Lithologies in the area have been metamorphosed to amphibolite (staurolite) facies with development of biotite schists after argillite protoliths and porphyroblastic textures in fine-grained greywacke and argillite.

Mineralization

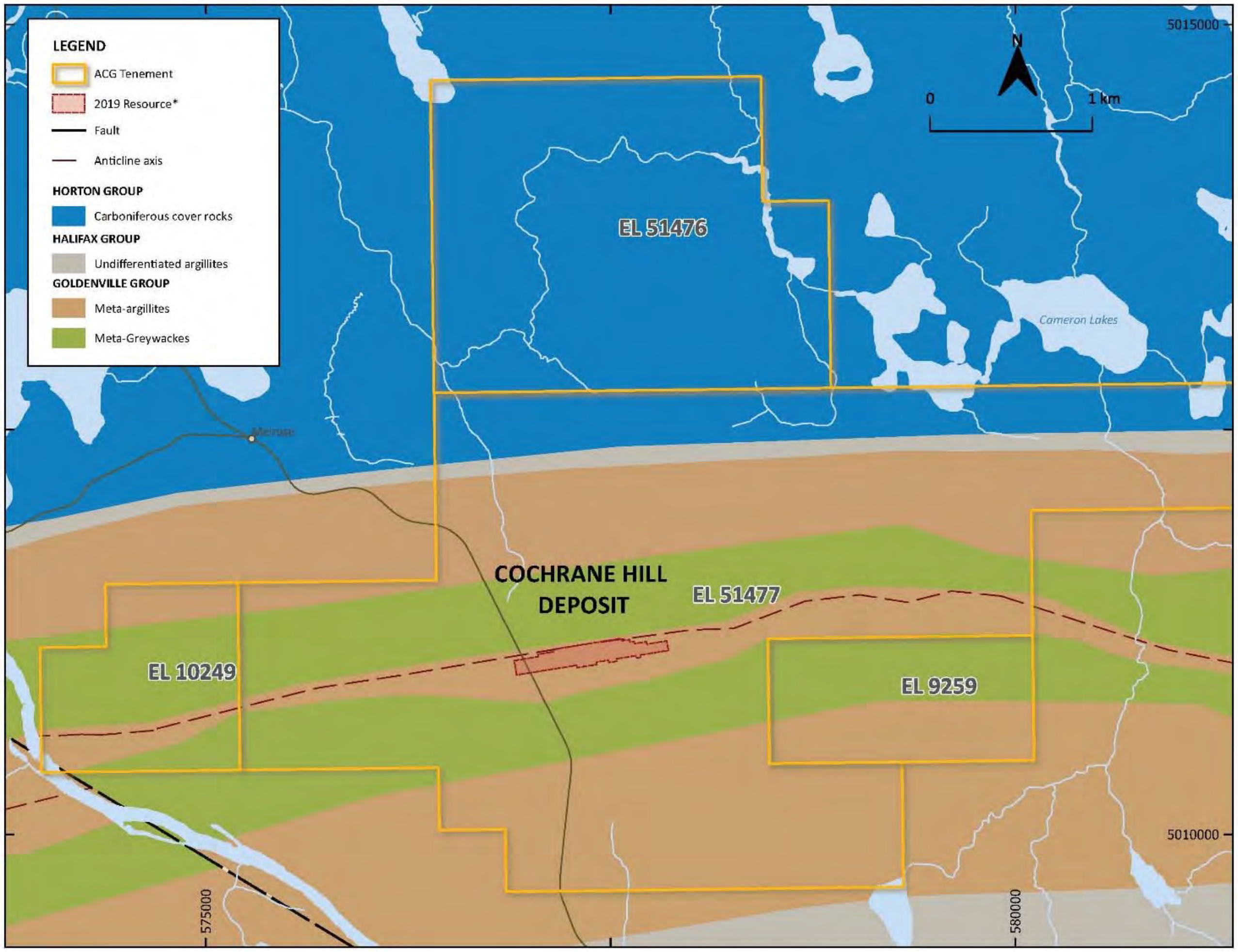
Mineralization is in the form of a tabular zone of parallel, planar quartz veins in a well-bedded argillite and greywacke protolith, dipping steeply to the north at approximately 70°, parallel to bedding in the southern limb of the Cochrane Hill anticline.

Figure 7-9: Cross Section, Fifteen Mile Stream Egerton–MacLean Zone



Note: Figure prepared by Atlantic Gold, 2019.

Figure 7-10: Geology Plan, Cochrane Hill



Note: Figure prepared by Atlantic Gold, 2019.

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Gold mineralization occurs over true widths of up to 60–70 m, within which better grade material (e.g., >0.8 g/t Au) is persistent over true widths varying from 5–30 m (Figure 7-11). The base of the gold mineralization is relatively sharp in terms of grade, but the hanging wall contact is less defined, with an erratic distribution of weakly anomalous grades and occasional >1 g/t Au grades. The mineralization has been defined over a strike length of 1,500 m and down to a vertical depth of 300 m.

Gold mineralization occurs within quartz veins and within biotite schist (after argillite) and metagreywacke host rock. Mineralization is associated with sulphides, including arsenopyrite, pyrite and pyrrhotite and lesser galena and sphalerite.

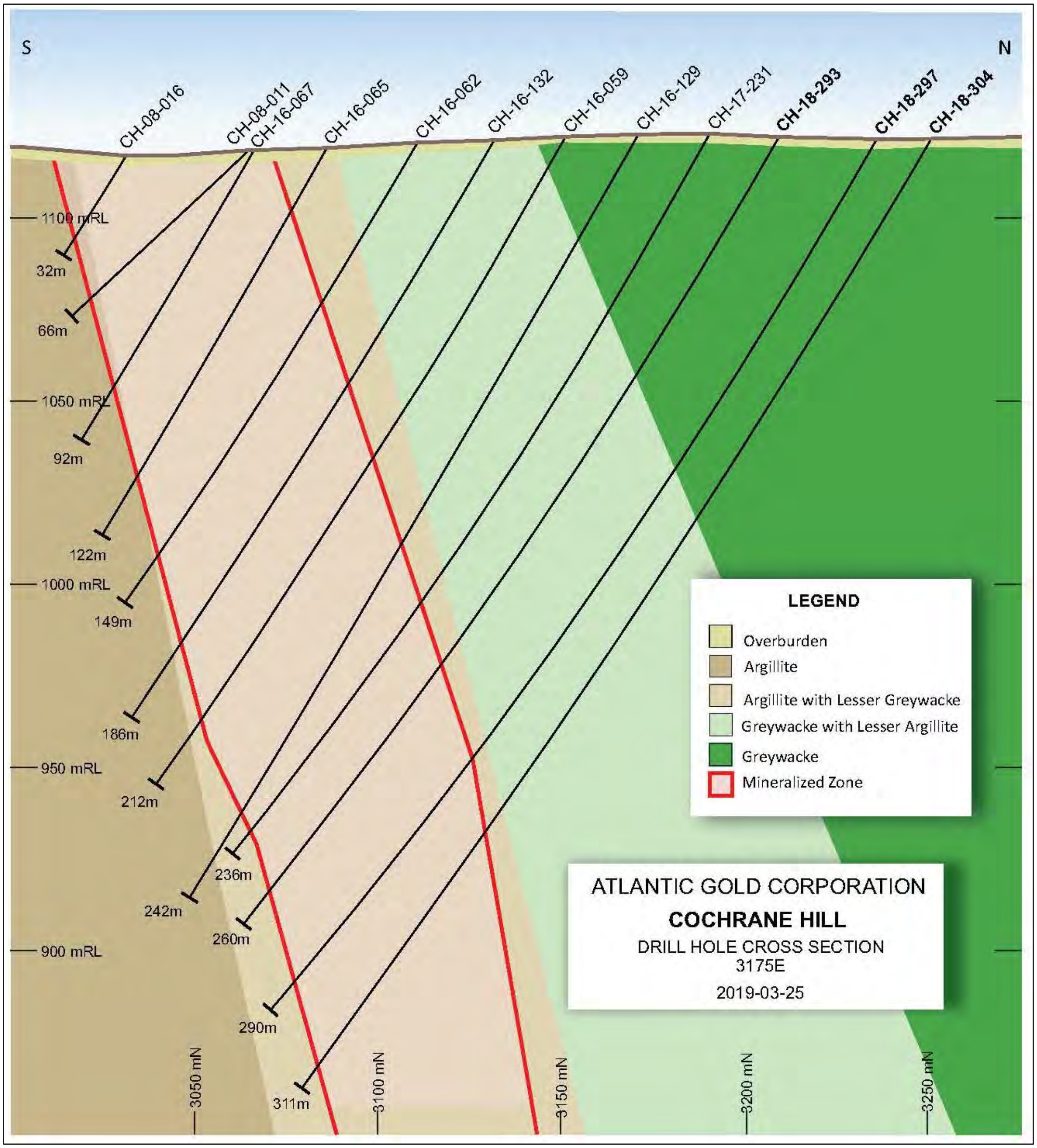
7.5 Prospects/Exploration Targets

Exploration potential is discussed in Section 9.7.

7.6 Comments on Section 7

In the opinion of the QP, the regional setting and the local geology are sufficiently well-understood to support the estimation of Mineral Resources and Mineral Reserves.

Figure 7-11: Cross-Section, 3175E, Cochrane Hill



Note: Figure prepared by Atlantic Gold, 2019.

8.0 DEPOSIT TYPES

The known deposits within the Project area are considered to be examples of turbidite-hosted, orogenic mesothermal gold deposits.

8.1 Deposit Model

The general deposit type description is adapted from Robert et al., (2007). Key features include:

- Type examples: Bendigo, Stawell, in Australia; Alaska Juneau in USA, Reefton in New Zealand. It is emphasized however, that although the regional geological attributes of these gold fields may be comparable, a comparison at the deposit scale between the four predominantly shale-hosted deposits discussed in this Report and the saddle-reef-hosted deposits at Ballarat-Bendigo, for example, cannot be made;
- Classic type: vertically stacked saddle reefs in anticlinal fold hinges linked by fault-fill veins in reverse shear zones and associated extensional veins;
- Regional setting: Thick, folded and faulted accretionary greywacke–mudstone turbiditic sequences, intruded by granitic plutons and in proximity to major crustal boundaries;
- Local setting: Associated with doubly-plunging, upright anticlines and high-angle reverse faults;
- Intrusions: Typically lack significant volumes of felsic intrusions, although lamprophyre dykes may be present;
- Alteration: May display Fe-Mg-carbonate alteration (spotting); Sulphides, most commonly arsenopyrite and/or pyrrhotite.
- Mineralization signature: Concentrations of Au-quartz veins; Au>Ag, As signature.

8.2 Nova Scotia

A discussion of the typical features of the turbidite-hosted deposits known in Nova Scotia is summarized from Kontak et al., (2001).

The gold deposits can be divided into three main types:

- High grade (approximately 15 g/t Au) narrow gold-bearing quartz veins, typically occurring as coarse native gold;
- Low-grade (0.5–4 g/t Au) disseminated slate/argillite hosted, typically occurring as fine native gold in fractures in sulphide minerals and host rocks;

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- Low-grade meta-sandstone hosted, occurring as native gold, in sulphides and rare minor electrum and associated intermetallic compounds and metal alloys.

A combination of two or more of these types can also occur. Almost all of the historical production in Nova Scotia came from high-grade veins within 200 m of surface.

8.3 Comments on Section 8

The turbidite-hosted mesothermal gold model is an appropriate model to use for exploration vectoring in the QP's opinion.

9.0 EXPLORATION

9.1 Overview

Atlantic Gold's current property holdings have been explored for gold since the late 1800s by many prospectors and a multitude of exploration companies. The main area of interest has been a southwest–northeast-trending belt of the Goldenville Group which hosts the known gold mineralization.

Although Atlantic Gold has attempted to verify and compile as much of the historical regional exploration data as possible, this is still a work-in-progress. The primary focus has been on verification and compilation of data proximal to the principal deposits at Touquoy, Beaver Dam and Fifteen Mile Stream in the Touquoy–Beaver Dam–Fifteen Mile Stream Corridor and at Cochrane Hill.

Since 2004, Atlantic Gold has focused much of the exploration efforts on the Touquoy property and proximal showings over a strike length of approximately 2.5 km. In 2014, Atlantic Gold acquired the Beaver Dam and Fifteen Mile Stream properties which led to the planning and commencement of resource definition drill programs from 2016 to the present.

On properties adjacent to the main prospects in the approximately 50 km long Touquoy–Beaver Dam–Fifteen Mile Stream Corridor and at Cochrane Hill, Atlantic Gold has completed reconnaissance exploration programs which have included geological mapping, geochemical drilling, and various geophysical surveys. Atlantic Gold has also reviewed and verified work by Acadian for database inclusion; not all this work falls within the current Project boundaries. However, work by other explorers has yet to be verified and is not included in the active exploration databases.

Table 9-1 and Table 9-2 provide a summary of the information currently accepted in the active exploration databases for the Touquoy–Beaver Dam–Fifteen Mile Stream Corridor and in Table 9-3 for Cochrane Hill. Note that drill totals in these tables are inclusive of the drilling discussed in detail in Section 10. Figure 9-1 and Figure 9-2 are exploration index plans for the Touquoy–Beaver Dam–Fifteen Mile Stream Corridor to end-2017 and Figure 9-3 shows the location of drilling completed in 2018. Figure 9-4 is an exploration index plan for Cochrane Hill to the end-2017 and Figure 9-5 shows the location of drilling in 2018. As noted, not all work included in the databases falls within the current Project tenure boundaries.

The databases supported identification of the Touquoy, Beaver Dam, Fifteen Mile Stream and Cochrane Hill deposits. The collated data is currently used for exploration vectoring, and identification of areas where step-out drilling is warranted.

Table 9-1: Exploration Summary Table, Touquoy–Beaver Dam Regional

Work Program	Years	Work Completed
Field mapping	2007, 2008, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017	Geological mapping; collection of 180 samples
Till sampling	2007, 2016, 2017	283 samples
Geophysical surveys	2010	Magnetic gradiometer and VLF-EM survey. Target anomalies associated with pyrrhotite signature. Covered 940 km
RC drilling	2004, 2005, 2006, 2008, 2009, 2011, 2013, 2014, 2018	645
Core drilling	2003, 2004, 2005, 22006, 2007, 2008, 2009, 2010, 2014, 2015, 2016, 2017, 2018	505

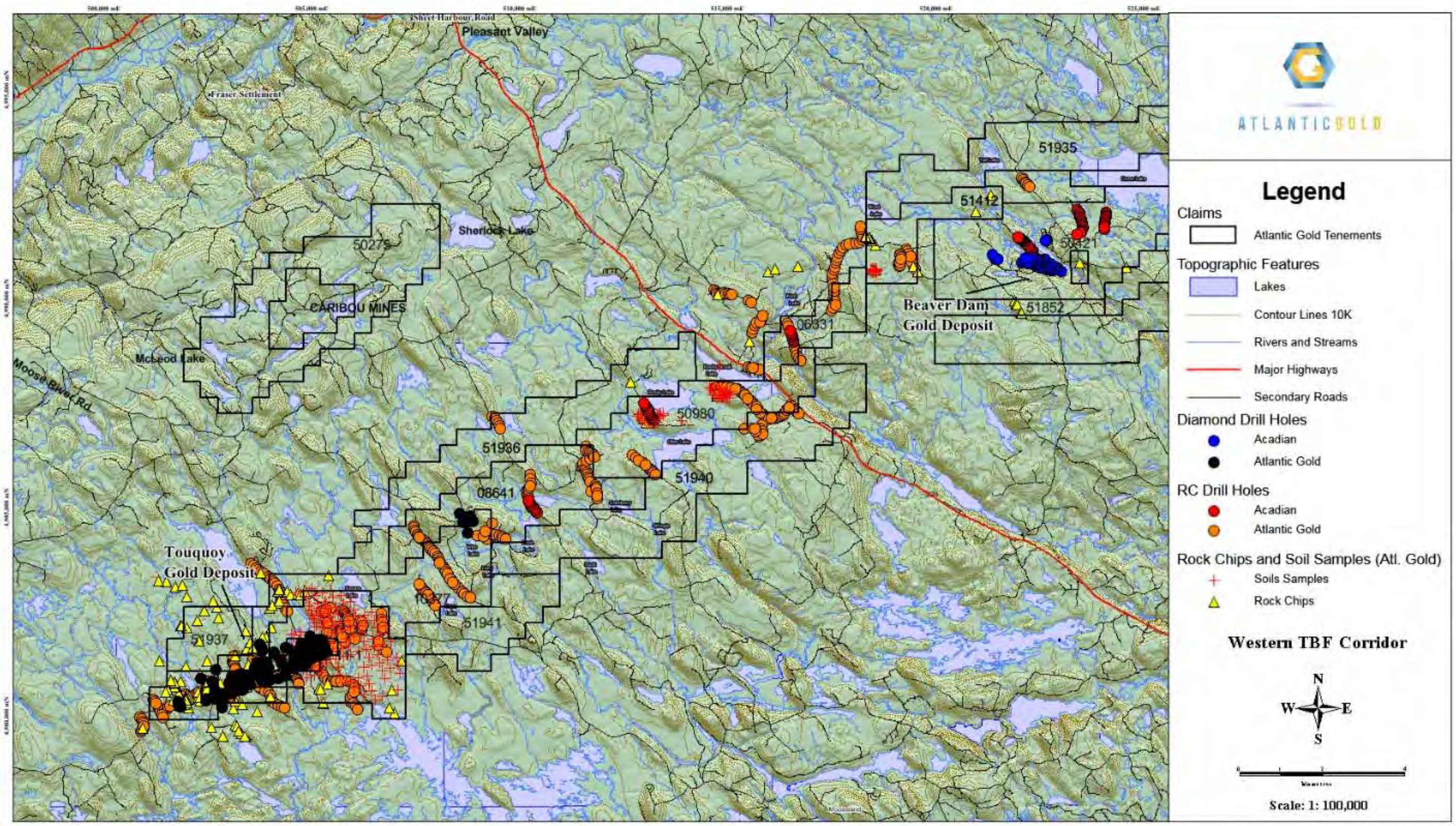
Table 9-2: Exploration Summary Table, Beaver Dam–Fifteen Mile Stream Regional

Work Program	Years	Work Completed
Field mapping	2008, 2009, 2010	Geological mapping, collection of 16 samples
Geophysical surveys	2010	Magnetic gradiometer and VLF-EM survey. Target anomalies associated with pyrrhotite signature. Covered 1600 km.
RC drilling	2011, 2013, 2014, 2016	118 drill holes
Core drilling	2009, 2010, 2015, 2016, 2017, 2018	673 drill holes

Table 9-3: Exploration Summary Table, Cochrane Hill Regional

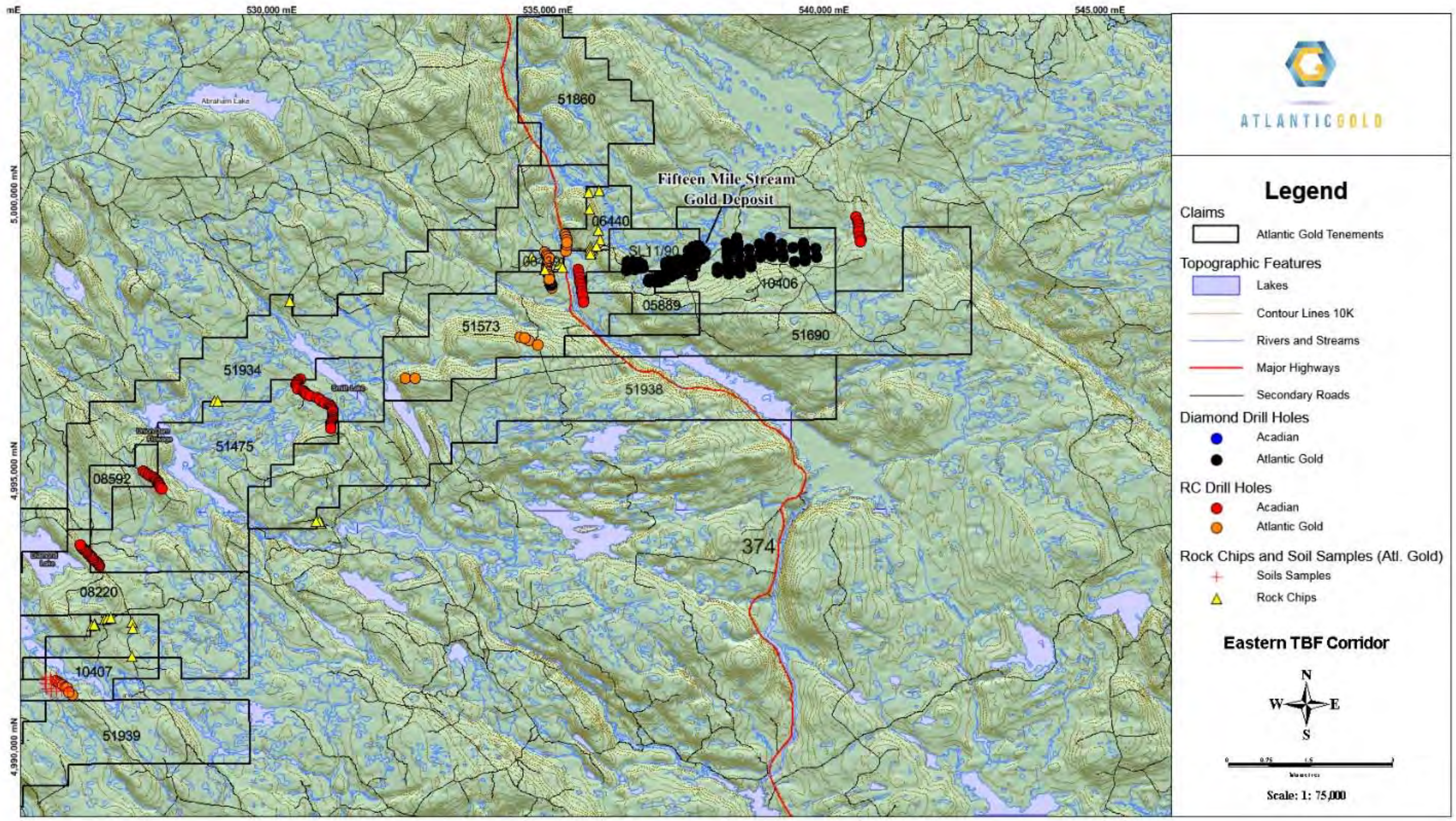
Work Program	Years	Work Completed
RC drilling	2008, 2011, 2016	133 drill holes
Core drilling	2006, 2007, 2008, 2009, 2011, 2016, 2017, 2018	465 drill holes

Figure 9-1: Exploration Index Map, Touquoy–Beaver Dam–Fifteen Mile Stream Corridor (west)



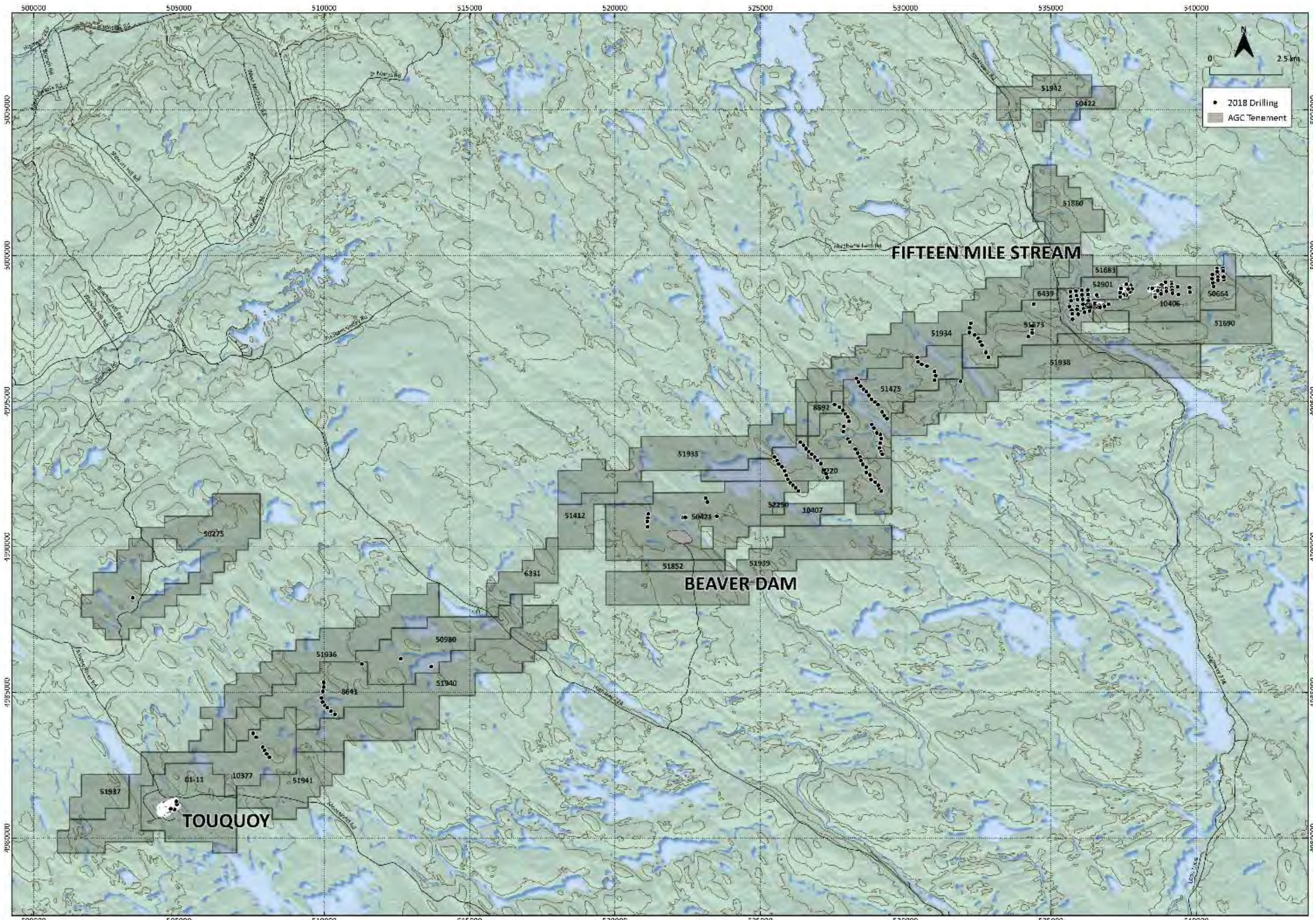
Note: Figure prepared by Atlantic Gold, 2018. Work displayed to end 2017.

Figure 9-2: Exploration Index Map, Touquoy–Beaver Dam–Fifteen Mile Stream Corridor (east)



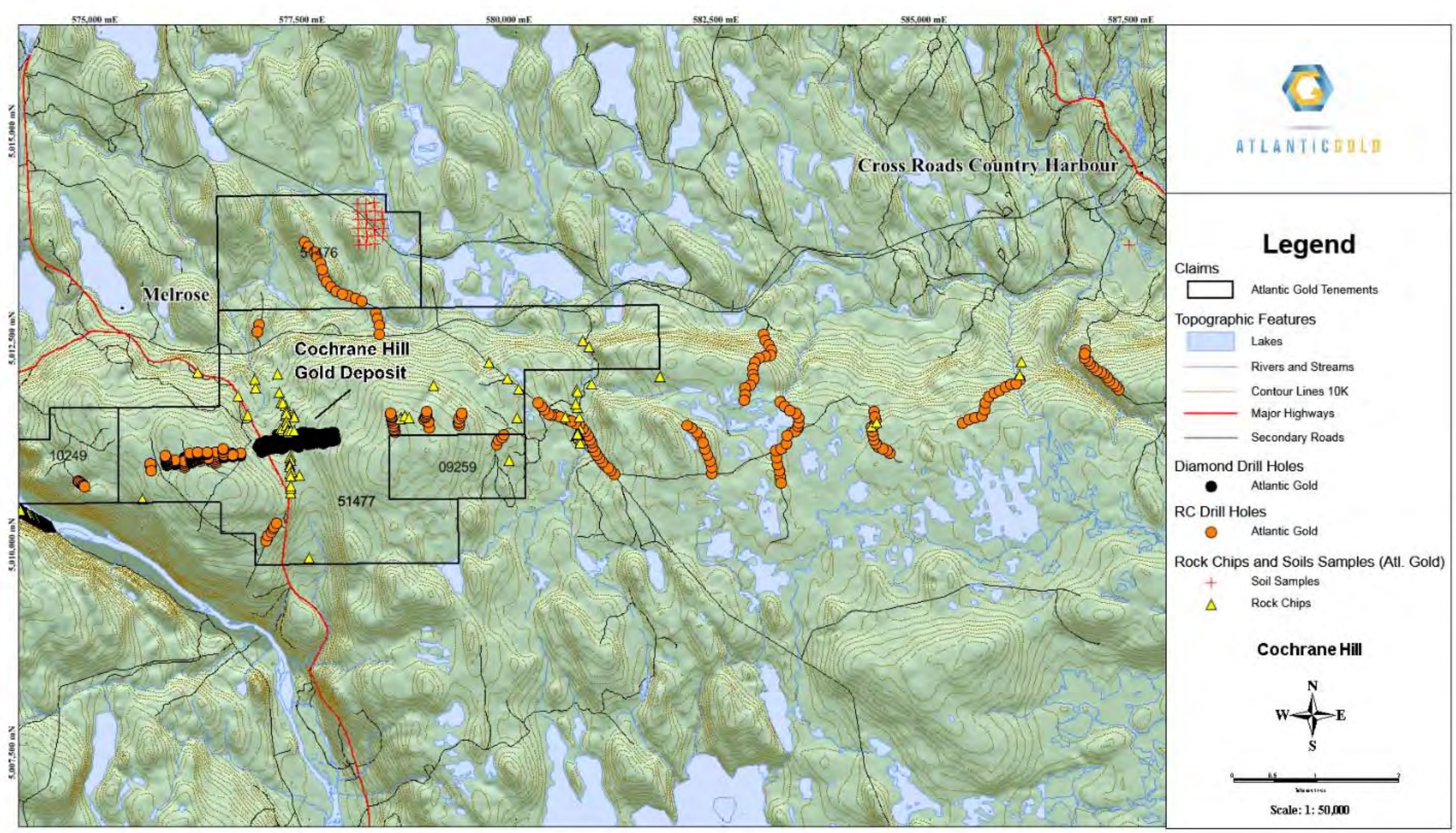
Note: Figure prepared by Atlantic Gold, 2018.

Figure 9-3: Exploration Drill Hole Location Map, Touquoy–Beaver Dam–Fifteen Mile Stream Corridor



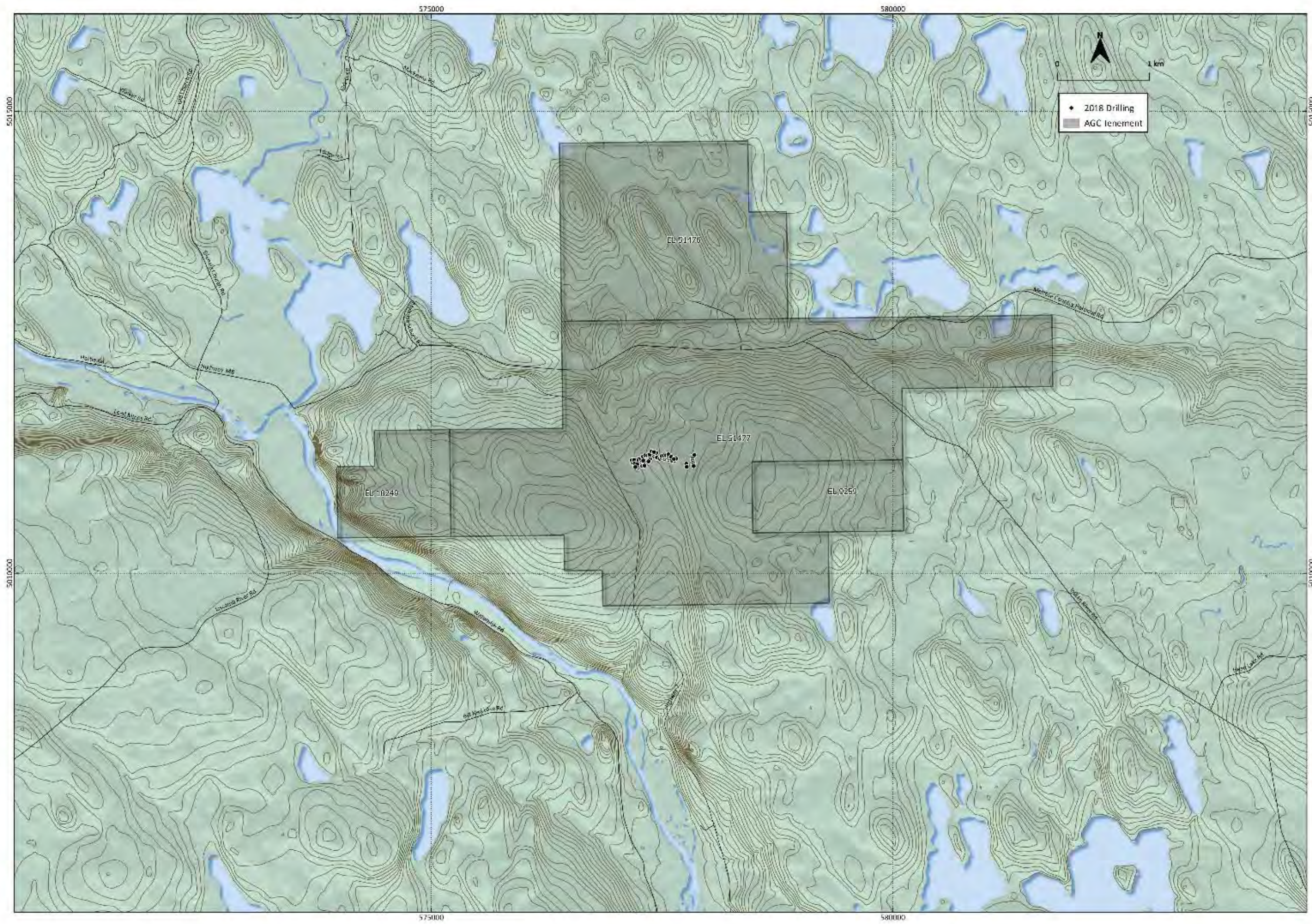
Note: Figure prepared by Atlantic Gold, 2019.

Figure 9-4: Exploration Index Map, Cochrane Hill



Note: Figure prepared by Atlantic Gold, 2018.

Figure 9-5: Exploration Drill Hole Location Plan, Cochrane Hill



Note: Figure prepared by Atlantic Gold, 2019.

Details of the more intensive exploration activities at Touquoy, Beaver Dam, Fifteen Mile Stream and Cochrane Hill are provided the following subsections. Information from previous technical reports has been used as a basis for the descriptions in these sections (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015; and Staples et al., 2018).

9.2 Grids and Surveys

9.2.1 Touquoy

At Touquoy a local grid, oriented 18.0° west of true north (NAD83 UTM) with baseline parallel to strike of local stratigraphy, has been consistently used. Reduced levels now use sea level datum, though previously sea level +1,000 m was the datum used.

All drill hole collar (x, y, z) pick-ups have been made using digital global positioning system (GPS) instruments with at most ±0.1 m error, and surface topographic models have been based on these data. A supplementary light detection and ranging (LiDAR) survey was conducted by Leading Edge Geomatics (Leading Edge) in 2009 with a horizontal accuracy of about ±0.8 m and a vertical accuracy of ±0.17 m.

9.2.2 Beaver Dam

At Beaver Dam a local grid, oriented 10.29° west of true north (NAD83 UTM) with baseline parallel to strike of local stratigraphy, has been consistently used. Reduced levels now use sea level datum, though previously sea level +1,000 m was the datum used.

All drill hole collar pick-ups have been made using digital GPS with at most ±0.1 m error, and surface topographic models have been based on these data.

9.2.3 Fifteen Mile Stream

At Fifteen Mile Stream a local grid, oriented 5.0° west of true north (NAD83 UTM) with baseline parallel to strike of local stratigraphy, has been consistently used. Reduced levels now use sea level datum, though previously sea level +1,000 m was the datum used.

All drill hole collar pick-ups have been made using digital GPS with at most ±0.1 m error, and surface topographic models have been based on these data.

9.2.4 Cochrane Hill

At Cochrane Hill a local grid, oriented 9.0° west of true north (NAD83 UTM) with baseline parallel to strike of local stratigraphy, has been consistently used. Reduced levels now use sea level datum, though previously sea level +1,000 m was the datum used.

All drill hole collar pick-ups have been made using digital GPS with at most ±0.1 m error, and surface topographic models have been based on these data, supplemented by results of a LiDAR survey completed by Leading Edge in April 2010, with a horizontal accuracy of about ±0.8 m and a vertical accuracy of ±0.17 m.

9.3 Geological Mapping

Seabright undertook a geological mapping program at Touquoy in about 1986. A series of six 1:2,000 outcrop maps were created in 2007 at Touquoy, covering a combined area of 22 km^2 and extending from the Touquoy area, west over the Higgins & Lawlor workings and Stillwater workings for a strike length of 4.4 km. The maps used topographic contour plans at 2 m contour intervals, with corresponding orthophotos as a base.

At Beaver Dam, initial geological mapping was conducted in 1975. There is no record of the mapping scale.

The Fifteen Mile Stream area was subject to geological mapping in 1983. The mapping scale is not recorded.

Atlantic Gold undertook a geological mapping program at Cochrane Hill during the summer of 2009. A series of four 1:2,000 outcrop maps were created which covered the historical trenching in the west, across the deposit area to the far east, for a strike length of 6.5 km and combined area of 13 km^2. The maps used topographic contour plans at 2 m contour intervals, with corresponding orthophotos as a base.

9.4 Geochemical Sampling

Limited geochemical sampling has been conducted. Known programs include:

- Touquoy: till sampling (1996);
- Beaver Dam: unknown geochemical survey type (circa 1978–1988); till sample survey of 68 samples (2010);
- Fifteen Mile Stream: humus and soil geochemistry (circa 1973–1983); humus geochemistry (1982); soil orientation geochemical survey (1987);
- Cochrane Hill: unknown geochemical survey type (1983); trenching and till and soil sampling (2004).

The surveys identified surface areas of gold (± silver/arsenic) anomalism.

9.5 Geophysics

Where known, geophysical surveys have included:

- Beaver Dam: unknown geophysical survey type (circa 1978–1988; 1983); very-low-frequency electromagnetic (VLF-EM), horizontal loop EM and induced polarization (IP) and resistivity geophysical surveys (1985–1987); helicopter-borne magnetic gradiometer and VLF-EM survey (2010).
- Fifteen Mile Stream: detailed ground magnetics, VLF-EM and dipole–dipole IP surveys (1985–1988); helicopter-borne magnetic gradiometer and VLF-EM survey (2010);
- Cochrane Hill: unknown geophysical survey type (1973–1975); VLF electromagnetic survey (1979); borehole geophysical testing (circa 1987); magnetics and VLF electromagnetic survey (1988-89); magnetics (2004).

The survey data were used to define targets along the anticlinal axes.

9.6 Bulk Sampling

9.6.1 Touquoy

In 1989, Westminer excavated a mini-pit on the upper edge of the Touquoy Zone and extracted a 56,878 ton bulk sample of 12 separate blocks from an 18 m deep mini-pit, and sent for processing at the Gays River Mill Facility.

In 1993, NovaGold carried out a metallurgical test program to see if its agglomeration/vat leaching process could be used to process Touquoy Zone material economically. An initial test was carried out on hand-cobbed material from the edge of the mini-pit.

9.6.2 Beaver Dam

Bulk sampling at the Beaver Dam deposit is summarized in Table 9-4.

9.6.3 Fifteen Mile Stream

The first sample comprised 4,030 tons of hand-selected material and was processed at Westminer's Gays River plant with estimated recovery of 93.7% and a gold head grade of 2.0 g/t. Results were considered disappointing and the second sample, comprising 1,788 tons was processed at Murray Brook Resources' Cochrane Hill plant in the same year. Results from this test are not available but were also described as disappointing.

Table 9-4: Bulk Sampling, Beaver Dam

Test No.	Date	Location	Rod Mill Discharge Grade (g/t Au)	Tons Milled	Contained Gold (g Au)	Grade Milled (g/t Au)
1	Dec-86	1100	1.2	1,828	2,236	1.2
2	Nov - Dec 1987	1100, 1090, 1080, 1065, 1050, 1040, 1025	1.3	5,795	—	—
3	Dec 1987 - Jan 1988	Austen Open Pit	2.5	8,732	—	—
3a	Jan - Feb 1988	1100, 1080, 1065, 1050, 1040	1.4	2,634	—	—
Subtotal 2, 3, 3a			**1.9**	**17,162**	**25,399**	**1.5**
4	May - June 1988	1100, 1065, 1050, 1040, 1025, Austen Open Pit	1.1	15,738	26,754	1.7
5	Aug - Sept 1988	1100, 1065, 1050, 1040	1.2	2,795	4,695	1.7
Subtotal 1–5			**1.48**	**37,522**	**59,084**	**1.6**
6	Oct-88	1100, 1080	8.0	732	8,151	11.1
7	Mar-89	1100, 1065, 1040	1.5	2,865	6,075	2.1
Subtotal 1–7			**1.6**	**41,119**	**73,309**	**1.8**
Mill Clean up				2,733		
Total	***41,119***			***76,043***		***1.8***

9.6.4 Cochrane Hill

Between 1986 and 1987, Scominex dewatered the Mitchell Shaft and extended underground workings on the 200 ft level to produce a 4,443 ton bulk sample. The sample was crushed and processed through a sample tower to reduce sample size to 2.8 tons. The average gold grade of this sample was reported to be 0.06 oz/ton Au (2.1 g/t Au) but no details of any metallurgical testwork are available.

In 1988, NovaGold developed 420 m of decline from the base of the open pit, running south to connect up with the Mitchell workings. Two cross cuts were driven to the north from the decline for a total of 146 m and drifting undertaken along selected veins. Approximately 7,400 tons of mineralised material was mined and stockpiled at surface. From this stockpiled material, NovaGold processed approximately 1,860 tons through an onsite 200 ton per day gravity and flotation processing plant (Coates and Freckleton, 1989); however, no details were provided as to metallurgical performance.

Between 1980 and 1984, Northumberland carried out extensive bulk sampling and metallurgical testwork. In 1980, a 17-ton bulk sample was tested at the Ontario Research Foundation. No report on this program is available; however, on the basis of this work a cyanide test mill was erected at the site. Between 1982 and 1983, 13,106 tons of material were excavated from an 80 m long x 30 m wide x 10 m deep open pit and processed in the test mill. A total of 512.4 oz Au was recovered, representing 76.7% of the calculated contained gold content. A 100-ton heap leach test was carried out on open pit material crushed to minus ½ inch with 67% gold recovery in 22 days and a 600 lb sample of open pit material was tested at the Atlantic Research Institute by vat cyanide (CN) leaching, jigging, and cyanidation of tails.

Scominex excavated 4,443 tons of material from four separate drifts off the Mitchell workings between October 1886 and February 1987. Each of the 94 drift rounds was crushed to minus ½" and passed through a sampling tower to obtain a 150 lb sample. A 60 lb sample was riffled from each 150 lb tower sample and leached in an alkaline cyanide solution. Filtered solution and residue were then analysed to determine the grade of each sample. In total, 2.8 tons of the bulk-sample was analysed, returning an average gold grade of 0.061 oz/ton Au (2.09 g/t Au). In addition, 3,400 lbs of material were collected from muck piles and from face samples with the muck pile samples analysed via fire assay and the face samples via a combination of cyanide leach and fire assay.

Northumberland undertook an underground bulk sampling program between January and June, 1988 to evaluate the mineralized zone to the east of the Mitchell workings. In that program, a 423 m underground access ramp was driven west, parallel to the mineralised zone between the open pit and the 200 level of the Mitchell workings. Two crosscuts totalling 146 m of development were driven to the north from the ramp to crosscut the mineralized zone on sections 80 m apart. From these crosscuts, a further 241 m was developed in drives along various mineralised leads. The mill feed supplied by this development was supplemented with approximately 300 tons of material from earlier development areas underground, such that a total of approximately 5,000 tons of bulk sample material was obtained from within the mineralized zone.

Mill testing was completed on 1,490 tons of material taken from within the first cross-cut, returning a calculated mill head gold grade across the mineralised zone of 0.06 oz/ton Au (2.06 g/t Au). A further 370 tons of material derived from more selective mining from the first cross cut was processed, returning a calculated mill head gold grade of 0.10 oz/ton Au (3.43 g/t Au).

9.7 Exploration Potential

9.7.1 Touquoy

The most advanced exploration target on the Touquoy property beyond the current resource is that around the historic Higgins & Lawlor workings located about 2 km west of the Touquoy deposit, generally known as Touquoy West. It was this locale that was initially explored by Seabright in 1986–1988, and where 127 core holes were drilled for approximately 16,675 m and a small underground exploration program was undertaken. Although numerous mineralized intersections were recorded, with 31 intersections exceeding grade x width values of >10 g.m/t over a strike length of over 600 m, small-scale continuity is relatively weak and mineralized intervals are relatively narrow (<3 m). Mineralization is almost universally quartz-vein hosted.

During 2004–2010, Atlantic Gold drilled a further 29 core holes for 2,621 m without significantly upgrading this prospect.

Although the gold mineralization here is reminiscent of the typical "Meguma-type" style (relatively high grade, nuggety and confined to narrow (<1 m) quartz veins), the presence of broader, shale-hosted mineralization amenable to open-pit extraction has not yet been entirely discounted.

9.7.2 Beaver Dam

At Beaver Dam, the most compelling exploration target is the eastern offset continuation of the deposit east of the Mud Lake and Cameron Flowage Faults. A 15-hole program (2,534 m) drilled by Seabright in 1986 (Coxheath Option) in the area of the Northeast Zone intersected potentially economic gold grades in the core. In 2013, Acadian drilled an18-hole fence of shallow vertical RC "interface" holes (425 m total) west of the Northeast Zone and between the two faults, and intersected stratigraphy considered equivalent to that hosting the Beaver Dam deposit. Although only anomalous concentrations of gold and arsenic were recorded, further diamond drilling was warranted to define the anomalous values, follow up on the Coxheath drilling and gain a better geological interpretation of the area and the true extant.

During the fall of 2018, Atlantic Gold completed six core drill holes (854 m), in the vicinity of the historical Coxheath drilling. The gold mineralization is hosted in argillite containing minor arsenopyrite and quartz veining in the hinge of an easterly-plunging (15–20°) anticline and in the overturned limb of the hanging wall.

Another area of significance is along strike to the west of the main deposit, identified as the Mill Shaft zone, which extends over a 1.5 km strike length. Multiple companies explored this area during the 1980s and periodically into the 2000s. A combined 24 drill holes were drilled by International Geochemical Associates, Seabright and Acadian, with the later being the most recent of the drill campaigns carried out in 2006.

During the 2018 drill program, Atlantic Gold completed four core holes (665 m). The Mill Shaft zone consists of a west–northwest-striking anticline, comprising two folded argillite units separated by an interbedded, greywacke-dominated unit coinciding with a linear magnetic high that can be traced along strike. The anticline is generally isoclinal, dips at 45° to the northeast and plunges to the east at about 25°. Disseminated mineralization is concentrated near the anticline axis, primarily within argillite on the northern right-way-up limb of the fold.

9.7.3 Fifteen Mile Stream

At Fifteen Mile Stream, the most significant exploration targets are along the 1.5 km strike length to the west of the Hudson and Plenty resource areas (Seloam Brook Prospect), and the 149 Zone that is located about 1.5 km east of Egerton–MacLean. During the 2018 core drill program, 27 (5,056 m) widely-spaced reconnaissance drill holes intersected anomalous gold mineralization in favourable structural positions, highlighting the potential for additional discoveries in this area.

The geology of the Seloam Brook area is subdivided into north and south by the east–west-trending Seigel Fault. In the western extension of the Fifteen Mile Stream anticline, gold mineralization occurs 650 m along strike from the Hudson Zone. South of the Seigel Fault, the targets include a largely untested west-plunging fold closure and the western extension of the Plenty Zone along its southern limb.

At the 149 Zone, widely-spaced core drilling in 1988 by Pan East intersected relatively wide, though generally relatively deep, anomalous gold intervals. During 2018, Atlantic Gold carried out a program in the 149 Zone and identified two zones of gold mineralization:

- A shallow, generally higher-grade Axis Zone in the core of a tight anticlinal fold which dips 60–75° to the north;
- A thicker, but lower-grade, Limb Zone on the over-turned limb of the anticline.

The mineralized zones are over 500 m in strike length and still open to the east.

9.7.4 Cochrane Hill

The most attractive exploration target at Cochrane Hill is the western extension of the mineralized zone, along the anticlinal axis, from the Cochrane Hill deposit towards the western boundary of the property near the St Mary's River.

Three widely-spaced RC traverses (23 holes for 336 m) drilled by Atlantic Gold in 2007 in this area intercepted anomalous gold vales at a location 600 m west of the current resource estimate. Although follow-up RC infill drilling (43 holes for 741 m) and core drilling (eight drill holes for 505 m) failed to extend this shallow, high-grade zone, further detailed exploration along this trend is warranted.

9.8 Comments on Section 9

In the opinion of the QP, the exploration programs completed and projected at the property are appropriate to the style of the mineralization and the current degree of geological knowledge and understanding of mineralization controls.

10.0 DRILLING

10.1 Introduction

Information from previous technical reports has been used as a basis for the descriptions in this section (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015; Staples et al., 2017; and Staples et al., 2018).

Drilling completed on the Touquoy property is summarized in Table 10-1 for the drilling completed as part of exploration efforts and resource delineation. Table 10-2 provides a summary of the drilling completed for other purposes, including condemnation, geotechnical, hydrogeological, and metallurgical purposes. The drill collar locations for drilling are shown in Figure 10-1. In total 834 drill holes (43,676 m) have been completed in the property area. Of this total, 364 drill holes (33,816 m) support Mineral Resource estimates.

Drilling completed on the Beaver Dam property is summarized in Table 10-3 for the drilling completed as part of exploration efforts and resource delineation. Table 10-4 provides a summary of the drilling completed for other purposes, including condemnation, geotechnical, hydrogeological, and metallurgical purposes. The drill collar locations are shown in Figure 10-2. In total 764 drill holes (80,393 m) have been completed in the property area. Of this total, 184 drill holes (28,632 m) support Mineral Resource estimates.

Drilling completed on the Fifteen Mile Stream property is summarized in Table 10-5. The drill collar locations are shown in Figure 10-3. In total 883 drill holes (123,365 m) have been completed in the property area. Of this total, 395 drill holes (52,179 m) support the Mineral Resource estimates.

Drilling completed on the Cochrane Hill property is summarized in Table 10-7. The drill collar locations are shown in Figure 10-4. In total 615 drill holes (78,614.5 m) have been completed in the property area. Of this total, 326 drill holes (52,697 m) support Mineral Resource estimates. Drilling completed since the close-out date for the database is discussed in Section 10.8.

Section 9.1 contains a summary of the drilling conducted for exploration purposes.

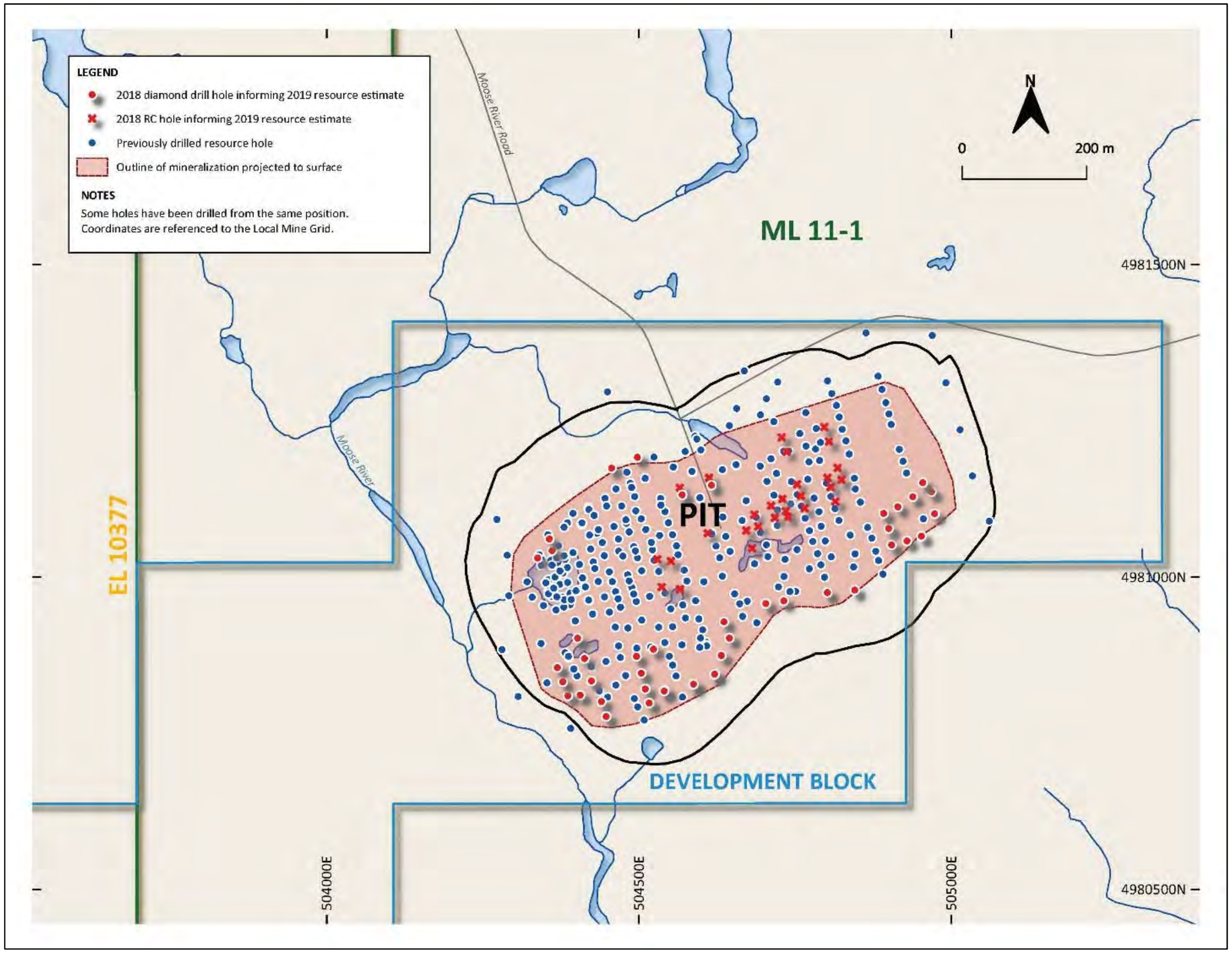
Table 10-1: Touquoy Drill Summary Table (exploration, resource estimation)

Year	Company	No. of Holes	Hole Type	Metres Drilled (m)
1986	Seabright	5	NQ Core	952
1987	Seabright	11	NQ Core	1,631
1988	Westminer	99	NQ Core	10,143
1989	Westminer	14	NQ Core	1,156
1995	Nova Scotia Dept. of Minerals and Energy	2	HQ Core	172
1996	MRRI	25	NQ Core	1,900
1997	MRRI	13	NQ Core	763
2002	Aurogin	1	HQ Core	81
2002	Aurogin	6	Open-hole percussion	300
2003	Atlantic Gold NL	22	NQ Core (one HQ)	1,841
2004	Atlantic Gold NL	33	NQ Core	2,825
2005	Atlantic Gold NL	63	NQ Core	4,771
2005	Atlantic Gold NL	7	NQ3 Core (+Geotech)	710
2006	Atlantic Gold NL	25	RC grade control	849
2007–2008	Atlantic Gold NL	80	BQ Core grade control	2,984
2008	Atlantic Gold NL	2	NQ core	291
2018	Atlantic Gold Corp.	28	RC Resource	1,728
2018	Atlantic Gold Corp.	44	NQ Core - Resource	5,268
Totals		***480***		***38,365***

Table 10-2: Drill Summary Table Other Touquoy Drilling (metallurgy, condemnation, geotechnical, hydrology)

Year	Company	No. of Holes	Hole Purpose	Hole Type	Metres Drilled (m)
2005	Atlantic Gold NL	8	Geohydrology	Water bores	864
2006	Atlantic Gold NL	7	Geotechnical	NQ3 Core	796
2004–2005	Atlantic Gold NL	326	Condemnation and exploration	Interface (shallow RC)	3,457
2005	Atlantic Gold NL	4	Comminution test work	PQ Core	188
2015	Atlantic Gold Corp.	*37*	Geotech	NQ Core	501
2016	Atlantic Gold Corp.	*18*	Condemnation drilling	Interface (Shallow RC)	312
2016	Atlantic Gold Corp.	*32*	Groundwater monitoring	HQ Core	704.1
Totals		***432***			***6,822.1***

Figure 10-1: Drill Collar Location Plan, Touquoy



Note: Figure prepared by Atlantic Gold, 2019.

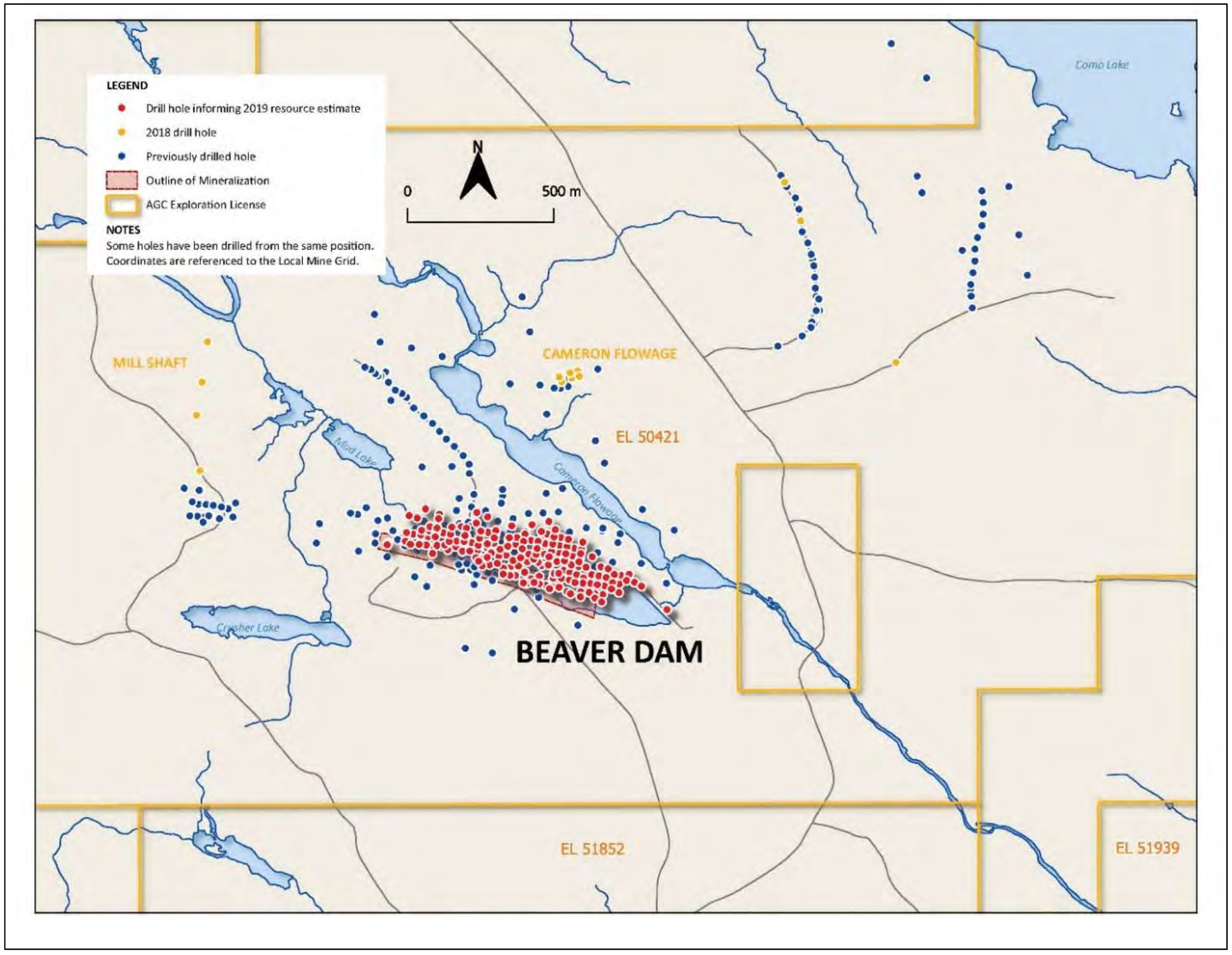
Table 10-3: Beaver Dam Drill Summary Table (exploration, resource estimation)

Year	Company	No. of Holes	Hole Type	Metres Drilled (m)
1978	Agassiz Resources	9	Core	644
1978	Comiesa Corporation	9	Core	1,003
1978	MEX	2	Core	213
1983	Acadia/MEX	11	Core	758
1985–1987	Seabright	304	Shallow reverse circulation	2219
1985–1987	Seabright	186	NQ Core	43,027
1987–1988	Seabright	34	Underground NQ core	2290
2005	Acadian	46	NQ Core	4911
2006	Acadian	87	NQ Core	12967
2007	Acadian	6	NQ Core	1,773
2009	Acadian	14	NQ Core	2351
2014	Acadian	18	RC interface	427
2014	Atlantic Gold	36	NQ Core	7,560
2015	Atlantic Gold	2	NQ Core	250
Totals		***764***		***80,393***

Table 10-4: Drill Summary Table Beaver Dam Other Drilling (metallurgy, condemnation, geotechnical, hydrology)

Year	Company	No. of Holes	Hole Purpose	Hole Type	Metres Drilled (m)
2018	Atlantic Gold Corp.	49	**Groundwater Monitoring**	HQ Core	899
Totals		***49***			***899***

Figure 10-2: Drill Collar Location Plan, Beaver Dam



Note: Figure prepared by Atlantic Gold, 2019.

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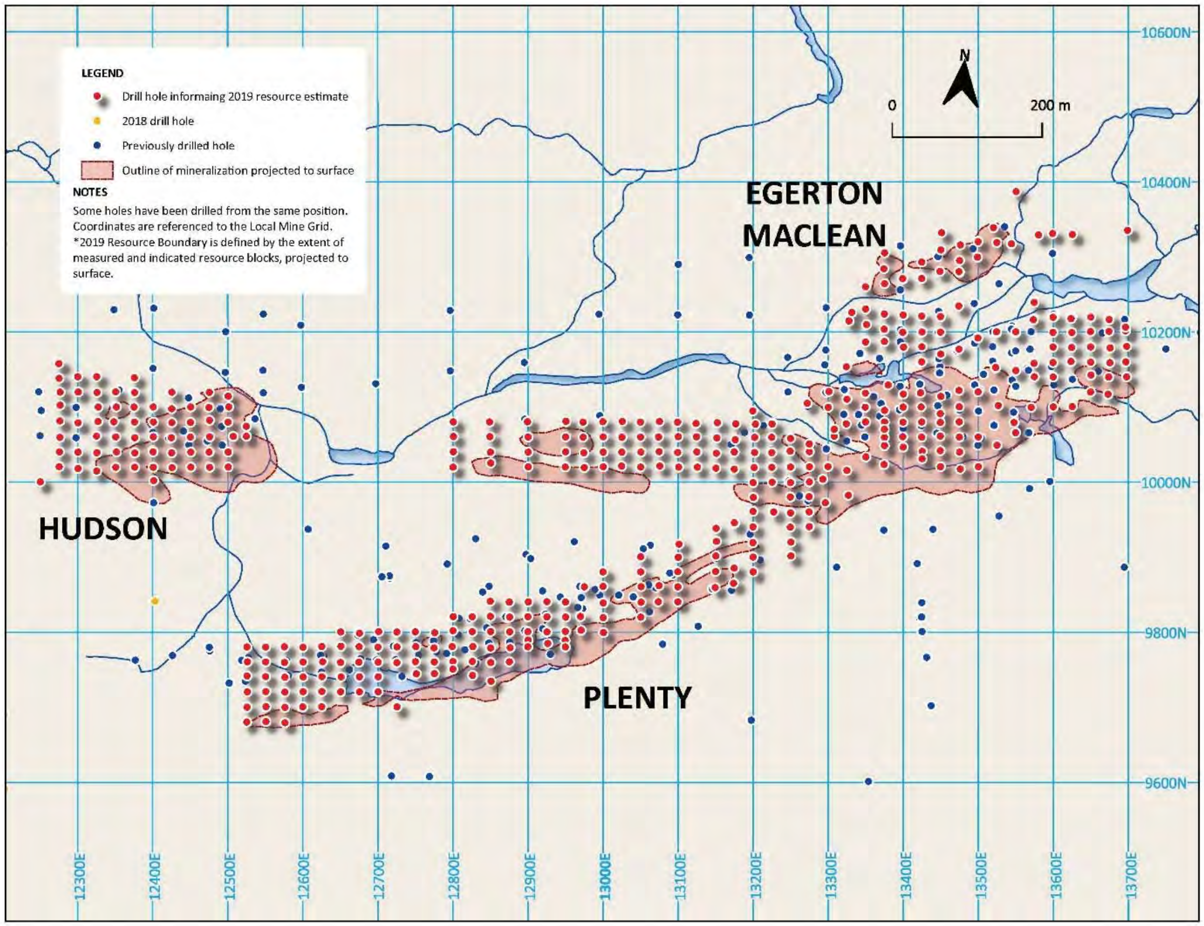
Table 10-5: Fifteen Mile Stream Drill Summary Table

Year	Company	No. of Holes	Hole Type	Metres Drilled (m)
1985	Pan East	24	NQ Core	2,858
1986	Pan East	17	NQ Core	3,096
1986–1987	NovaGold	97	NQ Core	13,822
1987–1988	Pan East	104	NQ Core	22,966
1988	NovaGold	8	NQ Core	1,594
2011	Acadian	29	NQ Core	3,741
2016	Atlantic Gold	11	NQ Core	945
2017 (program 1)	Atlantic Gold	180	NQ Core	23,044
2017 (program 2)	Atlantic Gold	186	NQ Core	21,062
2018	Atlantic Gold	66	NQ Core	11,858
Totals		***722***		***104,986***

Table 10-6: Drill Summary Table Fifteen Mile Stream Other Drilling (metallurgy, condemnation, geotechnical, hydrology)

Year	Company	No. of Holes	Hole Purpose	Hole Type	Metres Drilled (m)
2017	Atlantic Gold Corp	9	Geotechnical	NQ3 Core	1,340.77
2018	Atlantic Gold Corp	27	Hydrogeological	HQ3 Core	290.22
Totals		***36***			***1,630.99***

Figure 10-3: Drill Collar Location Plan, Mineral Resource Definition Drilling, Fifteen Mile Stream



Note: Figure prepared by Atlantic Gold, 2019.

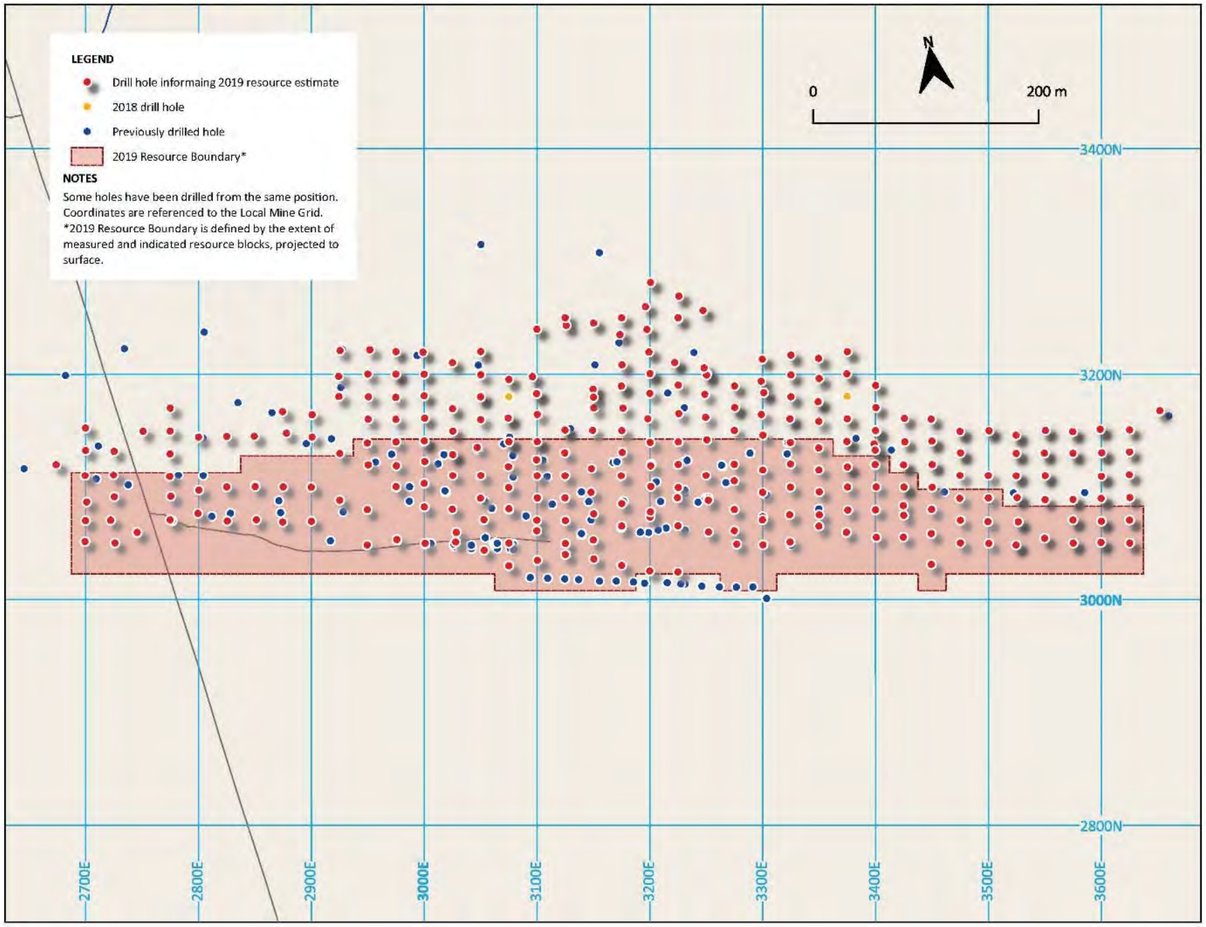
Table 10-7: Cochrane Hill Drill Summary Table

Year	Company	No. of Holes	Hole Type	Metres Drilled (m)
1934	Eastern Mining	3	Core	238
1974	Massval	44	AQ, BQ Core	4,912
1979–1981	Northumberland	21	AQ, BQ Core	3,931
1986-1987	Scominex	31	NQ Core	5,103
1986-1987	Scominex	28	NQ Core, underground	829
1988	NovaGold	28	NQ Core, underground	2044
2007	Atlantic Gold NL	2	NQ Core	149
2007–2008	Atlantic Gold NL	82	RC	1246
2008	Atlantic Gold NL	29	NQ Core	1753
2009	Atlantic Gold NL	16	NQ Core	1,726
2016	Atlantic Gold Corp	89	NQ Core	13,084
2017 (program 1)	Atlantic Gold Corp	88	NQ Core	13,811
2017 (program 2)	Atlantic Gold Corp	44	NQ Core	6,903
2018	Atlantic Gold Corp	66	NQ Core	15,985
Totals		***571***		***71,714***

Table 10-8: Drill Summary Table Cochrane Hill Other Drilling (metallurgy, condemnation, geotechnical, hydrology)

Year	Company	No. of Holes	Hole Purpose	Hole Type	Metres Drilled (m)
2017	Atlantic Gold Corp	4	Geotechnical	NQ3 Core	801.93
2018	Atlantic Gold Corp	26	Hydrogeological	HQ3 Core	462.40
Totals		***30***			***1,264.33***

Figure 10-4: Drill Collar Location Plan, Mineral Resource Definition Drilling, Cochrane Hill



Note: Figure prepared by Atlantic Gold, 2019.

10.2 Drill Methods

Drilling has used primarily NQ (47.6 mm diameter) core. Some drill holes at Cochrane Hill, Beaver Dam, Fifteen Mile Stream and Touquoy were HQ (63.5 mm) or PQ (85mm) size for various technical drill programs. A grade control program at Touquoy in 2006 was completed using BQ (37 mm) size. Drilling performed by Massval and Northumberland at Cochrane Hill used AQ (30.5 mm) and BQ sizes.

Drill contractors used in historical drill programs are not known. Drill contractors that are known have included Maritime Diamond Drilling, Logan Drilling, and Archibald Drilling.

10.2.1 Drill Programs

Core drilling was used for exploration programs testing geochemical and geophysical anomalies, deposit delineation and infill drilling, metallurgical testwork samples, geotechnical and hydrogeological information.

Interface and reverse circulation (RC) drilling were used in support of definition of certain lithological units and wider exploration (interface programs), condemnation drilling (interface programs) and as step-out and check drilling of mineralization trends (RC). A trial grade control program was undertaken in late 2006 with 25 RC 8.9–11.4 cm diameter holes drilled.

None of the data derived from interface samples are used in resource estimation.

10.2.2 Touquoy

Core Drilling

Some 165 core drill holes were drilled in Touquoy prior to the involvement of Atlantic Gold.

Atlantic Gold drilled another 125 core drill holes specifically for resource estimation, together with seven core drill holes (MR-06-GT01 to MR-06-GT06) for determination of geotechnical parameters, of which five were sampled and assayed. All of the holes were drilled in NQ diameter with the exception of MR-03-006, which was drilled as HQ size.

A further four core holes were drilled by Atlantic Gold NL in PQ diameter for comminution testwork and eight percussion holes drilled for hydrological testwork, but these holes were not sampled for resource estimation purposes.

Two core holes were drilled by Atlantic Gold in 2008 into the northern limb of the Touquoy anticline, beneath the current resource estimate area.

Exploration drilling was conducted on or near the 20600 easting (about 1 km west of the Touquoy deposit) to test mineralization defined by earlier (1986–1989) core drilling; on the west side of Moose River, within 350 m of the Touquoy deposit to test thin argillite units; between 500 m and 900 m west of the Touquoy deposit, targeting stratigraphy that had returned strongly anomalous results from interface drilling; across the Stillwater Argillite to the east and west of the historic Stillwater workings; across argillite in the core of the Higgins & Lawlor anticline, approximately 150 m north of the Stillwater argillite unit; and within the Higgins & Lawlor area, between existing holes and over a strike length of 175 m. In general results were disappointing. The area on the west side of Moose River may still be prospective for disseminated gold mineralization, and the Higgins Lawlor drilling confirmed the geological interpretation and distribution of grades at Higgins & Lawlor.

A further 44 core drill holes (5,268 m) were drilled in the fall of 2018 to support Mineral Resource estimates and to further define potential mineralization expansion.

Initial Grade Control Drilling

Atlantic Gold drilled 25 RC holes and 80 core holes to around 36 m depth in an area of the deposit tested mainly by KMS-15 sampling. Five holes reached 56 m deep. The spacing of the grade control drilling was 10 m east and 5 m north. All holes were drilled vertical and designed to reach the 1080 m RL at approximately 36 m to 38 m depending on surface topography. The RC program comprised 25 holes, the first three of which were 8.9 cm in diameter and the remaining 22 were 11.4 cm in diameter. Four holes terminated at shallower depths than planned due to the presence of underground voids.

Interface Drilling

Most of the exploration interface drill coverage has been restricted to existing roads, tracks and forestry clear-cuts with the result that the projected trend of the mineralization (i.e. the axis of the Moose River anticline) through the Touquoy property (a strike length of about 9 km) has been explored as a first pass with reconnaissance interface drill traverses at maximum 500 m spacings. On present findings, the area west of Touquoy, extending to the west of, and including the Higgins & Lawlor and Stillwater deposits, is considered to be the most prospective.

A total of 326 shallow percussion (interface) drill holes were completed using an open-hole technique for the first 235 holes and an RC technique for the most recent 91 holes. The holes were drilled between 1 m and 8 m into basement, providing one or two basement composite samples representing drill hole intervals of between 1 m and 5 m length. Samples were also collected from the glacial till that overlies basement, where till thicknesses exceeded 2 or 3 m.

Gold anomalism was intersected over a strike length of 700 m, between 350 m and 1,050 m west of the Touquoy deposit. Anomalies appeared to be associated with argillite dominated rocks. Testing using coring methods did not return any significant anomalies.

Interface drilling was used to define the Stillwater Argillite which is host to the historic Stillwater deposit. Follow-up diamond drilling did not demonstrate that gold mineralization extended substantially beyond the area defined by diamond drilling completed by previous explorers.

In 2004, a traverse of 12 percussion drill holes was completed by Acadian over the eastern portion of the Touquoy deposit where till cover varies from 6–9 m vertical depth. Each hole was drilled several metres into basement, and both basement and till samples taken and analysed for a suite of elements, including gold. Anomalous gold assays from basement samples showed a clear association with sub-cropping gold mineralization. However, till samples showed no indication of the underlying mineralization.

10.2.3 Beaver Dam

Core Drilling

Drilling from 2005–2007 consisted of 139 holes drilled in the Main Zone for a total of 19,651 m. Fourteen additional core holes were completed in 2009.

Between October 2014 and January 2015, Atlantic Gold undertook a resource definition drill program comprising 38 holes for 7,810 m. Atlantic Gold also completed eight geotechnical diamond holes (900 m). These drill holes were completed to help define parameters for pit wall design but also served as resource definition drill holes.

Three core holes were drilled into the Northeast Zone in 2006, and three core holes were also drilled into the Mill Shaft Zone in that year. A single core hole was drilled in the Mill Shaft Zone in 2009. The Mill Shaft Zone returned some anomalous gold intercepts.

RC Drilling

A single traverse of vertical, shallow RC drill holes was completed along an existing road in 2014 with 18 holes drilled for 427 m. The RC holes were essentially geochemical holes, penetrating at most 19 m below the base of overburden (tills). They were vertical holes and therefore tested only narrow basement widths if mineralisation in that area is as steeply dipping as the main Beaver Dam mineralisation.

The holes were drilled across a zone of anomalous gold grain counts in till samples. Gold anomalism was intersected in 11 adjacent holes, coincident with argillite dominated lithologies and with significant arsenopyrite and quartz vein contents which appeared analogous to the Beaver Dam mineralisation. However, the holes were drilled in an area that had been tested with core drill holes in the 1980s and there appears to be limited upside potential for this area.

10.2.4 Fifteen Mile Stream

A total of 279 core holes for 48,077 m were drilled between 1985 and 2011. The 1980s drilling was primarily focussed on the evaluation of mineralisation from an underground mining perspective with drilling concentrated in the Egerton–MacLean Zone and to a lesser extent the Hudson Zone but with some drilling between the two zones. One hole was drilled vertical and the remaining holes were inclined at angles of between 45° and 70°, with most drilled to the south but some drilled to the north across the near-vertical southern limb of the anticline. Acadian drilled 29 holes for 3,740 m in 2011. Twenty of the holes were drilled in or near the Egerton–MacLean Zone and the remainder in the Hudson Zone.

A total of 19 core holes for 4,142 m have been drilled in the 149 East area. Holes were drilled over a strike length of approximately 2 km on fences that were 100 m apart at their closest spacing and were inclined to the south at between 45–60°, to a maximum vertical depth of 324 m. Core was selectively sampled, with two drill holes returning anomalous intervals of a reasonable thickness.

NovaGold drilled 97 core holes for 13,822 m in the Plenty Zone between 1986 and 1988. The holes were inclined to the south at angles of between 45–60° over a strike length of 1.3 km, to a maximum vertical depth of approximately 175 m and with spacing between drill fences of the order of 25–30 m. Core was selectively sampled. Assay results were characterized by occasional very high grades associated with quartz veining and intervening weakly anomalous or barren intervals.

Atlantic Gold carried out their first drill campaign on the Fifteen Mile Stream property in 2016, with a total of 11 diamond drill holes situated in the Egerton–MacLean Zone, the central area and, in the Plenty Zone.

Atlantic Gold completed three resource definition campaigns throughout 2017 and 2018 with the latter being completed in the fourth quarter of 2018. These campaigns were focused on the Egerton–MacLean Zone in the east, the Hudson Zone in the west, and further exploration within the central area between the two mineralized zones. The Plenty Zone was also targeted to the southwest of the Egerton–MacLean Zone. The initial campaign was carried out through the first half of 2017, for 180 drill holes (23,044 m). The Egerton–MacLean Zone drilling was on a nominal 25 m x 20 m spacing from 13200E to 13625E to test for both shallow and deep mineralization. The Hudson Zone was drilled on a local 50 m x 20 m grid over a strike length of 100 m. The same grid spacing used for the Hudson Zone was applied to the central area over a strike length of 475 m. Mineral Resource estimates were updated using these data.

A subsequent campaign was carried out through the last quarter of 2017 into early 2018 for an additional 186 core drill holes (21,062 m). This campaign was complementary to the initial 2017 program, to further test the mineralization at depth and along the strike length over the project in its entirety. The Hudson Zone was drilled to a 25 m x 20 m grid over a 275 m strike length. The Egerton–MacLean Zone mineralization was further tested at depth to the northeast, along strike to the west and east targeting shallow mineralization. The Plenty Zone was drilled off on a nominal grid of 25 m x 20 m over a 500 m strike length. An additional program was carried out to test the potential for an eastern extension from the Plenty Zone, northeast to the Egerton–MacLean Zone.

The third campaign (Phase Three Resource Extension), completed in the fourth quarter of 2018, targeted the mineralization open both down dip to the north and down plunge to the east. This program consisted of 11,385 m in 69 drill holes. Results further defined disseminated mineralization in the eastern Egerton–MacLean Zone in the core of the anticline and on the northern limb of the anticline in the central and western Egerton–MacLean Zone. High-grade, vein-hosted gold was also intersected in deeper units along the anticline hinge zone.

10.2.5 Cochrane Hill

Core Drilling

Both surface and underground drilling have been undertaken. Core holes have tested the Cochrane Hill auriferous zone over a strike length of around 1,500 m with resources currently defined over approximately 800 m of this length.

Acadian completed a core drilling program of five holes to the east of the Cochrane Hill deposit in January 1989. The holes targeted a VLF conductor associated with an east–west-trending structure within a sulphidic, argillite-dominated unit. All of the holes were drilled in BQ diameter for a total of 596 m.

Atlantic Gold has carried out five separate drill campaigns at Cochrane Hill to further define the gold mineralization and the open pit potential. Drilling from the 2007–2009 programs were focused on shallow mineralization within the eastern portion of the proposed pit from 3000E to 3450E, for a total of 47 holes (3,628 m). Of these 47 core holes, eight holes were drilled for a total of 505 m along strike to the west of the main mineralized zone, to test a tabular zone defined by quartz veining and arsenopyrite hosted in argillites and inter-bedded greywackes which had been intersected by RC drill holes on the 2140 easting. Two of the core holes, approximately 300 m further west, tested the 1770E anomaly. Only weak gold values were returned.

Atlantic Gold initiated the first resource definition drill campaign over the entire proposed pit area during the fall of 2016. The program continued until spring 2017, for a total of 177 diamond drill holes (26,895 m). Drill spacing for this program was on nominal 25 m x 20 m spaced mine grid setup over an 820 m strike length. Mineralization was tested at depth and to the west and east extensions. An additional 44 holes for 6,903m was completed later in 2017 and early 2018 to complete infill drilling, also on 25 m x 20 m spacings. In 2018, a drill program consisting of 66 holes (15,985m) complemented the previous programs and further defined mineralization at depth and along strike to the east.

RC Drilling

A total of 66 shallow RC holes, together with eight diamond holes have been drilled by Atlantic Gold across the Cochrane Hill stratigraphy to the west of the Cochrane Hill deposit on 12 separate traverses and another 16 shallow RC holes drilled to the east of the Cochrane Hill deposit on three separate traverses. Five diamond holes were drilled to the east of the Cochrane Hill deposit by a previous explorer.

Thirty-nine shallow RC holes for a total of 505 m were drilled during October and November, 2007. The holes were drilled on six traverses with three holes drilled west of the Cochrane Hill deposit at nominal 400 m line spacing, and the other three drilled to the east of the deposit, also at nominal 400 m line spacings. Each traverse was positioned to cross the projected trend of mineralization in the deposit, parallel to the Cochrane Hill anticline, with traverses crossing the strike of stratigraphy over distances of between 80 and 140 m. The majority of the holes were vertical with the exception of 11 holes inclined at 60° to the south. Only basement was sampled at the drill rig at 1 m intervals. The holes were successful in identifying gold mineralization approximately 600 m to the west of the western limit of the Cochrane Hill deposit. The mineralization in these holes represents a north-dipping zone with a true width of approximately 8–10 m. A zone of mineralization, defined by quartz veining and associated arsenopyrite mineralization over a true width of approximately 10 m, was identified another 400 m further west, on the 1770 easting.

Infill RC drilling was undertaken in December 2007 and January 2008 with 43 holes completed for 741 m along eight separate traverses, closing drill line spacing to 100 m across the newly-identified zones of anomalism. The majority of these holes were inclined at 60° to the south with the exception of 11 vertical holes. Holes were restricted to a maximum depth of approximately 24 m by the capacity of the equipment used. Only weak gold assays were returned.

10.3 Logging Procedures

Prior to Atlantic Gold's involvement in these properties, core logging procedures were generally conventional in an exploration context, with lithological variation defining described intervals, and these necessarily of irregular downhole length. As assayed intervals generally conformed to lithological boundaries, assay intervals were of irregular downhole length.

Drill core logging procedures during Atlantic Gold's resource definition programs were described, for the purposes of digital capture, on a metre-by-metre basis with regards to lithology, texture, sulphide mineralization, alteration, quartz veining, structure, and in some cases magnetic susceptibility. All drill core has been photographed both wet and dry. Core recovery and rock quality designation (RQD) were measured for each hole at the same metre-by-metre intervals. This information was initially captured in hard copy and then transferred to a digital database.

During the 2016–January 2018 drill programs at Cochrane Hill and Fifteen Mile Stream, all data were captured directly into computerized software.

An ultraviolet (UV) light was used to check for the presence of scheelite in some drill holes at Fifteen Mile Stream.

10.4 Recovery

Touquoy

Core recoveries during the Atlantic Gold programs were very good overall. The 2005–2006 resource definition drill program for example had an average recovery of 93% from 72 drill holes.

Some intervals were not analysed where they were interpreted to be barren and these intervals have been assigned zero grade prior to compositing which will underestimate the composite grades in some instances. The average core recovery for the 2003–2010 drilling programs was 90%.

Beaver Dam

Core recoveries in each of the Atlantic and Acadian drill programs were generally good, even within the Mud Lake Fault, and are estimated at over 90% with lower recoveries associated with some local faulting and in proximity to underground voids (historic workings). The 2014–2015 resource definition drill program for example had an average recovery of 94% from 35 drill holes.

Fifteen Mile Stream

Overall core recovery was excellent, with local poor recovery limited to minor fault zones.

The Atlantic Gold 2016–January 2018 diamond drill program had very good core recovery overall averaging above 97% from 189 holes. Low recoveries were generally associated with the following:

- Near-surface with weathered rock;
- Proximal to underground workings;
- Faults and highly sheared zones.

Cochrane Hill

Massval Mines drill program recoveries averaged between 90–100%. This was confirmed by Atlantic Gold with 93% overall core recovery measured for the core remaining from 34 of the 44 Massval drill holes.

Core remaining from 18 of the 21 Northumberland drill holes was re-examined by Atlantic Gold and an overall core recovery of 96% determined.

Core from five surface and underground drill holes from the Scominex drilling, retrieved from storage by Atlantic Gold, shows an overall core recovery of 96%.

There is no information available as to core recoveries from the NovaGold programs, although drilling conditions in this area are good and reasonable recoveries would be expected.

None of the above drilling informs the current Mineral Resource estimates.

From the Atlantic Gold 2007–2009 diamond drill programs, core recovery was very good overall with an average at 97%.

The Atlantic Gold 2016–January 2018 diamond drill program also produced very good core recovery overall averaging above 98%. Low recoveries were generally associated with the following:

- Near-surface with weathered rock;
- Proximal to underground workings;
- Faults and highly sheared zones.

10.5 Collar Surveys

Touquoy

Between 2003 and 2006, Atlantic Gold's drill hole collars have been surveyed by Nova Scotian-registered surveyors using Real Time Kinematic Global Positioning Systems (RTK GPS).

In 2005, the location data was transformed from the NAD27 projection to the NAD83 projection such that ongoing survey data is collected in the NAD83 projection and transformed onto the local grid. The following programs were surveyed by the same company (now WSP Canada Inc.) in UTM NAD83 projection.

During the 2018 drilling campaign, drill hole collars were surveyed in UTM NAD83 (zone 20) projection by Atlantic Gold staff using Trimble RTK GPS instruments.

Beaver Dam

Between 2005 and 2007, drill hole collars were surveyed into the mine grid system using a theodolite. In 2009, the drill-hole collars were surveyed using a Trimble differential GPS system. In 2014, licenced surveyors from WSP Canada Inc. (WSP) resurveyed in the three control points established by Acadian together with a number of the Acadian and earlier drill collars. The control points were found to incorrectly located with respect to the NAD83 co-ordinate system but the relationship between the control points and the drill collars was correct such that relative positions in the local grid were maintained, and Mineral Resource estimates were not affected.

Fifteen Mile Stream

Acadian surveyed in a number of the 1980s-era drill holes using a Trimble differential GPS, re-establishing the local grid and defining transformation co-ordinates between the local grid and the UTM NAD83 projection.

Elevation data from historic drilling showed a regional systematic error and this was corrected for drill holes in the Egerton–MacLean and Hudson Zones where a topographic surface based on a surveyed 25 x 25 m grid was established.

Prior to Atlantic Gold's 2016–2017 drill campaign, WSP were contracted to validate the local grid transformation used previously by re-surveying in historic holes and re-establishing the grid. Once established, WSP surveyed in the proposed drill hole locations in UTM NAD83 projection. Upon drill hole completion, WSP surveyed in the final collar location.

Cochrane Hill

All of the Atlantic Gold proposed drill holes were surveyed prior to drilling and then upon completion by a Nova Scotian-licensed surveyor using a differential GPS system referenced to a Provincial survey marker and then transformed onto the local grid. Drill collars from eight holes drilled by previous explorers have been located and resurveyed. The new survey positions differ by between 0.6 m and 1.1 m from the original. This is considered to be a reasonable level of survey error.

10.6 Downhole Surveys

Touquoy

Holes drilled under the supervision of Atlantic Gold or its subsidiaries have continuously kept the same method of surveying down hole just beneath the drill casing, at approximately 30 m intervals and at the final hole depth. The survey tool used over the years varied (Table 10-9).

Beaver Dam

Holes drilled under Atlantic Gold supervision were surveyed down hole at approximately 30 m intervals and initially just below casing, using a FlexIT-brand tool. Data gathered from the survey tool included azimuth, dip, and magnetic field strength.

Drill holes are consistently quite straight, rarely varying by more than 5° in either dip or azimuth over the length of a drill hole.

Fifteen Mile Stream

Core drill holes completed under Atlantic Gold supervision were surveyed down hole just beneath the drill casing, at approximately 30 m intervals and at the final hole depth; using a Reflex-brand tool. Data gathered from the survey tool included azimuth, dip, and magnetic field strength.

Drill holes are consistently quite straight, rarely varying by more than 5° in either dip or azimuth over the length of a drill hole.

Cochrane Hill

Core drill holes completed under Atlantic Gold supervision were surveyed down hole just beneath the drill casing, at approximately 30 m intervals and at the final hole depth; using either a FlexIT or Reflex-brand tool. Data gathered from the survey tool included azimuth, dip, and magnetic field strength.

Drill holes are consistently quite straight, rarely varying by more than 5° in either dip or azimuth over the length of a drill hole.

10.7 Sample Length/True Thickness

Touquoy

Gold mineralization broadly conforms to the orientation of stratigraphy which has been tightly folded into an upright anticline, such that drill holes angled into the northern limb are inclined towards the south and vice-versa for drill holes angled into the southern limb. In this way, depending on where drill holes have been collared relative to the changing dips of bedding in the anticline, the angled holes intersect bedding at between 45° and 90°, exaggerating true widths by up to 1.4 times. Samples taken from vertical holes do not exaggerate actual widths of mineralization at the anticline hinge but can exaggerate widths by up to 2.9 times where bedding dips are steepest (70°).

Table 10-9: Down Hole Survey Instrumentation

Year	Survey Tool
2003	Pajari and Sperry-sun
2004	Sperry-sun
2005	Sperry-sun
2006	FlexIT brand
2007	FlexIT brand and Pajari
2008	Reflex brand
2010	FlexIT and Reflex brands

There is clearly a tendency toward more closely-spaced holes in the western part of the deposit where there is a significant area of higher grade. More holes with vertical orientation are drilled in the central part of the deposit and drill hole spacing tends to increase toward the east over the more recently drilled area of the deposit.

The bulk of the core holes are drilled at relatively shallow angles and drilling does not extend more than around 170 m below the surface.

Table 10-10 includes selected intercepts from drilling at Touquoy that illustrates the grade and down-hole thickness ranges of mineralization that can be encountered.

Beaver Dam

Drilling was on a nominal 25m x 25m grid spacing and holes were inclined to grid south at dips of between 32° and 71°, to down-hole depths ranging from 47 m to 373 m.

The orientation of mineralisation in both the Mill Shaft Zone and the Northeast Zone is uncertain at this stage and therefore the relationship between sample lengths and the true thickness of mineralisation is not known.

Table 10-11 includes selected intercepts from drilling at Beaver Dam that illustrates the grade and down-hole thickness ranges of mineralization that can be encountered.

Fifteen Mile Stream

Gold mineralisation at Fifteen Mile Stream is to some degree stratiform. Bedding was intersected at angles of between 45° and 90° such that the true thickness of mineralisation is generally between 70% and 100% of the downhole intercepts.

Table 10-12 includes selected intercepts from drilling at Fifteen Mile Stream that illustrates the grade and downhole thickness ranges of mineralization that can be encountered.

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Table 10-10: Example Drill Intercepts, Touquoy

Hole ID	Easting	Northing	Elevation	Dip (º)	Azimuth (º)	Total Depth (m)	Depth From (m)	Depth To (m)	Down-Hole Width (m)	Grade (g/t Au)
MR-05-084	504419	4981111	116.10	-63	178	150	54	65	11	5.12
							86	144	58	1.92
MR-05-121	504831	4981218	124.77	-45	183	88.5	16	27	11	6.98
							31	45	14	2.11
MR-04-051	504387	4980871	111.00	-60	360	35 *	19	35	16	1.55
MR-03-007	504542	4981105	118.60	-60	182	70	49	59	10	1.89
MR-04-038	504722	4981312	124.12	-60	180	150.5	107	108	1	1.21
MR-03-023	504866	4981079	123.73	-45	360	80	NSA			

Note: Significant mineralized intervals calculated as ≥0.5 g/t Au and up to 3 m internal dilution. NSA = no significant assays; that is, no intervals ≥ 3.0 g/t Au x m. * Drill hole ended in mineralization. Grid co-ordinates in NAD83 zone 20.

Table 10-11: Example Drill Intercepts, Beaver Dam

Hole ID	Easting	Northing	Elevation	Dip (º)	Azimuth (º)	Total Depth (m)	Depth From (m)	Depth To (m)	Down-Hole Width (m)	Grade (g/t Au)
BD14-166	522229	4990444	131.44	-60	180	221	160	173	13	1.11
							183	199	16	7.1
							194	195	1	68.7
							204	206	2	2.84
BD14-169	522279	4990444	131.43	-60	180	269	171	185	14	1.54
							214	220	6	1.62
BD14-174	522314	4990364	132.18	-60	180	149	80	91	11	3.3
							95	117	22	1.6
							121	125	4	1.00
BD14-183	522378	4990426	133.47	-60	180	251	194	233	39	1.63
BD14-189	522424	4990402	134.91	-60	180	242	181	200	19	0.56

Note: Significant mineralized intervals calculated as ≥0.5 g/t Au and up to 3 m internal dilution. High-grade assays top-cut at 50 g/t Au. Grid co-ordinates in NAD83 zone 20.

Table 10-12: Example Drill Intercepts, Fifteen Mile Stream

Hole ID	Easting	Northing	Elevation	Dip (º)	Azimuth (º)	Total Depth (m)	Depth From (m)	Depth To (m)	Down-Hole Width (m)	Grade (g/t Au)
FMS-17-040	537529	4998657	110.97	-60	175	80	19	42	23	1.54
							50	51	1	6.62
FMS-17-044	536927	4998642	108.55	-60	175	101	69	74	5	0.98
FMS-17-058	537080	4998636	113.07	-60	175	80	NSA			
FMS-17-098	537453	4998670	110.52	-55	175	122	28	31	3	1.37
							35	59	24	1.65
							69	81	12	0.78
FMS-17-172	537399	4998716	110.60	-45	175	202	106	121	15	13.5
							Incl. 109	110	1	28.7
							Incl. 113	114	1	161
							129	136	7	0.95
FMS-17-186	537565	4998821	110.67	-65	175	223	59	60	1	3.78
							80	81	1	3.49
							91	145	54	88
							Incl. 113	114	1	3,180
							Incl. 124	125	1	1,490
							191	208	17	0.78

Note: Significant mineralized intervals calculated as ≥0.5 g/t Au and up to 3 m internal dilution. NSA = no significant assays; that is, no intervals ≥ 3.0 g/t Au x m. Grid co-ordinates in NAD83 zone 20.

Cochrane Hill

Diamond drilling from surface in the resource area extends over a strike length of 1500 m with the bulk of the drilling on approximately 25 m spaced sections that extend over a strike length of 850 m and to a vertical depth of about 250 m. Drilling from underground is restricted to the eastern half of the regularly-spaced data and to within 75 m of surface.

Holes drilled from surface were inclined to the south at angles between 80° and 40° from horizontal. Mineralisation is confined to a zone or envelope that dips to the north at approximately 70° such that drill holes intersect the mineralization at angles of between 30° and 70° respectively and down-hole mineralized intercepts are exaggerated over true widths by between 1.1 and two times.

Underground drill holes were fanned, at dips ranging from -75° to +45° and have been used together with the surface drill holes to define the mineralization geometry.

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Table 10-13 includes selected intercepts from drilling at Cochrane Hill that illustrates the grade and downhole thickness ranges of mineralization that can be encountered.

10.8 Drilling Completed Since Database Close-Out Date

In the period 15 February to 22 April 2019, Atlantic Gold undertook a short core drill program in the 149 prospect area that is situated about 1 km east of the Fifteen Mile Stream deposit. A total of 5,137m in 35 drill holes was completed. No results are available from this program.

10.9 Comments on Section 10

In the opinion of the QP, the quantity and quality of the lithological, collar, and down hole survey data collected in the exploration and infill-drill programs completed by Atlantic Gold are sufficient to support Mineral Resource and Mineral Reserve estimation.

Table 10-13: Example Drill Intercepts, Cochrane Hill

Hole ID	Easting	Northing	Elevation	Dip (º)	Azimuth (º)	Total Depth (m)	Depth From (m)	Depth To (m)	Down-Hole Width (m)	Grade (g/t Au)
CH-16-114	576991	5011084	112.49	-60	171	134	73	87	14	0.66
CH-16-128	577286	5011141	115.54	-60	171	164	68	79	11	0.91
							91	97	6	1.36
							102	129	27	3.34
							114	115	1	27.6)
							134	135	1	67.8
							145	148	3	2.44
CH-16-132	577384	5011169	121.10	-60	171	185	92	99	7	0.84
							104	132	28	1.48
							147	150	3	2.34
CH-17-192	577036	5011127	110.77	-70	171	190	128	133	5	0.79
CH-17-204	577304	5011190	119.79	-70	171	251	125	126	1	92.6
							176	207	31	4.2
							Incl. 178	179	1	93.1
CH-17-224	577073	5011058	111.74	-45	171	80	17	35	18	1.54

Note: Significant mineralized intervals calculated as ≥0.5 g/t Au and up to 3 m internal dilution. Grid co-ordinates in NAD83 zone 20.

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Introduction

Information from previous technical reports has been used as a basis for the descriptions in this section (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015; Staples et al., 2017; and Staples et al., 2018).

11.2 Sampling Methods

Sampling methods and approaches to sampling have changed throughout the Project exploration history. Most sampling has been done by drilling.

11.2.1 Touquoy

Table 11-1 summarizes the sampling programs for the Touquoy property. Sampling included core and RC drilling, interface drilling, and a bulk sample.

11.2.2 Beaver Dam

Table 11-2 summarizes the sampling programs for the Beaver Dam property. Sampling included core drilling.

Shallow holes were completely sampled from the base of overburden to the end of hole. For deeper drill holes that intersected long intervals of the hanging wall to mineralisation, and known to be barren from previous drilling, the correspondingly non-mineralised upper sections of core were not sampled.

11.2.3 Fifteen Mile Stream

Table 11-3 summarizes the sampling programs for the Fifteen Mile Stream property. Sampling included core and RC drilling.

11.2.4 Cochrane Hill

Table 11-4 summarizes the sampling programs for the Cochrane Hill property. Sampling included core and RC drilling.

A significant proportion of the historical drill core from the Cochrane Hill Deposit (109 out of 154 holes) was retained in storage at a NSDNR facility in Stellarton, Nova Scotia. The NSDNR made this core available for re-logging and some sampling such that a large proportion of the Massval drill core (34 of 44 drill holes), Northumberland drill core (18 of 21 drill holes) and Scominex drill core (16 of 59 drill holes) was re-examined and selectively infill and duplicate sampled.

Table 11-1: Touquoy Sampling

Year	Operator	Comment
1986–1987	Seabright	Whole-core sampled. Sample lengths ranged from 8 cm to 4.55 m and averaged 0.7 m.
1988–1989	Seabright/Westminster	Split core and whole core sampling. Sample lengths ranged from 1 cm to 4.85 m averaging 0.9 m. Only 0.5% of samples were less than 10 cm in length and 0.3% greater than 2 m in length.
1989	Seabright/Westminster	A bulk sample was taken from the western edge of the Touquoy deposit. A total of 56,878 t mined from the 18 m deep Mini-Pit, separated into 12 blocks and trucked to the Gays River Mill for processing
1996–1997	MRRI	Sample lengths ranged from 3 cm to 2.7 m and averaged 0.9 m.
2002	Aurogin	Samples were taken over nominal 2 m lengths.
2003–2008	Atlantic Gold	Mark out samples at nominal 1 m intervals but break samples at major lithological contacts such as the footwall and hanging wall contacts to the Touquoy Argillite. Sample lengths have varied from 0.40 m to 9.2 m for specific circumstances but some 93% of sample intervals are 1 m long with only one sample less than 0.5 m long and two samples greater than 3 m long. All sawn to half core. For the RC grade control holes, samples were taken at 1 m intervals using a rig-mounted cyclone. The first sample in all cases was taken in till and not submitted for analysis. Typically, the till varied from three to 5 m in depth. Samples below the till were weighed, then split using a Jones, single tier splitter with multiple passes made on each sample until the sample weight was reduced to between 2–3 kg. For the RC grade control drill holes, the core was marked into 1 m intervals and sampled. Interface sample lengths depended on the hole depth; typically ranged from 1–5 m in length. Till samples taken if the till thickness was >2–3 m.
2018	Atlantic Gold	RC drill cuttings were collected at the rig from a Metzke oscillating cyclone mounted splitter which was adjusted to deliver 10% of the total sample mass (about 8.5kg for 2m of 140mm diameter drilling) to each of the three sampling chutes. Samples were collected from two of the three chutes, located on opposite sides of the splitter, designated chute A and chute B. Samples from both ports were collected, however only one split from each sample interval was sent for gold content determination (except in the case of duplicates). The split selected for analysis was determined by a random number generator. Once delivered to the lab, RC cuttings samples were received and dried in bags, until the moisture content was low enough for the samples to be riffle split. Each sample was riffle split to produce a 500g +/- 100g subsample for analysis. Gold content determined was done by PAL (Pulverize and Leach) with AAS finish.
2018	Atlantic Gold	Sawn to half core; nominal sample interval or 1 m

Table 11-2: Beaver Dam Sampling

Year	Operator	Comment
2005–2007	Acadian	Core split using a mechanical core splitter; subsequently changed to a core saw. 1 m sample intervals
2009	Acadian	Sawn to half core; nominal sample interval of 1 m
2014–2015	Atlantic Gold	Sawn to half core; nominal sample interval of 1 m

Table 11-3: Fifteen Mile Stream Sampling

Year	Operator	Comment
1985	Pan East	Quartz vein material split to half core using a core saw. Average sample length of 0.28 m. Unconventional sampling was locally undertaken by Pan East where samples either included both whole core and split core or split core and unsampled core over a designated interval.
1986–1988	Pan East	Whole core, split using core-splitter. Samples included quartz veins, wall rock adjacent to quartz veins, and zones of elevated sulphide content.
2009–2010	Acadian	Resampling program. Sampled intervals represented previously unsampled core that generally did not include quartz veins or significant alteration. Resample length was generally determined by subdividing the sample length into regular intervals of 3 ft (91 cm) or less, although in some case intervals did exceed 3 ft.
2011	Acadian	Sawn to half core using diamond-tipped core saw. Maximum sample length of 1.5 m and minimum sample length of 0.25 m.
2016—2017	Atlantic Gold	Core samples sawn to half core using a diamond-tipped core saw. Nominal 1 m sample intervals. Samples were dispatched from Atlantic's core facility in Moose River, directly to ALS.
2017–2018	Atlantic Gold	Selectively based on geology, core samples have been processed as: (1) sawn to half core using a diamond-tipped core saw with nominal 1m half-core sample intervals; or, (2) after core has been geologically logged and photographed, whole core has been sampled on 1 m sample intervals. Samples were dispatched from Atlantic's core facility in Moose River, directly to ALS in Sudbury, ON

Table 11-4: Cochrane Hill Sampling

Year	Operator	Comment
1974	Massval Mines	Split half core (not cut); 1–5 ft sample lengths (30–152 cm).
1979–1981	Northumberland Mines	Split half core (not cut); 1–5 ft sample lengths.
1979–1981	Northumberland Mines	Three bulk samples from surface open pits, of 13,041 tons, 100 tons, and 0.3 tons.
1986–1987	Scominex	Sawn to half core. Sample intervals range from 1 to 5 ft
1986–1987	Scominex	Bulk sample from Mitchell underground of 4,443 tons.
1988	NovaGold	Whole core samples; 1–5 ft sample lengths
1988	NovaGold	Bulk sample of 1.7 tons from Mitchell underground muck and face samples Two additional bulk samples of 1,490 tons and 370 tons from 5,000 tons mined.
1988–1989	Acadian	No record of sampling procedures
2007–2009	Atlantic Gold	Resampling program. Infill sample intervals were defined, nominally at 1 m lengths but with many shorter intervals due to intervening samples taken by earlier explorers.
2007–2009	Atlantic Gold	Core samples sawn to half core using a diamond-tipped core saw. Nominal 1 m sample intervals. RC samples taken at 1 m intervals using a rig mounted cyclone. October and November 2007 RC samples taken as 4 m composites by hand-grabbing roughly equal volumes of material from four separate plastic bags, each representing a 1 m sample interval. All samples were sent directly to ALS.
2016—2017	Atlantic Gold	Core samples sawn to half core using a diamond-tipped core saw. Nominal 1 m sample intervals. Samples were dispatched from Atlantic's core facility in Moose River, directly to ALS.
2017–2018	Atlantic Gold	Selectively based on geology, core samples have been processed as: (1) sawn to half core using a diamond-tipped core saw with nominal 1m half-core sample intervals; or, (2) after core has been geologically logged and photographed, whole core has been sampled on 1 m sample intervals. Samples were dispatched from Atlantic's core facility in Moose River, directly to ALS in Sudbury, ON.

11.3 Density Determinations

The following bulk density data were used in estimation:

- Touquoy: Following confirmation of nil-porosity core (by comparing results from waxed and un-waxed core samples) Atlantic Gold took 56 bulk density measurements using the water displacement technique on un-waxed NQ core. The mean bulk density was 2.79 t/m^3 with a minimum of 2.46 t/m^3 and a maximum of 2.92 t/m^3 and 90% of the values falling in the range of 2.7 to 2.84 t/m^3. The mean value was applied globally to calculate tonnages;

- Beaver Dam: The bulk density used to convert modelled volumes to tonnes was set at 2.73 t/m^3 globally;
- Fifteen Mile Stream: The bulk density used to convert modelled volumes to tonnes was set at 2.78 t/m^3 globally. From Atlantic Gold's 2016–2018 diamond drill campaign, 356 samples were selected, and bulk density values were determined using the water displacement method. Representative lithologic samples were collected from each stratigraphic unit and samples included a range of gold grades;
- Cochrane Hill: The bulk density used to convert modelled volumes to tonnes was set at 2.77 t/m^3 globally. From Atlantic Gold's 2016–2017 diamond drill campaign, 75 samples combined with 145 samples from the 2009 drilling, were selected and bulk density values were determined using the water displacement method. Representative lithologic samples were collected from each stratigraphic unit and samples included a range of gold grades.

11.4 Analytical and Test Laboratories

A list, where known, of the analytical and test laboratories is provided in Table 11-5 (Touquoy), Table 11-6 (Beaver Dam), Table 11-7 (Fifteen Mile Stream), and Table 11-8 (Cochrane Hill).

11.5 Sample Preparation and Analysis

A list, where known, of the sample preparation and analytical methods is provided in Table 11-9 (Touquoy), Table 11-10 (Beaver Dam), Table 11-11 (Fifteen Mile Stream) and Table 11-12 (Cochrane Hill).

11.6 Quality Assurance and Quality Control

11.6.1 Touquoy

The 1985–1989 Seabright/Westminer programs relied on the quality assurance and quality control (QA/QC) measures implemented at the sample preparation and analytical laboratories. No QA/QC field procedures were incorporated into Aurogin's 2002 exploration for the HQ core drill hole. QA/QC relied on the analytical laboratory's internal QA/QC measures.

Data collected during these programs were verified through resampling programs, which are discussed in Section 11.7.

Table 11-5: Laboratories Used, Touquoy

Year	Laboratory	Purpose	Accreditation	Independent
1986–1989	Chemlab in Saint John, New Brunswick	Sample preparation and analysis	Unknown	Yes
1989	Chemex, Mississauga, Ontario.	Sample preparation and analysis, resampling program	Unknown	Yes
1996–1997	M-Tech laboratory in Elmsdale, Nova Scotia	Sample preparation and analysis	Unknown	Yes
1996–1997	Technical University of Nova Scotia (‘TUNS”), Halifax.	Check analysis	Not accredited	Yes
2002	TUNS, Halifax, Nova Scotia	Sample preparation and analysis	Not accredited	Yes
2002	ALS Chemex in Vancouver, BC	Analysis	ISO registered	Yes
2003	SGS laboratory in Perth, Western Australia	Sample preparation and analysis of check samples	Unknown	Yes
2003–2006	SGS laboratory in Rouyn-Noranda, Quebec	Sample preparation and analysis of resource drilling samples	Not accredited	Yes
2006–2008	ALS Chemex laboratory in Timmins, Ontario	Sample preparation of mini grade-control samples	ISO registered	Yes
2006–2008	ALS Chemex laboratory in Val d’Or, Quebec	Analysis of mini grade-control samples	ISO registered	Yes
2018 - RC	Atlantic Gold Corp Mine, Moose River, Nova Scotia	Prep and PAL analysis	Not accredited	No
2018 - RC	ALS Chemex laboratory in Vancouver, BC	Check samples of the RC program	ISO registered	Yes
2018 - Core	ALS Chemex laboratory in Vancouver, BC	Analysis of mini grade-control samples	ISO registered	Yes

Table 11-6: Laboratories Used, Beaver Dam

Year	Laboratory	Purpose	Accreditation	Independent
2005–2007	ALS Chemex, Mississauga, Ontario	Sample preparation and analysis	ISO registered	Yes
2005	Overburden Drilling Management of Nepean, Ontario	Till sample analysis	Unknown	Yes
2009	ALS Val d’Or, Quebec	Analysis	ISO registered	Yes
2009	ALS Sudbury, Ontario	Sample preparation	ISO registered	Yes
2014–2015	ALS Sudbury, Ontario	Sample preparation	ISO registered	Yes
2014–2015	ALS Vancouver, BC.	Analysis	ISO registered	Yes

Table 11-7: Laboratories Used, Fifteen Mile Stream

Year	Laboratory	Purpose	Accreditation	Independent
1986	Bondar-Clegg in Ottawa	Sample preparation and analysis	Unknown	Yes
1986–1988	Chemlab in Saint John, New Brunswick or Bondar-Clegg in Bedford (sample preparation) or Ottawa (analysis).	Sample preparation and analysis	Unknown	Yes
2011	ALS Chemex in Sudbury Ontario ALS Chemex in Timmins Ontario	Sample preparation	ISO registered	Yes
2011	ALS Chemex laboratory in Val d'Or, Quebec ALS Chemex laboratory in Vancouver, BC	Analysis	ISO registered	Yes
2016–2017	ALS Chemex laboratory in Timmins Ontario	Sample Preparation	ISO registered	Yes
2016–2017	ALS Chemex laboratory in Vancouver, BC	Analysis	ISO registered	Yes
2017–2018	ALS Chemex laboratory in Sudbury, Ontario	Sample preparation	ISO registered	Yes
2017–2018	ALS Chemex laboratory in Vancouver, BC	Analysis	ISO registered	Yes

Table 11-8: Laboratories Used, Cochrane Hill

Year	Laboratory	Purpose	Accreditation	Independent
1974–2009	Various, including Bondar Clegg (Ottawa, Ont.); Chemlab (St John, N.B.); Atlantic Analytical (Debert, N.S. and St. John, N.B.); Lakefield Research; the Canadian Nickel Laboratory; Copper Cliff Ontario; Caledonia Assay Laboratory; and ALS (in both Timmins, Ont. and Val d'Or, Quebec	Sample preparation and analysis	Unknown	Yes
2007–2009	ALS Timmins, Ontario	Sample preparation	ISO registered	Yes
2007–2009	ALS Val d'Or, Quebec	Analysis	ISO registered	Yes
2016–2017	ALS Chemex laboratory in Timmins Ontario	Sample preparation	ISO registered	Yes
2016–2017	ALS Chemex laboratory in Vancouver, BC	Analysis	ISO registered	Yes
2017–2018	ALS Chemex laboratory in Sudbury, Ontario	Sample preparation	ISO registered	Yes
2017–2018	ALS Chemex laboratory in Vancouver, BC	Analysis	ISO registered	Yes

Table 11-9: Sample Preparation and Analytical Methods, Touquoy

Year	Company	Methodology	Comment
1986–1987	Seabright	Combination of conventional fire assays (FA30) and -80 mesh screened metallics assays. Sample was pulverized to about 80 mesh, then screened to a +80 mesh fraction. Two standard 30 g fire assays were taken of the -80 mesh fraction. If the reproducibility of the two -80 mesh fraction assays was unacceptable, then a third assay of the -80 mesh fraction was taken. The head grade of the sample was then calculated using the weighted average grade of the -80 mesh fraction and the +80 mesh fraction.	Prior to the involvement of Atlantic Gold 70% of the assayed composites from within the mineralized zones had been prepared and analysed by KMS-15, 19% by fire assay and 11% by screened metallics (and 12% by more than one method). At completion of Atlantic Gold's drilling 51% of assayed composites from within the mineralized zones had been prepared and analysed by KMS-15, 19% by fire assay and 30% by screened metallic.
1988	Seabright/Westminer	KMS-15 sample preparation and analysis method on the core involves a Kuryluk Mineral Separator to extract the coarse gold from the sample. Method was developed to obtain analyses from typical Meguma vein type mineralization with a high coarse gold content. Sample is crushed to 100% passing 10 mesh or 1.7 mm; screened to obtain -10 to +20 mesh, -20 to +60 mesh, -60 to +100 mesh and -100 mesh fractions. Gravity concentrate is produced for the +100 mesh material by processing the three coarser fractions through the KMS-15 elutriation column and combining the concentrates from each size fraction. Resulting concentrate is fire assayed with an atomic absorption (AA) finish. -100 mesh fraction is fire assayed with an AA finish. Analytical grade reported as the weighted average of the assays from the different size fractions.	
1996–1997	MRRI	Combination of fire assays (FA30) and -200 mesh screened metallics assays. Due to budget limitations, numerous anomalous argillite samples with initial grades >0.5 g/t Au were only fire assayed using FA30 and not analysed using screen metallics.	
1996–1997	MRRI	Several split samples from two drill holes, MR-96-002 and MR-97-026 (East Zone) were sent to TUNS for comparison using 100 g and 1 kg bottle roll cyanidation tests.	Results compared well with the original assays.
2002	Aurogin	At Daltech (TUNS), samples were jaw crushed, pulverised by rod milling and screened to 30 mesh, followed by cyanide bottle roll digestion and gold determined by atomic absorption spectroscopy (AAS). The coarse screened fraction of the rod milled product was stored in vials and sent to Chemex. The fraction was reweighed and the entire fraction was fire assayed with gold determination using a gravimetric finish. Head assays were calculated for each of the samples using a weighted average of Daltech's assay on the fine portion and Chemex's assay on the coarse fraction.	
2003	Atlantic Gold	For orientation purposes, whole samples taken from Aurogin's percussion drill chips were pulverized at SGS Perth to a nominal 90% passing 75 µm in an LM5 ring mill. Three 50 g subsamples were taken for fire assay from each LM5 product or residue. A fourth 50 g fire assay was provided for 38 of the 55 samples. A 1 kg subsample was scooped from each of the LM5 residues and used for a 75 µm screen fire assay with the -75 µm fraction assayed in duplicate	

Year	Company	Methodology	Comment
		and the +75 µm fraction assayed in its entirety. A second 100 g subsample was scooped from 10 percussion drill hole residues, and these subsamples were also analysed by 75 µm screen fire assay. A 1 kg subsample was scooped from the remainder of the LM5 residues and used for accelerated cyanide digest (LeachWell) analyses.	
2003–2008	Atlantic Gold	Where fire assaying (FA30) was used, it has generally been incorporated as a first pass approach. Screen fire assaying (SFA) has commonly been used for the higher-grade samples, as a first pass where visible gold was identified, or high grades suspected, or as a second pass following recognition of higher grades, usually > 1 g/t Au, via first pass fire assay. At SGS, samples were crushed, then pulverized to a nominal 75% passing 106 µm. If several loads of the pulveriser were required, then the sample was recombined and roll-mixed in a designated container which was cleaned with pressurized air between samples. A 30 g sample of the pulp was fire assayed with an AAS finish. Where assays were >0.5 g/t over potentially mineable widths, SFAs were requested. The residue was riffle split to produce a subsample of approximately 100 g, and screened to 106 µm. The +106 µm fraction was fire assayed in its entirety with an AAS finish. Two 30 g subsamples of the -106 µm fraction were fire assayed with an AAS finish. The head grade of each sample was calculated as the weighted average of the grades of the coarse and fine fractions. At ALS, samples were oven dried, jaw crushed and pulverised to 85% passing 75 µm or better. 30 g samples were taken from the master split and fire assayed with an AAS finish. Samples returning >10 g/t Au were re-assayed with another 30 g sample taken from the master split and fire assayed using a gravimetric finish, rather than AAS.	
2006–2008	Atlantic Gold	Drill core grade control samples were oven dried, jaw crushed and then pulverised to 85% passing 75 µm or better in an LM5 ringmill. A 30 g subsample was fire assayed and Au concentration determined by AAS. Assays >10 ppm Au were reassayed using a new 30 g subsample from the master split and the Au concentration determined via a gravimetric finish. RC sample preparation and analysis were similar to the core program, except a jaw crushing stage was not required and samples were transferred directly from drying ovens to the ring mill.	
2018	Atlantic Gold	RC drill cuttings were collected at the rig from a Metzke oscillating cyclone mounted splitter which was adjusted to deliver 10% of the total sample mass (about 8.5kg for 2m of 140mm diameter drilling) to each of the three sampling chutes. Samples were collected from two of the three chutes, located on opposite sides of the splitter, designated chute A and chute B. Samples from both ports were collected, however only one split from each sample interval was sent for gold content determination (except in the case of duplicates). The split selected for analysis was determined by a random number generator. Once delivered to the lab, RC cuttings samples were received and dried in bags, until the moisture content was low enough for the samples to be riffle split. Each sample was riffle split to	

Year	Company	Methodology	Comment
		produce a 500g +/- 100g subsample for analysis. Gold content determined was done by PAL (Pulverize and Leach) with AAS finish.	
2018	Atlantic Gold	Sawn half-core samples were submitted to ALS Chemex facility in Sudbury, Ontario where each sample was dried, finely crushed to better than 70% passing a 2 mm screen. A split up to 1,000 g was taken using a Boyd rotary splitter and pulverized to better than 85% passing a 75 µm screen. A subsample was taken for 50 g charge fire assay with AAS finish (ALS method Au-AA26). A 1:10 duplicate sample was also performed (Au-AA26D).	

Table 11-10: Sample Preparation and Analytical Methods, Beaver Dam

Year	Company	Methodology
2005–2007	Acadian	Whole half-core samples were crushed, pulverized and sieved through a 150 mesh (105 µm) Tyler screen. The +105 µm fraction was analyzed in its entirety by fire assay with gravimetric finish (Au-GRA21) and reported as the Au (+) fraction result. The -105 µm fraction was homogenized and two sub-samples were analyzed by fire assay with AAS finish (Au-AA25 and Au-AA25D). The average of the two AAS results, reported as the Au (-) fraction, is weight averaged with the +105 µm assay to yield the head grade of the sample.
2009	Acadian	Whole half-core samples were crushed, pulverized and sieved through a 150 mesh (105 µm) Tyler screen. The +105 µm fraction was analyzed in its entirety by fire assay with gravimetric finish (Au-GRA21) and reported as the Au (+) fraction result. The -105 µm fraction was homogenized and two sub-samples were analyzed by fire assay with AAS finish (Au-AA25 and Au-AA25D). The average of the two AAS results, reported as the Au (-) fraction, is weight averaged with the +105 µm assay to yield the head grade of the sample.
2014–2015	Atlantic Gold	Holes were sampled top to bottom. The mineralised zones, where expected, were screen fire assayed and the non-mineralised zones, where expected, were fire assayed. Each sample was dried then weighed, with samples generally weighing of the order of 2.4 kg, before jaw crushing (ALS method CRU-21) the half core samples such that ≥70% passed 6 mm. The Atlantic Gold sampling and assaying protocol requires that the entire sample is pulverised to a nominal 85% passing 75 µm (ALS method PUL-21). This was initially achieved using a Labtechnics LM5 ringmill but during the course of the program, smaller capacity (1 kg bowls) were also used and the pulverised material recombined into a single sample before screen fire assaying. Screen fire assays (screened metallics) – ALS Method Au-SCR24: The entire pulverised sample was screened using a 106 µm screen. All of the material that was retained on the screen (the Au (+) fraction) was fire assayed in its entirety and the gold content determined gravimetrically. Two subsamples were taken from the fines (the Au (-) fraction) and a 50 g charge of each was fire assayed with an AAS finish. The average of the two AAS results was reported as the Au (-) fraction result. The gold grade of the entire sample was then determined as the weight average of the Au (+) and Au (-) fraction gold concentrations. Minus fraction subsamples were fired together while the plus fraction samples were assayed separately. Sample preparation at the ALS Sudbury facility included the screening of samples to produce the Au (+) and Au (-) fractions and weighing of those fractions. Paper packets containing the Au (+) fraction and an approximately 150 g split from the Au (-) fraction were then sent to an ALS assaying facility in either Val d'Or, Quebec or Vancouver, BC. 50 g fire assays – ALS Method Au-AA26: An approximately 150 g split was scooped from the pulverised material for each sample and placed in a paper packet labelled with the appropriate sample number. These 'assay splits' were then sent to an ALS assaying facility in either Val d'Or or Vancouver. The remainder of the pulverized product (the 'bulk pulp') was placed in a plastic bag which in turn was placed inside the original calico bag. The bulk pulps were stored for 90 days at the ALS Chemex facility before being discarded. At the ALS assay facility, a 50 g subsample was scooped from each of the paper packets and weighed into fire assay crucibles, still in sample number sequence. Approximately 200 g of flux was added to each crucible and thoroughly mixed with the sample and the crucibles then placed on racks together with standards and blanks introduced by ALS Chemex, in a recorded sequence. The crucibles were placed in a furnace for one hour after which, with fusion complete, the crucibles were removed, slag poured off and the lead button transferred to cupels in the same rack sequence as the crucibles.

Table 11-11:Sample Preparation and Analytical Methods, Fifteen Mile Stream

Year	Company	Methodology
1985	Acadian	Bondar Clegg assayed using a one assay ton split (29.17 g/t Au) of the pulverized sample by conventional fire assay and atomic absorption method. Of 577 samples submitted, 22 samples containing visible gold were assayed by screen fire assay based on a weighted average of the fire assay for a one assay ton split of the -150 mesh fraction with the fire assay for the entire +150 mesh fraction.
1986–1988	Acadian	Chemlab samples were assayed by conventional fire assay and atomic absorption on a 30 g sample. For all samples assaying over 1 g/t Au (this limit was subsequently reduced to 0.5 g/t Au), the reject material was re-assayed by the screen fire assay method. Bondar Clegg samples used a similar method. The screen size used was 80 mesh and two 30 g samples of the fine fraction were assayed and weight-averaged with assays for the entire +80 mesh fraction.
2010	Acadian	Samples selected for resampling were assayed at ALS using the “Screen Metallics Gold, Double Minus” procedure which is designed for samples which contain coarse gold. The sample is dried, crushed, pulverised in a ring mill and the entire sample sieved through a 100 µm screen. The coarse fraction was completely digested in a classic fire assay with gravimetric finish. The fine fraction was homogenized and two 30 g samples (Au-AA25 and Au-AA25D) split from this fraction and assayed by fire assay with AAS finish. The weighted assay value of the entire sample was then calculated from the three analyses.
2011	Acadian	Similar methodologies as used for the 2010 resampling program.
2016–2017	Atlantic Gold	Sawn half-core samples were submitted to ALS Chemex facility in Sudbury, Ontario where each sample was dried, coarse crushed and pulverized in a ring mill to 85% passing 75 µm or better. A subsample was taken for 50 g charge fire assay with AAS finish (ALS method Au-AA26).
September 2017 to February 2018	Atlantic Gold	Sawn half-core (97%) or whole core (3%) samples were submitted to ALS Chemex facility in Sudbury, Ontario where each sample was dried, finely crushed to better than 70% passing a 2 mm screen. A split up to 1,000 g was taken using a Boyd rotary splitter and pulverized to better than 85% passing a 75 µm screen. A subsample was taken for 50 g charge fire assay with AAS finish (ALS method Au-AA26).
February 2018 to December 2018	Atlantic Gold	Sawn half-core samples were submitted to ALS Chemex facility in Sudbury, Ontario where each sample was dried, finely crushed to better than 70% passing a 2 mm screen. A split up to 1,000 g was taken using a Boyd rotary splitter and pulverized to better than 85% passing a 75 µm screen. A subsample was taken for 50 g charge fire assay with AAS finish (ALS method Au-AA26). A 1:10 duplicate sample was also performed (Au-AA26D).

Table 11-12: Sample Preparation and Analytical Methods, Cochrane Hill

Year	Company	Methodology
1974	Massval Mines Ltd.	Fire assay
1979, 1981	Northumberland	Fire assay/screen fire assay on samples with visible gold
2007–2009	Atlantic Gold	Sawn half-core samples were submitted to an ALS Chemex facility in Timmins, Ontario where each of the samples was oven dried, jaw crushed then transferred to a Labtechnics LM5 ring mill and the entire sample pulverised to 85% passing 75 µm or better. An approximately 150 g split was then retrieved directly from the ring mill and transported to an ALS Chemex facility in Val d'Or, Quebec where a 30 g sample was taken from the analytical split and fire assayed with an AAS finish (ALS Chemex method Au-AA25).
2016–2017	Atlantic Gold	Sawn half-core samples were submitted to ALS Chemex facility in Sudbury, Ontario where each entire sample was dried, coarse crushed and pulverized in a ring mill to 85% passing 75 µm or better. Samples from the mineralized zone, where expected, were dry screened with stainless steel screen to 100–106 µm (150 mesh) to produce plus and minus fractions for screen fire assay. The entire coarse sample was fused and analyzed with gravimetric finish (ALS method Au-SCR24) and two fines subsamples were fire assayed with 50 g charge (ALS method Au-AA26) and results averaged. Head assay was obtained as a weighted average of the plus and minus fraction assays. Samples from the suspected barren hanging wall and footwall to the mineralized zone were whole-sample pulverized with a 50 g charge fire assayed with AAS finish (ALS method Au-AA26). Any such samples generally assaying ≥0.5 g/t Au were returned for screen fire assay.
September 2017 to February 2018	Atlantic Gold	Sawn half-core (97%) or whole core (3%) samples were submitted to ALS Chemex facility in Sudbury, Ontario where each was dried, finely crushed to better than 70% passing a 2 mm screen. A split up to 1,000 g was taken using a Boyd rotary splitter and pulverized to better than 85% passing a 75 µm screen. A subsample was taken for 50 g charge fire assay with AAS finish (ALS method Au-AA26).
February 2018 to December 2018	Atlantic Gold	Sawn half-core samples were submitted to ALS Chemex facility in Sudbury, Ontario where each sample was dried, finely crushed to better than 70% passing a 2 mm screen. A split up to 1,000 g was taken using a Boyd rotary splitter and pulverized to better than 85% passing a 75 µm screen. A subsample was taken for 50 g charge fire assay with AAS finish (ALS method Au-AA26). A 1:10 duplicate sample was also performed (Au-AA26D).

11.6.2 Beaver Dam

Overall, the sampling QA/QC results presented indicate a high level of sample and assay quality appropriate for use in a Mineral Resource estimate.

2005–2007 Program

The 2005–2007 Acadian programs included coarse blank material. Field duplicates and certified reference materials (CRMs) or standard reference materials (SRMs) were not introduced. The QA/QC programs primarily relied on the analytical laboratory's internal QA/QC measures.

Acadian inserted blank samples at a 1:20 frequency; the source of the blank material is unknown. Review of the analytical results indicated that the majority (89%) were below the gold detection limit. Blanks with anomalous gold values could be indicative of sample contamination or background levels in the blank material. No impact on the Mineral Resource estimate was expected.

ALS QA/QC is based on the sample batch size; with a typical scenario having blanks inserted at the start, SRMs randomly inserted, and duplicate samples at the end of each batch. Blank material consisted of a flux. SRMs were sourced from independent third-party SRM sources, Gannet Holdings and Rocklabs. Duplicate samples consisted of the minus fraction material and a laboratory duplicate. Review of the results indicated:

- Analytical blanks returned results within expected parameters of 0.01–0.02 g/t Au;
- SRM results do not indicate any temporal or systematic accuracy issues;
- Grades of the minus fraction duplicate pulps above 0.1 g/t Au are highly correlated and readily reproducible with a precision of around ±7%; gold grades in the minus fraction pulps range from 0–100 g/t Au, suggesting that relatively coarse gold remains in the fine fraction.

2009 Program

Acadian inserted coarse blank material (massive anhydrite drill core) at a 1:50 rate, and inserted SRMs, sourced from Rocklabs and WCM Minerals, at a similar 1:50 insertion rate. All blank samples returned values below detection level (<0.05 g/t Au) indicating no obvious cross contamination. Results from the SRMs were considered to be acceptable.

Reliance was also placed on ALS internal control procedures, which used a similar insertion protocol as described for the 2005–2007 program. Blanks were found to be within acceptable limits, with assays at or below gold detection limits; SRM results indicated no significant issues; duplicate sample correlation and precision were very similar and indicated a consistent and high quality was maintained in the sample processing and assaying.

2014–2015 Program

Atlantic Gold inserted coarse blank material (half-sections of barren Touquoy core) and SRM material at a 1:14 rate. Review of the blank results against blank values from ALS suggested that a small proportion of the core used was not completely non-mineralized. Results from the SRMs were considered to be acceptable.

Reliance was also placed on ALS internal control procedures, which used a similar insertion protocol as described for the 2005–2007 program. Blanks were found to be within acceptable limits, with assays at or below gold detection limits. SRM results were considered acceptable. There was no indication of global bias in the duplicate data that would suggest serious problems in the sampling and splitting process.

11.6.3 Fifteen Mile Stream

1985–1988 Program

There is no documentation of standards, blanks or field duplicates being inserted into the sample stream for any of the 1985–1988 drill core sampling. Evaluation in 2008 of available pulp duplicate assays indicated poor precision in the dataset which is commonly a problem in coarse gold environments. Duplicate assays for -80 mesh fractions analysed after 1986 were reviewed and appear to show much better linear correlation due to the removal of coarse gold prior to analysis and do not indicate laboratory precision issues from any of the laboratory facilities.

2011 Program

The 2011 Acadian program included submission of blanks (85 total), SRMs (1:20 insertion rate) and field half-core duplicate samples (1:20 rate). Evaluation of the results indicated:

- In general, blank samples returned gold values below the analytical detection limit. For all but two of the blanks with values above detection, the preceding sample returned a high gold value suggesting that the elevated value of gold for these samples reflects carry-over resulting from contamination. Although it would be preferable to see no evidence of contamination and carryover between samples the percentage of carryover is not significant and is considered acceptable;
- The standard reference material results are considered to be appropriate to support a Mineral Resource estimate;

- The half-core duplicate data show an expected high level of variation in keeping with the high coefficient of variation.

Reliance was also placed on ALS internal control procedures, which used a similar insertion protocol as described for the 2005–2007 Beaver Dam program. Results included:

- Blank samples indicated a degree of contamination; however, not all blank samples that were preceded by a core sample returning a high gold grade had elevated gold grades, indicating that contamination and carryover between samples is not a persistent issue;
- The assay results for ALS internal standards indicate a high degree of accuracy;
- The statistics of screened pulp duplicates show high correlation and very similar histograms both of which are consistent with good sampling and assaying procedures.

2016–2017 Program

For Atlantic Gold's program, blind blanks, each comprising about 1 m of nil-grade sawn half-core from previously assayed drill holes, were routinely inserted at every 28th sample, and as well, directly after most samples observed to contain visible gold. A standard was also routinely inserted at every 28th sample. Every tenth sample pulp was duplicate fire assayed.

A total of 951 blanks, 722 standards, and 2,017 duplicates were assayed, against a total of 21,617 primary samples assayed.

Of the 951 blanks, there were 18 outliers (>0.1g/t, max 1.1g/t), twelve of which followed samples with high assays or containing visible gold. Blank performance is considered acceptable.

Of the 722 standards, there were 28 outliers (>3x standard deviation). In most cases the outlier samples were underestimating grade on average by 9.9%. Two outliers overestimated grade on average by 9.5%. There are very few outliers for standards with lower expected values. Most of the outliers are for standards with expected values in the range of 3.5 g/t Au to 14.2 g/t Au. Overall the standard assays have performed well.

A total of 2,017 pulp duplicates out of the 21,617 fire assays were assayed. There are 437 outliers (22%) of which 46 failed (≥ 100% difference) (11% of the outliers) duplicates. Overall, however, the pulverized duplicates are performing well for a coarse gold deposit. There is a very strong positive correlation (0.94) between the original and duplicate samples.

September 2017 to February 2019 Program

Atlantic Gold has continued to follow strict QA/QC protocols of inserting prepared standards, blanks and duplicate analyses. With the exception of blanks, from autumn 2018 onwards the 1 m nil-grade sawn half-core samples were replaced by river rocks purchased from a hardware store.

A total of 951 blanks, 792 standards, and 2,262 duplicates were assayed, against a total of 22,770 primary samples assayed.

Of the 951 blanks, there were 12 outliers (>0.1g/t, max 6.97g/t), three of which followed samples with high assays or containing visible gold. Blanks performed well.

Of the 792 standards, there were 31 outliers (>3x standard deviation). In most cases the outlier samples were underestimating the grade on average by 10.8%. Two outliers overestimated grade on average by 19%. There are very few outliers for standards with lower expected values. Most of the outliers are for standards with expected values in the range of 7.7 g/t Au to 14.2 g/t Au. Overall the standard assays have performed well.

A total of 2,262 pulp duplicates out of the 22,770 original samples were assayed. There are 241 outliers (10%) of which 29 failed (≥ 100% difference) (12% of the outliers). Overall the pulverized duplicates are performing well for a coarse gold deposit. There is a strong positive correlation (0.84) between the original and duplicate samples.

11.6.4 Cochrane Hill

1974–1987 Drill Programs

Limited information is available on any QA/QC programs that may have been conducted:

- Check assays were performed on the Massval sampling, whereby pulp samples from mineralised zones were composited, re-assayed, and the composite assays compared with the averaged original assays on a hole by hole basis;
- A number of Northumberland samples that returned high fire assay grades were apparently resubmitted for screen fire assay; however, none of this check assay data has been found;
- Scominex sent samples from the mineralized zones for re-analysis, and samples from the primary and secondary laboratories, which gave values >800 g/t gold, were re-analyzed using a screened method. No original check assay data, including comparable sets of fire assay and screen fire assay data are available.

1988–1989 Program

A reanalysis program was conducted for Acadia, consisting of fire assaying of selected samples, and included one screen fire assay at 80 mesh, and some duplicate fire assays run by the laboratory. No other QC or check assaying procedures are known.

2007–2009 and 2016–2017 Programs

For Atlantic Gold's programs, blind blanks, each comprising about 1 m of nil-grade sawn half-core from previously assayed drill holes, were routinely inserted at every 28th sample, and as well, directly after most samples observed to contain visible gold. A standard was also routinely inserted at every 28th sample. For those holes fire assayed throughout (instead of screen fire assayed across the mineralized zone - that is, the 21 holes of the 2007–2009 program and the last 42 holes of the 2016–2017 program), every 10th sample pulp was duplicate fire assayed.

A total of 1,162 blanks, 1,018 standards and 9,352 duplicates (mostly fine-fraction duplicates for screen fire assayed samples) were assayed, against a total of 28,741 primary samples assayed.

Of the 1,162 blanks, there were 11 outliers (>0.1 g/t Au, max 4.43 g/t Au), three of which followed samples with high assays or containing visible gold. Blank performance is considered acceptable.

Of the 1,018 standards, there were 49 outliers (>3x standard deviation). In most cases the outlier samples were underestimating grade on average by 9.8%. Five outliers overestimated grade on average by 7.4%. There are very few outliers for standards with lower expected values. Most of the outliers are for standards with expected values in the range of 2.77 g/t to 14.9 g/t Au. The worst performing standard (QC_AGC_7Pb) was one of those used in 2008 and 2009.

A total of 926 pulp duplicates out of the 6,818 fire assayed whole-samples from the 21 holes of the 2007–2009 program and the last 42 holes of the 2016–2017 program, were assayed. There are 122 outliers (13%) of which 11 failed (≥ 100% difference) (9%) duplicates. Overall, however, the pulverized duplicates are performing well for a coarse gold deposit. There is a strong positive correlation (0.84) between the original and duplicate samples.

September 2017 to February 2019 Program

Atlantic Gold has continued to follow strict QA/QC protocols of inserting prepared standards, blanks and duplicate analyses. With the exception of blanks, from autumn 2018 onwards the 1 m nil-grade sawn half-core samples were replaced by river rocks purchased from a hardware store.

A total of 581 blanks, 442 standards, and 1,334 duplicates were assayed, against a total of 13,154 primary samples assayed.

Of the 581 blanks, there were three outliers (>0.1g/t, max 1.76/t), two of which followed samples with high assays or containing visible gold. Blanks performed well.

Of the 442 standards, there were 27 outliers (>3x standard deviation). In most cases the outlier samples were underestimating the grade on average by 10.1%. One outlier overestimated grade by 21%. There are very few outliers for standards with lower expected values. Most of the outliers are for standards with expected values in the range of 3 g/t Au to 14.2 g/t Au. Overall the standard assays have performed well.

A total of 1,334 pulp duplicates out of the 13,154 original samples were assayed. There are 142 outliers (11%) of which 15 failed (≥ 100% difference) (11% of the outliers). Overall the pulverized duplicates are performing well for a coarse gold deposit. There is a very strong positive correlation (0.99) between the original and duplicate samples.

11.7 Resampling Programs

A number of review and resampling programs have been conducted.

11.7.1 Assay Methodology Selection Review, Touquoy

Atlantic Gold re-sampled a suite of large rock chip samples remaining from three of Aurogin's percussion drill holes in 2003, with the intent of determining the most appropriate sampling and assaying methods for the Touquoy mineralization. Results of the SGS Perth re-assay program indicated:

- Most of the gold is in the coarse fraction of the screened sample (+75 µm);
- The screened fire assays appear higher in average grade that the others but the LeachWell assays tended to be higher in the higher-grade samples.

It was concluded that 30 g fire assays were not a good predictor of grades, since the grades appeared significantly lower on average and the different assays of the same higher-grade samples appeared were variable. It was noted that better assaying precision could be achieved with the routine use of screen fire assays, but at significantly higher cost or possibly with LeachWell assaying of large aliquots of 500–1,000 g, although the LeachWell technique is relatively unused in Canada.

11.7.2 Touquoy KMS-15 Assay Review

The analyses resulting from the use of the Kuryluk Mineral Separator were reviewed against analytical results using other methodologies, with the following results:

- FA30 assays of the same sample material performed around the same time as the KMS-15 assays reported considerably lower average gold grades than the KMS-15 assays. Seabright's FA30 assays may marginally understate gold grades; however, this did not explain the difference between Seabright FA30 and KMS-15 analytical results;

- Repeat screen metallic assays from the 1988 Seabright program showed generally higher gold grades than the KMS-15 assays. FA30 assays of the same sample intervals showed generally lower gold grades than both the KMS-15 and screen metallic assays;
- In 1989, Watts, Griffis and McOuat Limited (WGM) collected 50 composite samples from MR-188-188 and MR-88-202 to provide samples for comparative assaying as a check of Seabright's KMS-15 results. WGM's composite samples were initially assayed by Chemex using the metallic screen method and a subset of 26 were again assayed by both Chemex and Intertek. Screen metallic assays of composited core from the WGM resampling program showed considerably lower gold grades than the KMS-15 assays;
- Screen fire assays of remaining half core were undertaken by Atlantic Gold in 2005 and 2006; the intervals had previously been analysed by KMS-15 methods. In addition to the KMS-15 assays Seabright 30FA results were available for 86 of these intervals. For grades below 1.0 g/t Au, which represent the 86% of the fire assay subset, the screen fire assay and fire assay results showed comparable values. For higher-grade samples, the screen fire assays show generally higher results. The fire assays generally showed considerably lower average gold grades than the KMS-15 assays;
- Comparison of FA30 and screen fire assays generated for Atlantic Gold with the KMS-15 values from spatially-adjacent composites indicated lower average grades in the Atlantic Gold results than reported by KMS-15 analyses;
- Comparison of results from the trial grade control program indicated a reasonable probability that the KMS-15 data are biased high on average.

It was decided by Westminer to conduct a bulk sampling program to provide definitive information on grades, and to provide a reference should any bias adjustments be required.

11.7.3 Bulk Sampling Reconciliation, Touquoy

In 1989, a bulk sample was taken from the upper edge of the Touquoy Zone. A total of 56,878 t of material was mined from the 18 m deep Mini-Pit. The material was mined in twelve separate blocks and trucked to the Gays River Mill for processing. Gold recovery was by means of both gravity concentration and sulphide flotation to produce gravity recovered gold and a sulphide flotation concentrate which was shipped to Noranda at Gaspe for smelting.

An important objective of the bulk sampling was to verify the grade of the deposit in the Mini-Pit area to provide confidence in the overall grade estimate for the deposit. A preliminary reconciled grade of 1.56 g/t Au was calculated based on the amount of gold actually recovered.

This was compared to grade calculated from blast holes, a block model of the deposit, a detailed polygonal resource estimate of the Mini-Pit area and the rod mill discharge assays. All methods used to estimate the grade returned a lower value than the actual grade as calculated by the amount of gold recovered. The blast-hole method was noted to be subject to an arbitrary estimate of dilution while the block method and polygonal method was considered to be affected by geological interpretation and the resulting estimation methods. As such, these methods were not considered to provide a direct assessment of the reliability of the assays used to estimate the resource. The rod mill discharge assays were interpreted to provide an accurate assessment of the grade of the mined material, subject only to sampling and analytical error. As such, they were considered to provide a good check of the reliability of the analytical method used.

Rod mill discharge samples were collected by an automatic sampler at regular intervals and subjected to standard FA30 with an AAS finish. The fact that the rod mill discharge assays consistently under-estimated the grade of the mined material by 18% indicated that standard FA30 would underestimate the grade of the deposit. This agrees with the data derived from the comparison of fire assays and screened metallic.

Nevertheless, it is Atlantic Gold's view that reliable reconciliation between the grade of this bulk sample and that of the associated exploration drilling is impossible for a number of reasons, including reliance on blast hole sampling for grade control, indeterminate mining dilution, deficiencies of polygonal resource estimation in this type of coarse gold mineralization, nature of rod mill discharge sampling, and gold-in-circuit contamination from other sources.

11.7.4 Resampling Program, Cochrane Hill

The NSDNR allowed resampling of selected drill core from earlier exploration efforts. Data suggest that the selection of half cores in past sampling has been strongly biased toward high-grade half cores. Examining each of the data sources separately, the only source which does not appear to be affected by this bias is the Inco surface data set (Scominex) which showed no significant difference between the means of each half core assays. The Northumberland data were most severely affected.

11.8 Databases

Prior to December 2016 data capture was done by hand. The hard copy was then transferred to Excel spreadsheets and from there to Access databases. The data in these Access databases were then validated and transferred to a SQL server database by using DataShed software from Maxwell GeoServices. Since December 2016, data capture has been done using either LogChief or Excel spreadsheets. With LogChief, the data are temporarily stored in the logging computers local SQL server database and from there the data is synchronized to the main SQL server database. With Excel spreadsheets and with the assay CSV-files received from the laboratory, the importing to the main SQL server database is done with import layouts within DataShed.

A full backup of the main SQL server database is performed daily at 12 am, PDT and backups are stored offsite in Vancouver, BC.

11.9 Sample Security

Security procedures prior to Atlantic Gold's involvement in the Project are not known although check sampling and re-examination of core from a large number of drill holes has not shown any sign of sample tampering.

During Atlantic Gold programs, core was typically kept in a secure and locked area with limited access. Samples are typically placed in plastic bags, then into plastic pails with one-use, self-sealing security lids. Samples are typically conveyed from the Project site to the laboratory using commercial transport firms.

Chain-of-custody procedures consist of filling out sample submittal forms that are sent to the laboratory with sample shipments to make certain that all samples are received by the laboratory.

11.10 Comments on Section 11

The QPs are of the opinion that the quality of the gold analytical data collected by Atlantic Gold are sufficiently reliable (also see discussion in Section 12) to support Mineral Resource and Mineral Reserve estimation at Touquoy and Beaver Dam, and Mineral Resource estimates at Cochrane Hill and Fifteen Mile Stream. Sample preparation, analysis, and security procedures undertaken by Atlantic Gold are generally performed in accordance with exploration best practices and industry standards.

The exploration of the four deposits has occurred in a number of drilling campaigns undertaken by different exploration companies, mainly since the 1980s. One consequence of this is that a number of different sampling and assaying methods have been used to handle the drill hole samples and QC procedures have not remained consistently in place. At Beaver Dam, Cochrane Hill and Fifteen Mile Stream any such perceived shortcomings have been effectively eliminated by re-drilling these deposits within the last 12, 10, and two years respectively with application of currently-prevailing QA/QC protocols adopted.

In the case of the Touquoy deposit, some 40% of the sample gold grades have been generated by the unconventional processing and assaying method called KMS-15 which was introduced by Westminer. For the purposes of the Mineral Resource estimate in Section 14, any resource panels predominantly informed by KMS-15 data were downgraded from Measured to Indicated categories.

12.0 DATA VERIFICATION

12.1 Introduction

Information from previous technical reports has been used as a basis for the descriptions in this section (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015; Staples et al., 2017; and Staples et al., 2018).

12.2 Internal Data Verification

12.2.1 Current Data Verification

Internal data verification programs have included review of QA/QC data, re-sampling and sample reanalysis programs, and database verification for issues such as overlapping sample intervals, duplicate sample numbers, or lack of information for certain intervals.

Validation checks are performed on data used to support estimation, and comprise checks on surveys, collar co-ordinates, lithology data, and assay data.

Where errors are noted, Atlantic Gold staff typically address the problem prior to the database being used for estimation purposes.

12.2.2 Touquoy

Data verification used the standard procedures outlined in Section 12.2.1. In addition, a mini grade control drilling program has been undertaken, providing support grade determinations sourced from core drilling

12.2.3 Beaver Dam

Data verification used the standard procedures outlined in Section 12.2.1.

12.2.4 Fifteen Mile Stream

Verification of drill-hole locations by Acadian included re-establishing the local grid. The grid coordinates provided in the database were used to check drill hole collar locations of several drill casings located on the property. All of the located drill holes were within ±1 m of the documented coordinates, validating the collar database. A close-spaced topographic survey was carried out on a 25 x 25m grid over the Egerton–MacLean and Hudson Zones and the data used to create a topographic surface. Where necessary, drill hole collar elevations were adjusted to conform to this surface.

Acadian undertook verification of the historical assay data provided in the Hudgtec database. This was done by manually checking the assay data in the database against

1980s vintage assay certificates which are available in published assessment reports from the NSDNR library. Whenever a disagreement was noted, the database was corrected to reflect the certificate. In total, approximately 75% of all historic assays were checked

Acadian captured lithologic data from the 1980s drill logs available in assessment files from the NSDNR library. This was done by manually typing data from paper and digital pdf drill logs into excel spreadsheets. The spreadsheets were then imported into GEMS software, incorporated into the existing database, and subject to data verification using software routines. Any errors encountered during this procedure were cross checked against the original drilling records (where available) and corrected.

Data from Acadian's 2011 drill program was input into the GEMS database using Gemcom GEMS Logger software, and subject to data verification using software routines. After completion, logs were uploaded and incorporated into the GEMS database. Assay data pertaining to the 2011 program was imported directly from laboratory certificates to avoid data-entry errors.

12.2.5 Cochrane Hill

Data verification used the standard procedures outlined in Section 12.2.1.

12.3 External Data Verification

12.3.1 Touquoy

A review of the Touquoy database was conducted in 2007 by Hellman and Schofield. This included:

- Comparing database assay values to values shown in the source laboratory files;
- Comparing selected database entries of historical assay values from previous explorers to hard copy sample intervals and laboratory assay sheets provided by Atlantic;
- Checking of sampling intervals, sample numbers and gold grades in 22 of the 165 pre-Atlantic Gold drill holes;
- Comparing all assay grades from the drill holes containing eight of the 14 highest-grade samples to original sampling sheets;
- Comparing anomalously short intervals (0.01 m to <0.1 m) and anomalously long intervals (3 m to 12.5 m) with sampling records;
- In total, 22% of the historic records were completely or partially checked with errors noted and corrected in 1.1% of entries; an error rate of one in 91. For the sampling

done by Atlantic Gold, a total of 9,153 entries representing around 77% of the assaying were checked and 25 missing values were noted and corrected.

In March 2019, the QP made a short tour of the Touquoy pit to view the geology exposed by the mining and to verify the collars of recent drill holes which included the collars of MR-18-RC001 and MR-18-RC003 near the eastern end of the pit and MR-18-040 and MR-18-039 collars on the northern side of the pit. The tour also allowed a good view of the structural complexity of the geology being exposed in the southern wall of the pit.

During March 2019, the QP undertook a detailed comparison of nearest neighbour resource and grade control sample composites to verify that these methods of sampling the Touquoy mineralization were generating compatible data sets. The analysis confirmed that the data sets were reasonably closely comparable.

12.3.2 Beaver Dam

No external data verification has been performed.

12.3.3 Fifteen Mile Stream

In April 2017, the QP reviewed core from two mineralized intersections of holes FMS-17-013 and FMS-17-059. These sections of both drill holes indicated significant gold mineralization in the assays. Some visible gold was observed in pyrite. On the visit to the project site, the collars of FMS-17-036, PL-16-005 were located and the coordinates were checked with GPS.

12.3.4 Cochrane Hill

In April 2017, the QP reviewed core from two mineralized intersections of holes CH-16-72 and FMS-16-104. These sections of both drill holes indicated significant gold mineralization in the assays. The core exhibited minor visible gold with quartz veining and variable amounts of coarse arsenopyrite. The collars of FMS-17-036, PL-16-005 were located and the coordinates were checked with GPS.

12.3.5 General Checks of Drill Hole Sample Quality

As part of the resource modelling process undertaken in 2018–2019, the QP reviewed the data quality procedures for standards, blanks and duplicates undertaken by Atlantic Gold personnel. The procedures used are considered comprehensive and the results are considered reasonable for the style and grade of gold mineralization encountered in these deposits.

12.4 Comments on Section 12

In the opinion of the QP, sufficient verification checks have been undertaken on the databases to provide confidence that the databases are reasonably error free and may be used to support Mineral Resource estimation.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

Information from previous technical reports has been used as a basis for the descriptions in this section (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015; Staples et al., 2017; and Staples et al., 2018).

13.1 Touquoy

13.1.1 Introduction

Various metallurgical testing has been completed by previous owners of the Touquoy property. This showed that a high proportion of the gold contained in the Touquoy mineralization was coarse grained and recoverable by gravity concentration.

The majority of the testwork used during the Feasibility Study was completed in Sydney, Australia under the direction of Peter Lewis of Peter J. Lewis & Associates Pty. Ltd, acting on behalf of Atlantic Gold. This included gravity concentration, leaching and other testwork at Metcon Laboratories, which was completed in two stages, and thickening testwork by Outokumpu Technology Pty. Ltd. Carbon adsorption and cyanide detoxification testwork was completed at Ammtec Ltd. in Perth, Australia, under the direction of Stuart Smith of Aurifex Pty. Ltd., but in close liaison with Peter Lewis. Semi-autogenous grind (SAG) milling and other comminution testwork was completed by SGS Minerals Services in Lakefield, Ontario, under the direction of Perth-based Orway Mineral Consultants, who acted directly for Atlantic Gold, and also interpreted the results.

13.1.2 Metallurgical Testwork

Table 13-1 summarizes the testing completed at the time the 2015 Feasibility Study was concluded.

13.1.3 Recovery Estimates

The results of the gravity/leach tests on the argillite master composite showed that the percentage of gold recovered by gravity increased as the calculated head grade increased. The leach feed grades all fell within a relatively narrow range and, in turn, the final leach residue grades also fell within a narrow range. Therefore, it was assumed that the residue grade will remain constant regardless of head grade.

Table 13-1: Metallurgical Testwork Summary, Touquoy

Program	Laboratory	Testwork	Comment
Stage 1	Sample selection		Two composites, one greywacke/argillite mix, second argillite.
	Metcon Laboratories	Detailed head assays, including inductively coupled plasma (ICP) scans and whole rock analyses; gravity concentration; kinetic tests; gravity/leach tests under carbon-in-leach (CIL) conditions; leach time series tests; cyanide series tests; size distribution of gravity recoverable gold; determination of Bond rod and ball mill work indices and abrasion indices.	The argillite and greywacke/argillite composites responded in almost identical fashion to conventional gold processing by gravity concentration followed by cyanidation under CIL conditions. Gravity and overall gold recoveries were very high, and the leach residue grades were very low at a coarse grind of P_{80} 150 µm. Cyanide and lime consumptions were low. Both composites contained a significant amount of coarse gold, which will make the inclusion of gravity concentration in any future plant mandatory. The ball mill work indices and abrasion indices for both composites were low; coupled with the coarse grind required, this should result in low grinding costs.
Stage 2	Sample selection		Five variability composites based on argillite-hosted mineralization, one mixed argillite–greywacke composite, and one greywacke composite; one argillite master composite (most testwork completed on this composite); one low-grade composite
	Metcon Laboratories	Gold head assays; gravity/leach testwork, kinetic tests, duplicate tests on argillite variability composites, gravity/leach tests over 20 hours on the argillite composites; gravity/leach tests on the greywacke and mixed greywacke/argillite composites; pulp viscosity tests; oxygen uptake tests, checks on the effect of laboratory gravity concentration on pulp chemistry; heap leaching test on the low-grade argillite composite; gravity/flotation testwork;	The following conditions were selected as the basis for plant design: grind size: 80% passing 150 µm; leach time: 20 hours; initial cyanide concentration: 0.075%
	Ammtec Ltd	Carbon adsorption, cyanide detoxification and pulp viscosity testwork	
	Outokumpu Technology Pty. Ltd	Tailings thickening testwork	
	Golder Associates	Tailings consolidation testwork	
	SGS Mineral Services	Environmental testwork in support reducing arsenic content in tailings water	
	Lightnin Mixers	CIL agitator design testwork	

Program	Laboratory	Testwork	Comment
	Orway Mineral Consultants	SAG mill testwork	The ball mill work indices and the abrasion indices of the mixed greywacke/argillite composites and the argillite composite were in close agreement with those obtained in the Stage 1 testwork

The average residue grade was 0.072 g/t Au for all the tests completed on the argillite master composite under the reduced gravity concentration conditions at a grind size of P80 150 µm and with the design leach time of 20 hours. Consequently, a slightly conservative solids residue grade of 0.075 g/t Au was assumed to apply to all three lithological units. However, to obtain the overall gold recovery, an allowance had to be made for the expected soluble gold losses in CIL tailings. Assuming a loss of 0.010 g/t Au in solution and a CIL tailings pulp density 45% solids w/w, this equated to an additional loss of 0.012 g/t solids and a combined solids and solution residue grade of 0.087 g/t.

Thus, for block modelling purposes and the production schedule, the following formula was derived for calculating gold recoveries:

- % gold recovery = (((h-0.087)/h)*100);

where h = the head grade.

At a head grade of 1.5 g/t Au, this gives a gold recovery of 94.2% and a combined residue grade of 0.10 g/t Au.

Actual Moose River plant recovery data from March 2018 to October, 2018 were reviewed and it was determined that the gold recovery formula used for the 2015 Feasibility Study under-estimated the recoveries from 1.0% to 2.5% as shown in Table 13-2.

As a simple correction to the 2015 Feasibility Study recovery estimation formula, 1% was added to the recovery formula to reflect the actual experienced recovery. The new updated gold recovery formula is therefore:

- % gold recovery = (((h-0.087)/h)*100+1%);

where h = the head grade.

Table 13-2: 2018 Plant Recovery Data

	Units	March	April	May	June	July	August	September	October
Tonnes milled	t	188,221	197,331	200,761	187,176	196,069	190,759	194,301	184,952
Reported head grade	g/t Au	1.34	1.31	1.28	1.35	1.39	1.40	1.58	1.27
Reconciled gold recovery	%	94.9	95.9	94.2	95.7	96.0	94.8	95.7	94.5
Using recovery formula gold recovery	%	93.5	93.3	93.2	93.6	93.7	93.8	94.5	93.1
Delta of estimate vs actual gold recovery	%	1.4	2.5	1.0	2.1	2.3	1.0	1.2	1.4

13.1.4 Metallurgical Variability

Initial testwork on Touquoy mineralization was carried out on an argillite composite and a mixed greywacke/argillite composite.

A complete program of testwork was carried out on the following seven samples:

- TWT: argillite mineralization from the western part of the mineralized zone at a depth of 0–35 m;
- TWM: argillite mineralization from the western part of the mineralized zone at a depth of 35–70 m;
- TWB: argillite mineralization from the western part of the mineralized zone at a depth of more than 70 m;
- TET: argillite mineralization from the eastern part of the mineralized zone at a depth of 0–35 m;
- TEB: argillite mineralization from the eastern part of the mineralized zone at a depth of greater than 35 m;
- TGW: greywacke from the mineralized zone;
- TMX: mixed greywacke/argillite from the mineralized zone.

The samples described above are considered to represent the Touquoy deposit.

13.1.5 Deleterious Elements

The only known deleterious element is arsenic, levels of which are managed in water discharge from the TMF through use of an effluent treatment plant. Ferric sulphate is used in the tailings pump box to deposit a stable arsenic compound in the tailings.

13.2 Beaver Dam

13.2.1 Introduction

Some testwork was carried out by SGS Laboratories at Lakefield in 2008. Atlantic Gold reviewed treatment of the Beaver Dam material through the proposed Touquoy flowsheet.

Table 13-3 summarizes the metallurgical testwork completed on Beaver Dam material.

A Bond ball mill work index (BMWi) of 15.4 kWh/t is used for design purposes. The abrasion index results were also conflicting and despite efforts to establish the reason for the variable results, a conservative view was taken and a value of 0.28 was used, being the 80^{th} percentile of all Beaver Dam results.

13.2.2 Recovery Estimates

Using the same approach for Beaver Dam as outlined for Touquoy, and using the average residue grade, the formula becomes:

- % gold recovery = (((h-0.071)/h)*100);

where h = the head grade.

With an average head grade of 1.5 g/t Au, this gives a gold recovery of 95.2%. Considering the very similar recoveries obtained for each deposit and the similar head grades, the average LOM recovery forecast for Touquoy and Beaver Dam is estimated at 94%.

13.2.3 Metallurgical Variability

The Beaver Dam deposit contains four stratigraphic units, identified as Hanging Wall Greywacke, Papke Mudstone, Millet Seed Greywacke, and Austin Mudstones. At least two samples were taken from each unit and a total of 13 samples were used in the testwork. Additionally, five further samples were taken and used to determine the Bond ball mill work index. The samples used are considered to be representative of the mineralization in the deposit.

13.2.4 Deleterious Elements

The only known deleterious element is arsenic, levels of which will be required to be managed in water discharge from the TMF through use of an effluent treatment plant. Ferric sulphate will be used in the tailings pump box to deposit a stable arsenic compound in the tailings.

Table 13-3: Metallurgical Testwork Summary, Beaver Dam

Program/Laboratory	Testwork	Comment
SGS 2008	Gravity separation, cyanidation of the gravity tails, whole ore cyanidation, flotation, heap leaching and comminution testwork.	A single composite was made from 1,400 kg of drill core by sequential crushing and riffling. The composite was found to give somewhat variable head grades from test to test but was consistently lower than the expected deposit head grade. However, the conclusions given were that a combination of gravity separation followed by leaching the gravity tailings would give combined extractions greater than 95% with low cyanide consumptions. A Bond ball mill work index (BMWi) of 13.4 kWh/t was determined.
ALS Perth	Head grade assays, gravity recovery and cyanidation leach; carbon adsorption testwork; cyanide detoxification testwork; comminution testwork	Work performed on 13 samples from the 4 lithology types. Determined much higher BMWi values for two of the samples tested (17.7 kWh/t and 18.3/19 kWh/t) but values similar to the SGS result for two other samples.
Base Met Labs (Kamloops)	Effect of water source on leaching; comminution testwork	Samples of Touquoy ore were leached in Scraggy Lake water and in Kamloops tap water and the Fleming adsorption constant was measured for both. Concluded that no adverse effect would be caused by using Scraggy Lake water. Four Beaver Dam samples gave BMWi values ranging from 13.6 to 15.7 kWh/t with an average of 14.4 kWh/t. Additional 5 samples tested at SGS and Base Met; SGS results vary from 14.6 to 16.6 kWh/t with an average of 15.3 kWh/t while the Base Met Laboratory results are lower, ranging from 13.3 to 14.7 kWh/t with an average of 14.2 kWh/t.

13.3 Fifteen Mile Stream

13.3.1 Mineralogy

Approximately 800 kg of half drill core samples were received at ALS Kamloops on August 16, 2017. In total 364 bags of drill core each representing 1 m intervals were received and validated against a listing provided by Atlantic Gold. The samples were identified as belonging to six different spatial zones in the deposit. Six variability samples, namely Core East, Core West, North East, North West, South East, and South West, were prepared by combining the prescribed drill core intervals.

The samples contained mostly quartz, micas and feldspars. Only minor amounts of clay minerals were detected. The most abundant sulphide minerals were pyrrhotite, arsenopyrite, and pyrite. Trace amounts of sphalerite, copper sulphides and galena were also present.

Bulk mineral analyses (BMA) were conducted on each of the six variability samples using quantitative evaluation of minerals by scanning electron microscopy (QEMSCAN) technology and summarized in Table 13-4.

Additionally, variability samples were assayed by X-ray fluorescence (XRF) and LECO combustion to determine their elemental compositions, as summarized in Table 13-4.

Table 13-4 provides a list of the main minerals in each of the variability composites. Table 13-5 provides the variability composite sulphur and whole rock assays.

13.3.2 Sample and Head Assays

The samples were stage crushed to pass 32 mm and subsamples were extracted for comminution testing. Once the comminution testing for each sample was complete, the crushed rejects were returned. Each variability sample was then crushed to 3.36 mm, homogenized and split into test portions as required. A master composite sample was also prepared to provide sufficient bulk sample for flowsheet development testing; the make-up of the master composite sample is shown in Table 13-4. The master composite preparation effectively corresponded to the proportionate mass of each variability sample as received from the site. Head samples were taken from and analyzed for each of the variability samples and the results were used to calculate the analysis of the master composite. Screened metallic gold analyses by fire assay were conducted on each variability sample, along with other chemical analyses.

Gold analysis by fire assay and sulphur assays by LECO combustion analysis were completed on each of six variability samples and the master composite sample. The calculated composition of the master composite is provided in Table 13-4 with fire assay results for the variability samples in Table 13-6. A sample of the master composite was screened into selected size fractions, and the individual size fractions assayed for gold, results of which are summarized in Table 13-6.

The measured master composite sample grade was 1.11 g/t Au, and the calculated average grade of the six samples was 1.91 g/t Au. The difference is attributed to the presence of coarse gold (nugget effect) in some samples.

To compensate for the nugget effect, head grades in tests using master composite samples (11 tests) and variability sample (29 tests) tests were back-calculated from concentrate and tails gold assays.

Additional master composite samples were prepared according to the same procedure as required to generate additional material for further testing. The additional master composite samples had average head grades of 1.72 g/t Au and 1.71 g/t Au, respectively.

Table 13-4: Mineral Composition of Fifteen Mile Stream Samples, ALS Kamloops (2017)

Minerals	Core East	Core West	North East	North West	South East	South West
Pyrite	0.5	0.4	0.2	0.8	0.6	0.4
Pyrrhotite	0.9	0.7	1.3	0.7	0.8	0.8
Arsenopyrite	0.9	0.3	0.4	0.1	0.2	0.2
Other sulphide minerals	0.1	0.1	<0.1	0.1	<0.1	0.1
Iron Oxides	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Quartz	32.4	33.4	30.6	33.6	31.3	30.8
Muscovite	30.3	30.7	32.4	28.8	32.2	33.2
Biotite/Phlogopite	11.5	10.1	12	13	10.9	9.8
Chlorite	9.3	11.4	10.6	10.7	12.9	12.4
Feldspars	9.8	8.7	8.1	7.9	7.5	7.7
Calcite	0.7	0.8	0.5	0.5	0.6	1
Kaolinite (clay)	1.2	1	1	0.9	0.8	1
Titanium minerals	1	1.4	1.7	1.9	1.3	1.5
Apatite	0.3	0.3	0.3	0.3	0.2	0.2
Others	1	0.8	0.8	0.7	0.6	0.9
Total	***100***	***100***	***100***	***100***	***100***	***100***

Table 13-5: Sulphur and Whole Rock Assays

Sample	Assay – percent															
	S	$S_{(SO4)}$	C	As	Al_2O_3	BaO	CaO	Cr_2O_3	Fe_2O_3	K_2O	MgO	MnO	Na_2O	P_2O_5	SiO_2	TiO_2
Master composite	0.6	0.03	0.3	0.2	18.4	0.1	1.1	0	8.2	4.31	2.6	0.1	0.9	0.1	58.9	0.9
Core East	0.7	0.05	0.4	0.3	—	—	—	—	—	—	—	—	—	—	—	—
Core West	0.6	0.04	0.2	0.1	—	—	—	—	—	—	—	—	—	—	—	—
North East	0.7	0.04	0.2	0.2	—	—	—	—	—	—	—	—	—	—	—	—
North West	0.6	0.04	0.2	0.1	—	—	—	—	—	—	—	—	—	—	—	—
South East	0.5	0.03	0.3	0.1	—	—	—	—	—	—	—	—	—	—	—	—
South West	0.6	0.04	0.3	0.1	—	—	—	—	—	—	—	—	—	—	—	—

Table 13-6: Master Composite Assembly and Sample Gold Grades

Zone	Make Up (%)	Grade (g/t Au)
Core East	11.5	0.91
Core West	7.0	11.3
North East	21.8	1.65
North West	16.3	1.71
South East	20.1	0.92
South West	23.3	0.82
Calculated master comp Au grade		***1.91***

Table 13-7: Master Composite Sample Assay

Sample	Head Portion	Assay Data		Distribution (%)	
		g	Au g/t	mass	Au
Master composite	> 106 µm	93.6	6.90	5.0	30.8
	Cut 1 < 106 µm	895	0.78	95.0	69.2
	Cut 2 < 106 µm	895	0.84		
	Total	***1,883***	***1.11***		

In general, the samples received had higher gold grades than the corresponding mine plan average LOM grade of 1.24 g/t Au. The difference in head grade between variability samples and the design grades could result in optimistic metallurgical performances, specifically if results from the variability sample testwork are not adjusted to account for their higher head grade. Further confirmatory testwork is recommended on samples with feed grades approximating the mine plan feed grades, to improve confidence in the metallurgical recoveries used for design.

13.3.3 Comminution Testwork

SMC Tests

Six composite sample SMC tests were done in 2017 (Table 13-8) by ALS Kamloops. The average drop weight index (DWi) was 7.22 kWh/m^3. The 75th percentile-derived A x b value was 35 kWh/m^3.

The Core East sample was the most competent and the South West composite the least competent. The average Bond abrasion index of the six samples was 0.013 and would be classified as non-abrasive.

Bond Ball Work Index Tests

Five BMWi tests were completed with the individual variability samples, as summarized in Table 13-9. Results showed medium hard mineralization, with BMWi of 10.0 to 10.3 kWh/t, and the 75th percentile of 11.3 kWh/t. The highest BMWi was for the Core East composites.

13.3.4 Gravity Recoverable Gold Testwork

A series of gravity recoverable gold (GRG) tests was completed to evaluate the potential to recover gold from the ore samples using a combination of gravity concentration and flotation processes.

Two main flowsheet designs were investigated in this test program. The design concept for Fifteen Mile Stream was concentration of gold values to deliver a low mass, high grade concentrate to the existing Touquoy process plant operation. Flotation technologies based on coarse particles size coupled with hydroflotation have the potential to reduce equipment and power costs.

The first flowsheet (Figure 13-1) included primary grinding to a P80 particle size range of approximately 100 to 200 µm, gravity concentration, and conventional froth flotation. The second flowsheet (Figure 13-2) included primary grinding to P80 particle size range of approximately 200 to 400 µm, gravity concentration, classification at 150 µm, then concentrate production from separate coarse and fine flotation circuits (split circuit).

The fine (<150 µm) flotation circuit used conventional flotation cells and the coarse (>150 µm) flotation circuit employed HydroFloatTM cells. Because the HydroFloatTM cell operates with a rising column of teeter water in higher density fluidized bed, most of the -150 µm particles attendant in the feed report to the concentrate due to elutriation regardless of sulfide content. Therefore, it is important to remove and minimize the -150 µm content in the material treated by the HydroFloatTM cell. Gravity concentration testwork for both first and second flowsheet options included hand panning a Knelson concentrate to obtain a low mass recovery to be more representative of an actual plant circuit.

A single GRG test was completed on a 10 kg sample of the master composite to investigate gold recovery using a GRG test protocol. The results are presented in Figure 13-3 and Figure 13-4. The results indicated that a high proportion of the gold contained in the master composite, greater than 90%, could be recovered by conventional gravity concentration given a P80 particle size of 200 µm or finer.

Table 13-8: SMC Testwork Results, ALS Kamloops (2017)

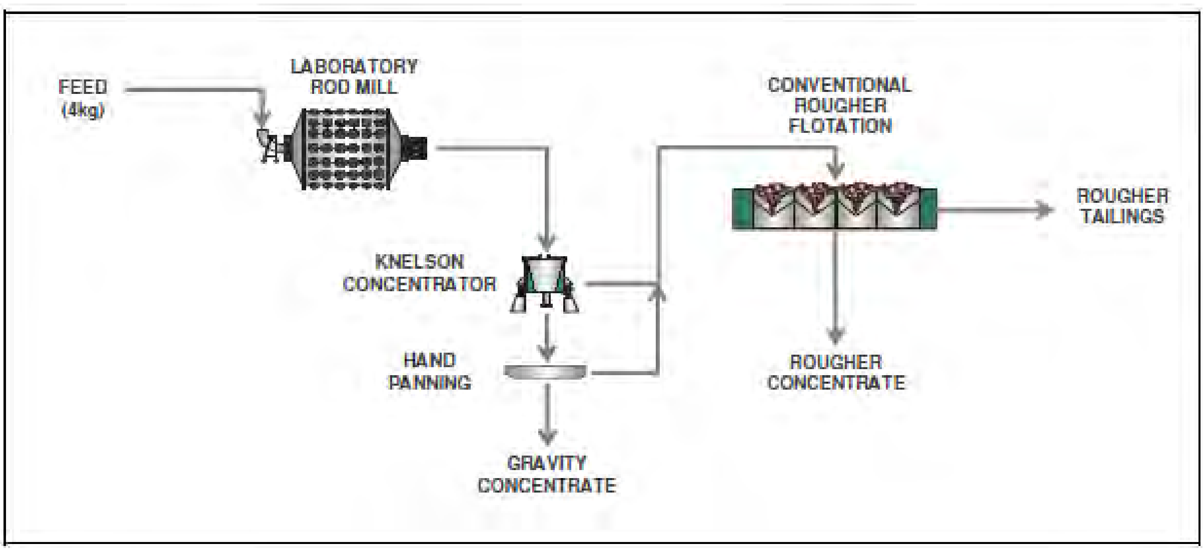
Sample ID	Size Fraction Tested (mm)	A	b	sg	ta	SCSE	A x b
Core East composite	31.5 - 26.5	63.8	0.53	2.77	0.32	10.86	33.8
Core West composite	32.5 - 26.5	58.1	0.61	2.80	0.33	10.69	35.4
North East composite	32.5 - 26.5	54.7	0.7	2.81	0.35	10.32	38.3
North West composite	32.5 - 26.5	61.5	0.61	2.78	0.35	10.35	37.5
South East composite	32.5 - 26.5	60.6	0.63	2.79	0.35	10.29	38.2
South West composite	32.5 - 26.5	53.8	0.94	2.57	0.51	8.76	50.6

Table 13-9: Grindability Testwork Results, ALS Kamloops (2017)

Sample ID	F80 (µm)	P80 (µm)	Gpr	BMWi (kW-hr/t)
Core East composite	3227	60	1.28	12.2
Core West composite	3147	56	1.52	10.3
North East composite	3262	55	1.38	11.0
North West composite	3247	51	1.47	10.0
South East composite	3261	56	1.34	11.3
South West composite	3251	55	1.35	11.2

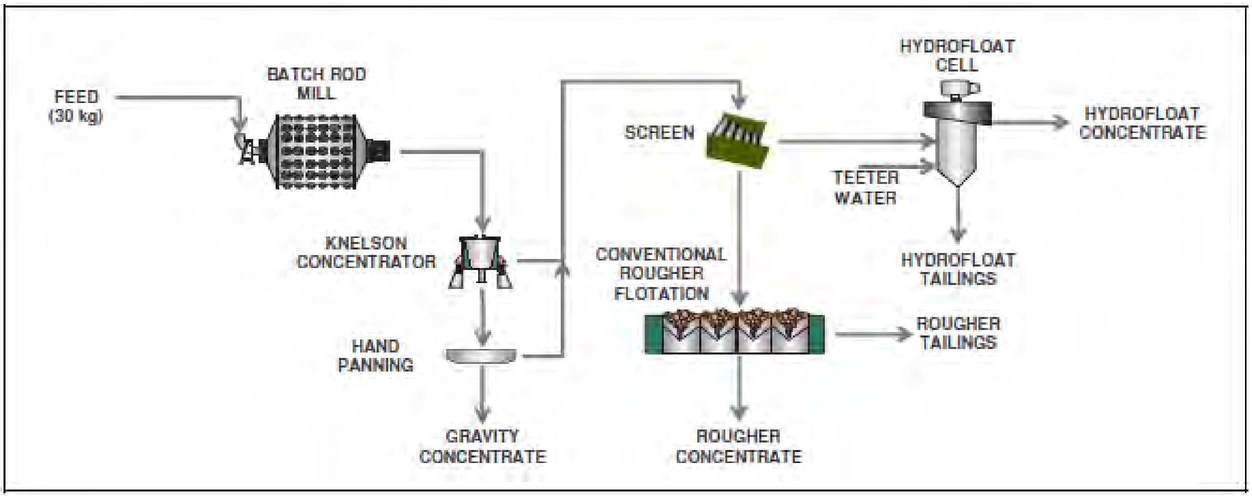
Note: All tests were conducted using a closing screen size of 106 µm.

Figure 13-1: Conventional Test Flowsheet



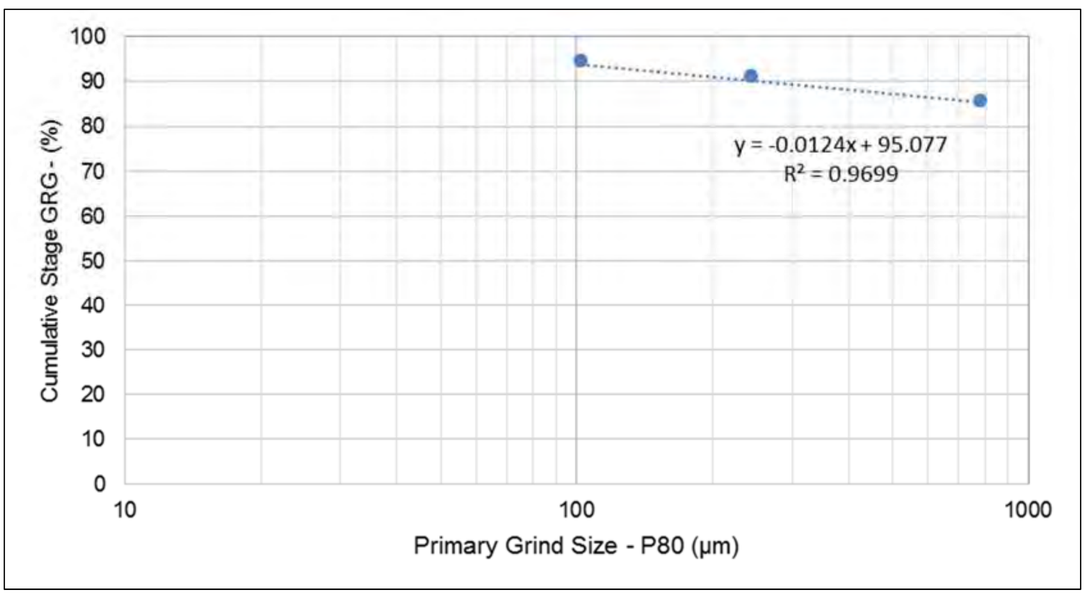
Note: Figure prepared by Ausenco, 2018.

Figure 13-2: Split Circuit Test Flowsheet



Note: Figure prepared by Ausenco, 2018.

Figure 13-3: Cumulative Stage GRG vs. Grind Size for Gold



Note: Figure prepared by Ausenco, 2018.

The sum of all the fractions shown in Figure 13-4 give an overall gravity gold recovery of 96.3% and shows a typical nugget effect with very high gold deportment and recovery in the 850 µm size fraction. The GRG test was conducted on a considerably higher feed grade sample of 3.56 g/t Au and appears that the considerably higher feed gold grade sample exaggerates the gravity recoverable gold with nugget effects and it would be important to use the similar mill feed gold grade sample to estimate the actual gravity recoverable gold in the plant.

It is also expected that both Fifteen Mile Stream and Cochrane Hill deposits will have coarse gold (nuggets) in higher gold grade mineralization, and might have difficulties obtaining accurate gold analyses by fire assay of the feed samples.

Gravity gold recovery data are presented for both the conventional and split circuit tests for all samples tested in Figure 13-5 and Figure 13-6. Gravity gold recovery was observed to decrease with increasing primary grind size. A 4 kg sample was used for gravity recovery tests for conventional flotation tests and a 30 kg sample was used for gravity recovery tests for the split flotation circuit.

There was a clear correlation between the gravity gold recovery and feed grade (Figure 13-6) in the testwork over the range of feed grades tested 0.7 to 5.3 g/t Au. Gravity recoverable gold varied between 35–94%, decreasing with decreasing head grade. Sulphur recovery to the gravity concentrate was shown to be directly related to mass pull (Figure 13-7).

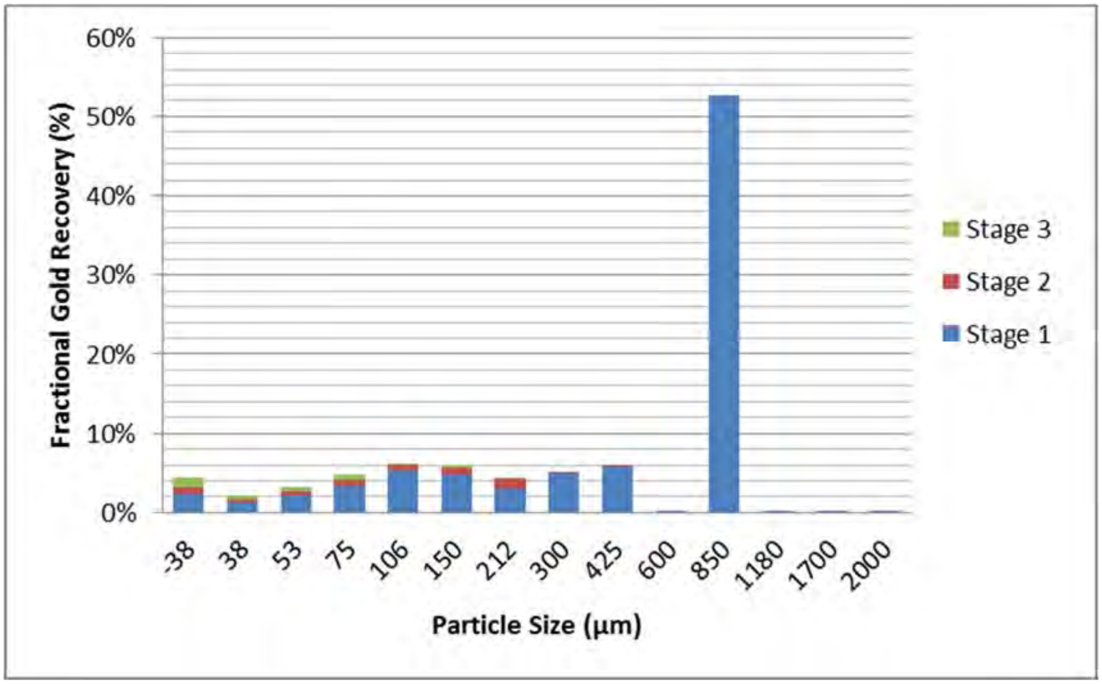
13.3.5 Flotation Testwork

Conventional Rougher and Cleaner Flotation Performance

Gravity plus conventional rougher tests were conducted at primary grind sizes ranging from P80 of 91–213 µm on master composite and variability samples. Rougher flotation circuit gold recoveries ranged from 64.5–85.4% (Figure 13-8), at mass flotation recoveries of 4.5–8.9%. The South West zone sample tests resulted in the lowest rougher flotation recoveries. The South West composite had the second lowest arsenopyrite and second highest pyrrhotite contents of the composites tested, and the higher pyrrhotite and low arsenopyrite contents in this sample is likely to have contributed to the reduced flotation performance. More variability testwork needs to be conducted to understand the flotation responses from the different spatial zones.

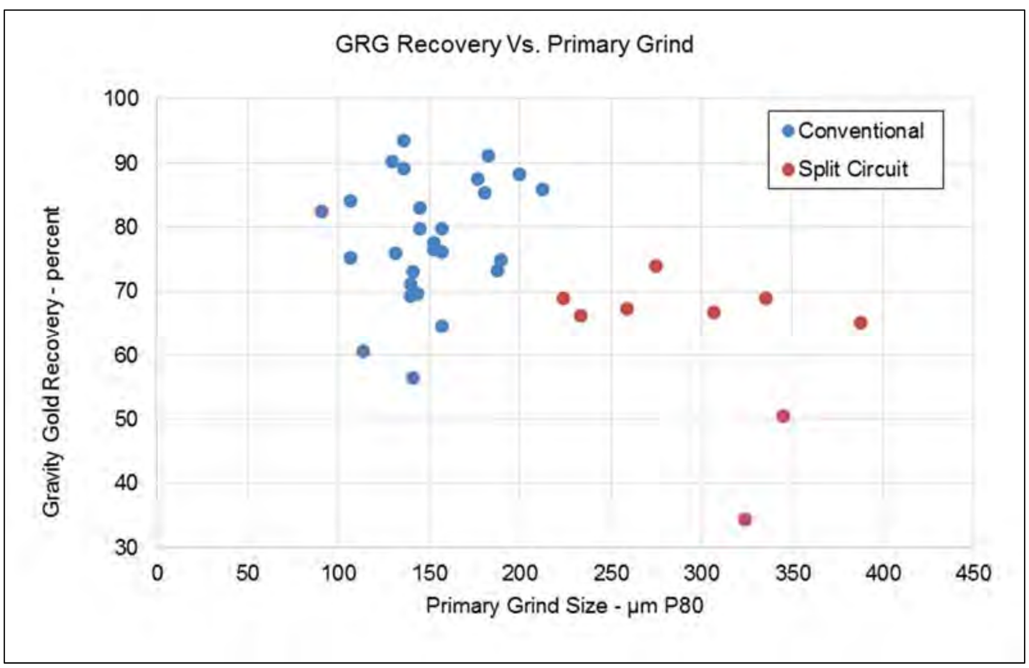
Eight open circuit cleaner tests, each with two stages of flotation cleaning, were conducted on variability samples and the master composite. Samples were prepared to a target P80 particle size of 150 µm prior to testing in order to be comparable with results from the commercial Touquoy process plant.

Figure 13-4: Fractional Gravity Gold Recovery vs. Particle Size



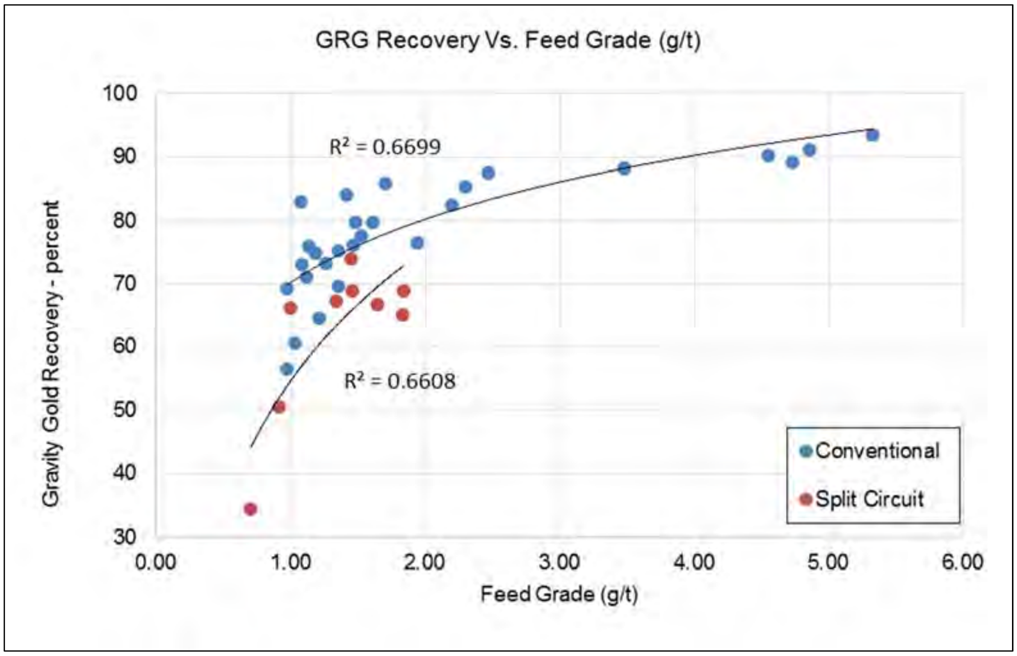
Note: Figure prepared by Ausenco, 2018.

Figure 13-5: Gravity Recovery vs Primary Grind



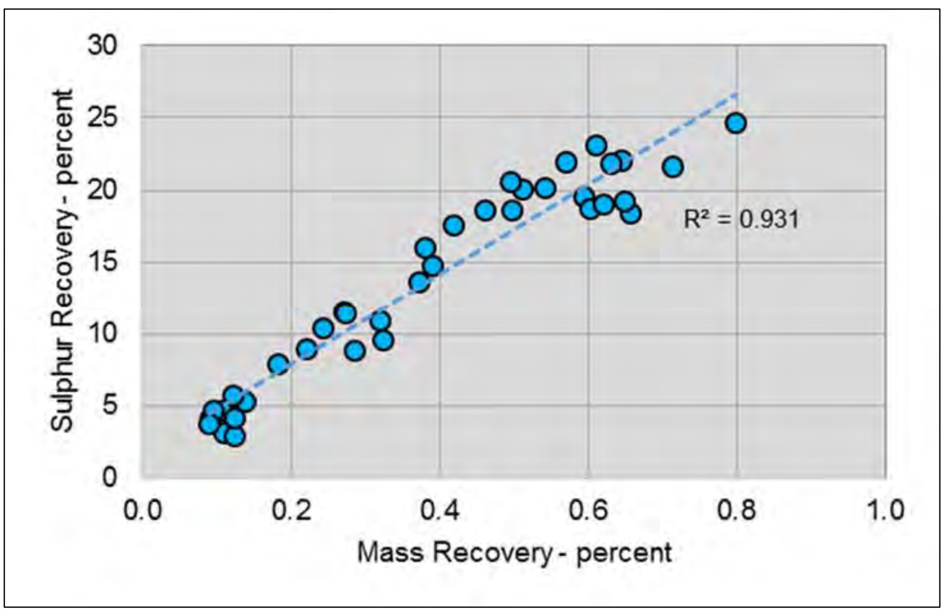
Note: Figure prepared by Ausenco, 2018.

Figure 13-6: Gravity Recovery vs Feed Grade



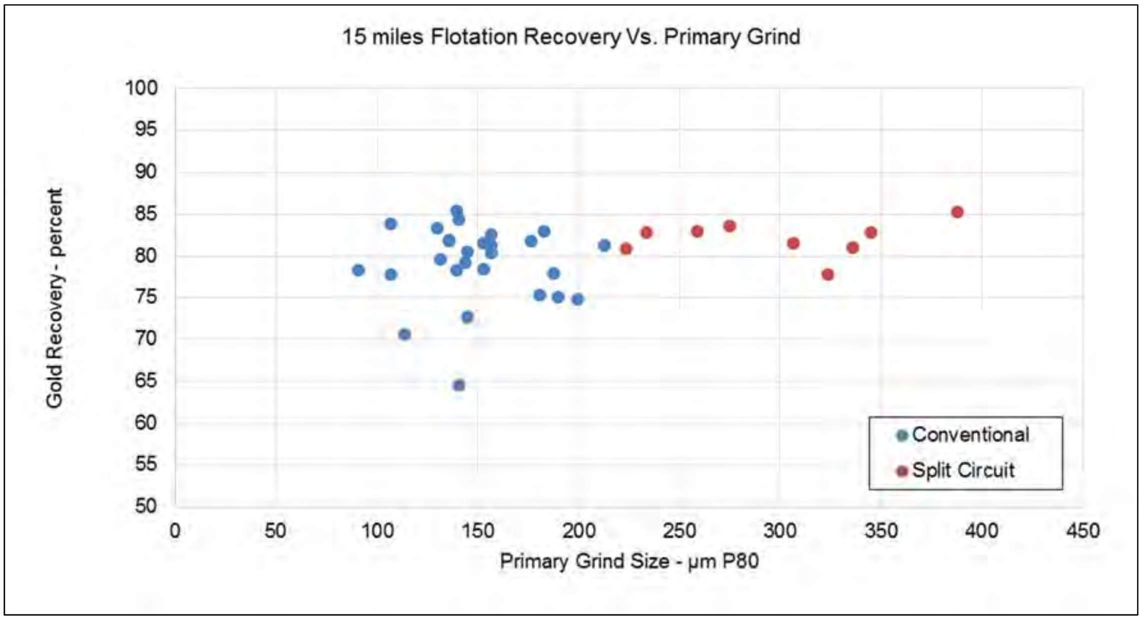
Note: Figure prepared by Ausenco, 2018.

Figure 13-7: GRG Sulphur Recovery vs Mass Recovery



Note: Figure prepared by Ausenco, 2018.

Figure 13-8: Fifteen Mile Stream Flotation Recovery vs Primary Grind



Note: Figure prepared by Ausenco, 2018.

Results of the cleaner flotation tests showed that 0.1–0.8% of the gold in the flotation feed reported to the cleaner tails, and as these were open circuit tests were reported as losses. In closed-circuit tests, some of this gold would be expected to be recoverable. Current design for the cleaner flotation circuit includes the cleaner circuit tails being re-circulated to the fines rougher flotation circuit. The concentrate mass was reduced from an average of 6% of the feed mass at rougher flotation concentrate to an average of 1% after two stages of cleaning. Additional tests are recommended to optimize the cleaning flotation circuit.

Split Circuit Performance

A series of tests based on a split circuit flowsheet were completed with several of the variability samples. The split circuit concept is based on classification of the gravity tails into coarse and fine fractions (150 µm split size), with the coarse fraction being treated by coarse particle flotation (hydroflotation) and the fine fraction by conventional flotation, and the disparate concentrates be collected and combined for further treatment.

Variability samples were prepared to a target P80 particle size of 240 µm, and ground material was processed through a Knelson concentrator to recover a gravity concentrate. The gravity tails were then separated into coarse and fine fractions using a 150 µm vibrating screen. The coarse portion was processed through a laboratory scale HydroFloat™ cell. The fine portion was processed using conventional flotation. All test products were assayed for gold and sulphur. In addition, assays by size were also conducted on the HydroFloat™ test products to confirm recovery by size over five size fractions.

Gravity followed by split circuit tests were conducted at primary grind sizes ranging from P80 of 224 to 388 µm on the two master and variability samples. The gold recovery to the combined fines rougher flotation and HydroFloatTM circuit concentrates in the split circuit testwork averaged 82% as shown on Figure 13-9. Split circuit flotation of the North East variability sample resulted in the highest gold recovery at 85.3% and the South West variability sample returned the recovery at 77.8%. The final tails grades varied between 0.07–13 g/t Au, but did not consistently trend with primary grind size.

Gold recovery across the HydroFloatTM cell averaged 73.8%. Gold recoveries across the conventional fines flotation circuit averaged 89.8%, and trended with sulphur recovery. The combined concentrate mass recoveries averaged 10.4%; 6.7% from the fines rougher concentrate, and 3.7% from the hydroflotation concentrate.

Total ore concentrate including GRG and flotation circuit recoveries gave similar recoveries for conventional and split circuits with coarser grind as shown in Figure 13-9.

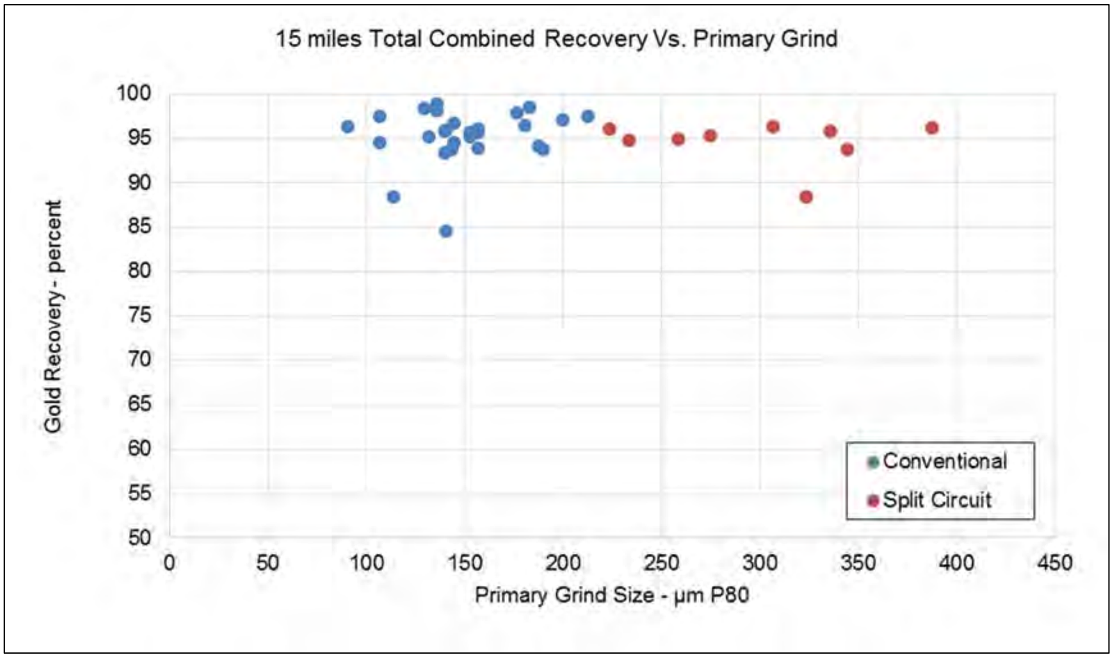
The average feed grade of the split circuit test was 1.35 g/t Au. The 1.35 g/t Au average is reasonably comparable to the average anticipated mine feed grade.

Circuit Performance Comparison

The conventional circuit feed grades averaged 2.03 g/t Au, while the split circuit feeds averaged 1.35 g/t Au, and despite this variability, overall recoveries to concentrate were relatively constant at 95%, regardless of treatment method, as shown in Figure 13-9. There was not a clear difference in total gold recoveries (gravity + flotation) between the conventional and split circuit treatment schemes.

Table 13-10 compares results of conventional tests completed at a primary grind P80 of approximately 150 µm with those of split circuit tests completed with an average primary grind P80 of 274 µm. Gold recoveries from the conventional circuit tests averaged 95.3% while those from the split circuit test averaged 94.6%. On average, the split circuit tails grade was 0.02 g/t Au higher than the conventional circuit tails grade for this selection of tests.

Figure 13-9: Fifteen Mile Stream Combined (Gravity + Flotation) Recovery vs Primary Grind



Note: Figure prepared by Ausenco, 2018.

Table 13-10: Comparison of Metallurgical Results

Composite	Conventional Circuit				Split Circuit			
	Feed (Au g/t)	Grind (P80 µm)	Total Au Recovery (%)	Tails (Au g/t)	Feed (Au g/t)	Grind (P80 µm)	Total Au Recovery (%)	Tails (Au g/t)
MC	1.61	157	96.0	0.07	1.46	336	94.1	0.10
MC	1.21	157	93.8	0.08	1.34	259	94.4	0.08
MC	1.47	157	95.5	0.07	1.45	275	95.7	0.07
Core East	1.08	145	96.6	0.04				
Core East	1.49	145	94.4	0.09				
North West	1.53	153	95.1	0.08	1.84	224	94.0	0.13
North West	1.94	153	95.6	0.09				

Flotation Concentrate Upgrading (Cleaning)

Conventional rougher flotation concentrates were upgraded using one stage of flotation cleaning. The rougher flotation concentrates ranged in mass from 4.5–7.5% of the overall feed mass and contained between 8.9–29.3% of the overall feed gold.

In all tests, a considerable reduction in concentrate mass was achieved; with first cleaner concentrate masses ranging from 1.9–3.8% of the feed mass. The first stage cleaning resulted in gold losses from 0.1–0.8% with stage recoveries from 94.7–98.8%. The average stage recovery was 98.0%. The recoveries shown in Figure 13-10 are relative to the total circuit feed; thus, the difference between these recovery data and the aforementioned overall recovery numbers is attributable to the gravity gold recovery.

Concentrate Cyanide Leach Testing

A series of cyanide bottle roll tests was completed on samples of cleaner flotation concentrate, to confirm the expected leach extractions upon processing in the Touquoy process plant.

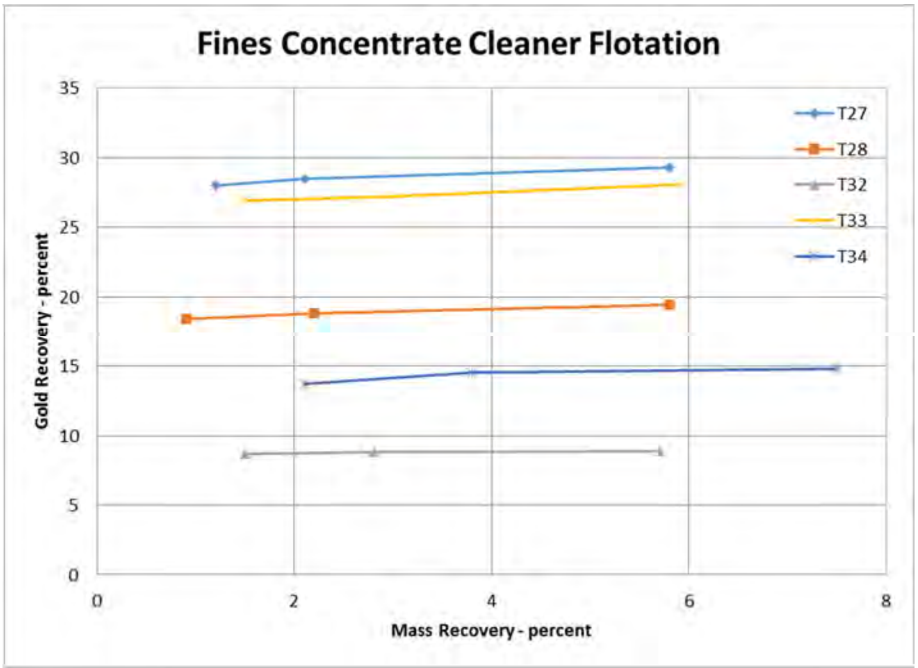
Samples of first cleaner concentrate produced from conventional flowsheet tests completed at a primary grind P80 of 150 µm were selected for cyanide leach testing. The concentrate particle size averaged P80 of 15 microns

Cyanide leach tests were 48 h in duration with periodic adjustments throughout the test to maintain 2,000 mg/L NaCN. Despite the high sulphur content in the concentrate samples, greater than 90% recoveries were achieved without pre-aeration. On average, 95.3% of the gold was extracted from the 1st cleaner concentrates within 24 hours with an average cyanidation tails assay of 0.041 g/t Au.

A single leach test was conducted with carbon, to determine the loading of potentially deleterious elements such as copper, lead, arsenic and mercury. The test was conducted using a carbon concentration of 15 g/L. Approximately 13% of the copper in the leach feed was extracted to the leach solution, but less than 1% reported to the loaded carbon. This was a consequence of the high cyanide concentrations and copper complex speciation. Minor amounts of lead and arsenic were measured on the carbon. Mercury values were below detection limits.

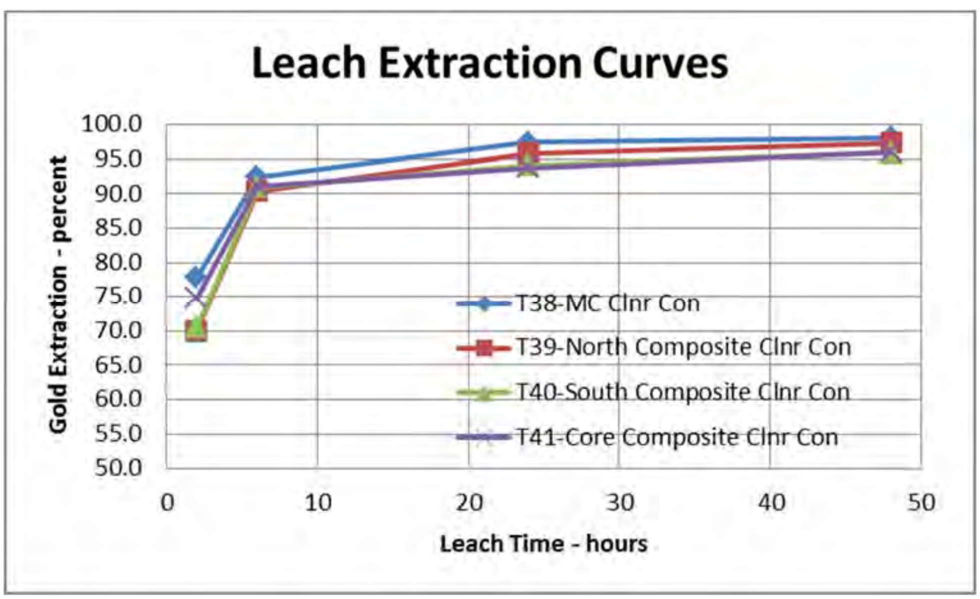
Figure 13-11 shows the leach extraction curves.

Figure 13-10: Relationship Between Mass Recovery and Gold Recovery in Cleaner Flotation of Rougher Flotation Concentrate



Note: Figure prepared by Ausenco, 2018.

Figure 13-11: Leach Extraction Curves



Note: Figure prepared by Ausenco, 2018.

13.3.6 Projected Recovery

Table 13-11 presents a summary of the metallurgical balance for the treatment of Fifteen Mile Stream ore at the Touquoy process plant operation. The interpretation of the testwork and development of the data for the metallurgical balance are discussed below.

The gravity gold laboratory recovery result was adjusted to estimate typical plant practice mass pull within the gold grade range presented in the mine plan. The adjustment considered the 4 kg ALS tests conducted in the conventional flotation flowsheet particle size range of 132–157 µm and the single e-GRG test. The adjusted gravity recovery is presented in Figure 13-12.

Gravity concentration is followed by conventional sulphide flotation. Most of the nuggets and coarse free gold is recovered by the centrifugal concentrators. The conventional flotation circuit recovers fine native and sulfide gold that is not recoverable by the gravity concentration circuit.

Flotation gold recoveries were estimated based on ALS conventional flotation test results performed on P80 size fractions in between 132 µm and 157 µm. Flotation gold recovery is relatively stable at 80% to 82% over the wide head grade range tested. Figure 13-13 presents the feed head grade versus flotation recovery. The flotation test feed grade, following gravity recovery, ranged from 0.2–0.8 g/t Au.

Touquoy Process Plant Leach Circuit Recoveries

The CIL circuit recovery estimate is based on actual Moose River plant experience and concentrate leach tests. Moose River carbon-in-leach (CIL) recovery from March to October 2018 averaged 91.3% at 1.37 g/t Au weighted average head grade. ALS Kamloops conducted bottle role tests on Fifteen Mile Stream flotation concentrates and showed average of 95.3% gold extraction from the first cleaner concentrates from conventional flotation tests within 24 hours, at elevated cyanide concentration (2,000 ppm).

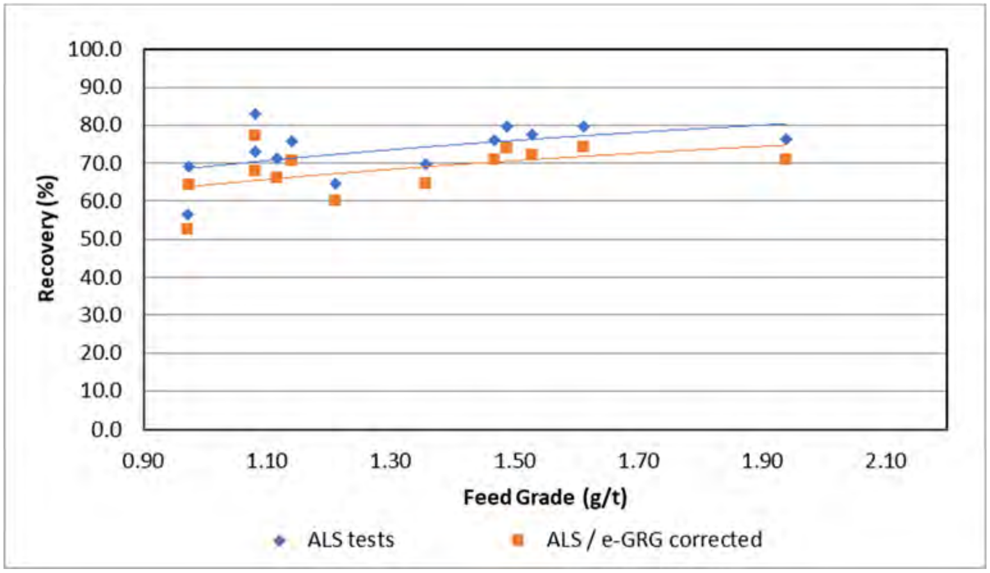
Future leach tests will investigate concentrate leach extraction when combined with Touquoy ore at lower cyanide levels and the Moose River plant retention time of 22 hours. Based on ALS bottle role test results, it is estimated CIL circuit recovery would improve at slightly elevated cyanide concentration from the current average of 91.3% when Fifteen Mile stream flotation concentrate is processed at the Touquoy plant. CIL gold recovery of 92.3% at 1.4 g/t Au head grade is used as the basis for leach recovery, until additional leach tests are completed.

Table 13-11: Overall Gold Recovery

Description	Units	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Mill Feed	kt	1,300	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,464
Gold in LOM mill Feed	g/t	1.54	1.56	1.46	1.38	1.05	0.95	0.80	0.46	0.41
Gold reporting to gravity concentrate	%	71.1%	71.2%	70.3%	69.4%	65.0%	63.3%	60.6%	51.8%	50.2%
Gold reporting to flotation feed	%	28.9%	28.8%	29.7%	30.6%	35.0%	36.7%	39.4%	48.2%	49.8%
Gold flotation recovery	%	80.0%	80.0%	79.9%	79.7%	78.9%	78.6%	78.2%	76.6%	76.3%
Flotation/CIL recovery	%	21.7%	21.6%	22.1%	22.5%	24.5%	25.2%	26.1%	28.6%	29.0%
Overall Gold Recovery	**%**	**92.8%**	**92.8%**	**92.4%**	**91.9%**	**89.5%**	**88.5%**	**86.8%**	**80.4%**	**79.1%**

Note: ILR = intensive leach reactor

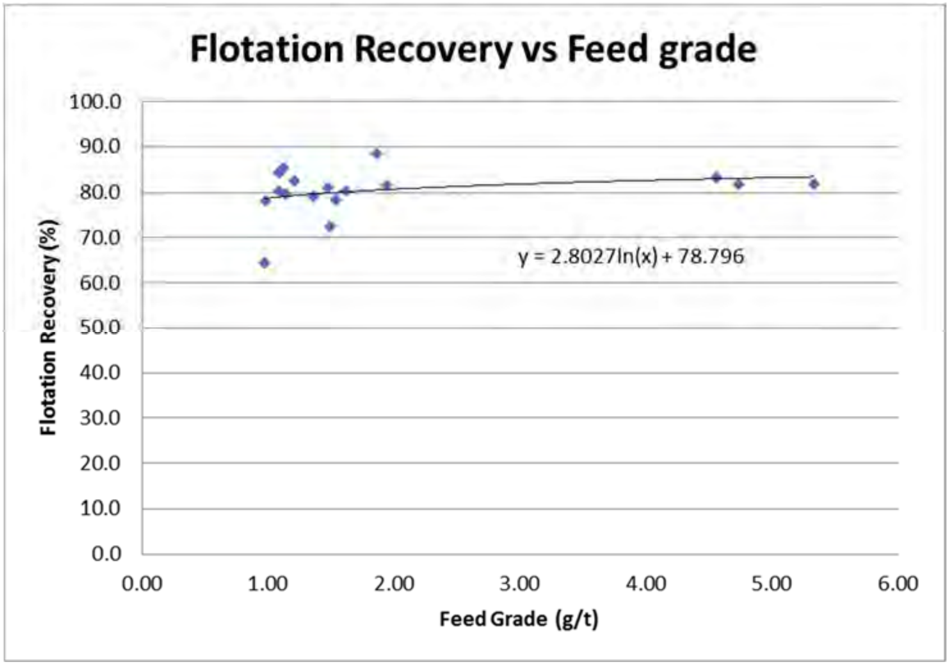
Figure 13-12: Corrected Gravity Recovery



Note: Figure prepared by Ausenco, 2019.

ATLANTIC GOLD

Figure 13-13: Flotation Recovery vs Feed Grade



Note: Figure prepared by Ausenco, 2019.

Total Gold Recovery

Total gold recoveries, from ore to gravity plus flotation concentrates, were calculated based on extrapolated gravity and flotation recoveries as a function of feed grade. Combined total gold recoveries are presented in Table 13-11 for each year of production. Average recoveries for Fifteen Mile Stream are expected to range from 93% in the first and second years of the mine plan to 79% in the final year of mining when lower grade material will be processed. The overall average life-of-mine (LOM) recovery is expected to be 88%.

13.3.7 Deleterious Elements

There are no known deleterious elements that will negatively impact metallurgical recovery of the Fifteen Mile Stream mineralization.

No deleterious elements are expected in the doré. Copper head grades range from 30–140 g/t Cu. Copper reporting to carbon at the Touquoy process plant can be minimised by adjustment of cyanide addition. Alternatively, the copper content will be reduced through the smelting process.

13.4 Cochrane Hill

13.4.1 Previous Metallurgical Testwork

Metallurgical testwork was conducted by previous explorers, as outlined in Section 6. No details of any of these metallurgical testwork programs are available.

MetSolve laboratories conducted gravity separation and flotation tests, including cyanide leaching of the flotation concentrate. A Bond ball mill work index value was determined. This work is superseded by the testwork completed as part of the 2018 Pre-Feasibility Study.

13.4.2 Mineralogy

A total of 775 kg of half drill core samples from the Cochrane Hill project were received at ALS Metallurgy in Kamloops on June 9, 2017. In total 353 bags of drill core, each representing a 1 m interval were received. The samples were identified as belonging to six different spatial zones in the deposit. Six variability samples, namely Central Bottom, Central Top, East Bottom, East Top, West Bottom, and West Top, were prepared per the compositing instructions.

The six variability samples contained mostly quartz, micas and feldspars. Only minor amounts of clay minerals were detected. The most abundant sulphide minerals were arsenopyrite, pyrrhotite, and lesser amounts of pyrite. Trace amounts of sphalerite, copper sulphides and galena were also present.

BMA were conducted on each of the six variability samples using QEMSCAN technology and summarized in Table 13-12.

Likewise, variability samples were analyzed by XRF to determine to their elemental composition, as summarized in Table 13-13.

Table 13-12 provides a list of the main minerals in each of the variability composites. Table 13-13 provides the variability composite sulphur and whole rock assays.

13.4.3 Sample and Head Assays

The samples were lightly stage-crushed to pass 32 mm and sub-samples were extracted for comminution testing. Once the comminution testing for each sample was complete, the crushed rejects were returned to their respective composites. Each variability sample was then crushed to -3.36 mm homogenized and split into test portions as required. A master composite to provide sufficient sample for development testing was prepared by blending aliquots of the variability samples as the proportion in which they were received from site. The composition of the master composite sample is provided in Table 13-14.

Table 13-12: Mineral Composition of Cochrane Hill Samples, ALS Kamloops (2017)

Minerals	Central Bottom	Central Top	East Bottom	East Top	West Bottom	West Top
Pyrite	0.2	0.2	0.2	0.1	0.2	0.3
Pyrrhotite	0.4	0.3	0.5	0.5	0.4	0.6
Arsenopyrite	1	1.5	0.4	0.4	0.8	0.6
Other sulphides	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Quartz	43.1	41.6	40.6	39.4	43.9	40
Chlorite	3.6	2.9	3.3	3.4	2.6	3.3
Feldspars	22.9	20.2	21.7	23	21.4	21.3
Micas	24.8	29.6	28.5	28	27.2	28.9
Carbonates	0.4	0.2	0.2	0.4	0.2	0.4
Staurolite	0.6	0.6	1.4	1.3	0.7	1.0
Titanium minerals	0.8	0.9	1.0	1.2	0.9	1.0
Amphibole	0.9	0.6	0.7	1.0	0.7	1.0
Kaolinite' (clay)	0.6	0.5	0.6	0.6	0.5	0.7
Apatite	0.3	0.2	0.2	0.2	0.2	0.3
Others	0.5	0.4	0.5	0.5	0.4	0.5
Total	***100***	***100***	***100***	***100***	***100***	***100***

Table 13-13:Sulphur and Whole Rock Assays

Sample	Assay - percent												
	S	Al	BaO	CaO	Cr	Fe	K	MgO	MnO	Na	P	SiO	TiO
East Top	0.44	14.9	0.06	1.64	0.04	6.13	2.70	1.92	0.12	2.12	0.14	67.4	0.85
East Bottom	0.47	15.3	0.06	1.41	0.04	6.44	2.87	2.07	0.12	2.09	0.07	67.0	0.87
Central Top	0.47	15.2	0.06	1.73	0.06	6.55	2.89	2.01	0.13	1.97	0.11	66.7	0.85
Central Bottom	0.50	14.5	0.06	1.43	0.04	5.89	2.72	1.86	0.10	2.04	0.09	68.6	0.83
West Top	0.71	15.0	0.06	1.30	0.03	6.21	3.07	1.96	0.10	1.90	0.11	69.1	0.87
West Bottom	0.57	14.4	0.04	1.55	0.04	5.76	2.76	1.91	0.10	2.18	0.09	69.2	0.83
Master Composite	0.50	14.9	0.06	1.51	0.04	6.08	2.88	1.96	0.10	2.06	0.11	67.5	0.83

The composite make-up percentage shown in Table 13-14 corresponds to the percentage mass samples received from the site. Head samples were extracted from each of the variability samples and master composite. Screened metallic gold analyses by fire assay were conducted on each variability sample, along with other chemical analyses. The gold and sulphur assays for each variability sample and a master composite are shown in Table 13-14 and Table 13-15 together with the calculated composition of the master composite.

Gold and sulphur analysis, as determined by fire assay and LECO combustion analysis respectively, for each of the six variability samples and the master composite sample. The composition of the master composite sample is provided in Table 13-14 with assay results for the variability samples in Table 13-15.

Table 13-14: Master Composite Assembly

Zone	Make Up (%)	Grade (g/t Au)
East Top	17.4	1.98
East Bottom	17.5	2.66
Central Top	17.2	0.99
Central Bottom	14.1	1.9
West Top	17.3	4.13
West Bottom	16.6	0.59
Calculated master composite Au grade		***2.06***

Table 13-15: Master Composite Sample Assay

Sample	Head Portion	Assay Data		Distribution (%)	
		g	Au g/t	Mass	Au
Master composite	> 106 µm	100.5	9.59	5.0	49.4
	Cut 1 < 106 µm	950	0.51	95.0	50.6
	Cut 2 < 106 µm	950	0.53		
	Total	***2,000***	***0.98***		

A sample of the master composite was screened into selected size fractions and the individual size fractions assayed for gold, results of which are summarized in Table 13-15.

The measured master composite sample grade was 0.98 g/t Au, and the calculated average of the six samples was 2.06 g/t Au. The difference was attributed to the presence of coarse gold (nugget effect) in some samples.

To compensate for the coarse gold (nugget) effect, head grade determinations for all tests with the master composite (15 tests) and variability samples (eight tests) were back-calculated from concentrate and tails gold assays. As required, additional samples of the master composite were prepared to provide sufficient material for additional tests.

The weighted average feed head grades of master composite samples varied between 1.77 and 2.00 g/t Au and the calculated average grade of all samples, including variability samples, was 1.74 g/t Au.

In general, the Cochrane Hill samples received had higher gold grade than the corresponding mine plan weighted average grade of 1.12 g/t Au. The difference in head grade between variability samples and the design grades could result in optimistic metallurgical performances, particularly if results from the variability sample testwork are not adjusted accordingly to account for their significantly higher head grade. Further testwork is recommended on samples with feed grades approximating the mine plan feed grades to improve confidence in the metallurgical recoveries used for design.

13.4.4 Comminution Testwork

SMC Tests

Six composite sample SMC tests were done in 2017 (Table 13-16) by ALS Kamloops. The average DWi was 7.4 kWh/m^3. The 75th percentile derived A x b value was 37.9 kWh/m^3.

The average Bond abrasion index of the six samples was 0.080 and would be classified as non-abrasive.

Bond Ball Work Index Tests

Six BMWi tests were completed with the individual variability samples, as summarized in Table 13-16 by ALS Kamloops. Results showed medium hard mineralization with BMWi values ranging from 15.7 to 16.6 kWh/t, and the 75th percentile of 16.2 kWh/t. The highest BMWi was for the Central and East Bottom composites, although all six BMWi values were very similar.

The BMWi tests were conducted on two closing screen sizes, 106 and 300 µm. The consistency of the data indicated that closing screen aperture may not be significant factor in BMWi value, but tests would have to be duplicated on the same sample with the same screen aperture to confirm this.

Gravity Recoverable Gold Testwork

A series of GRG tests were completed to evaluate the potential to recover gold from the master composite sample using a combination of gravity concentration and flotation processes.

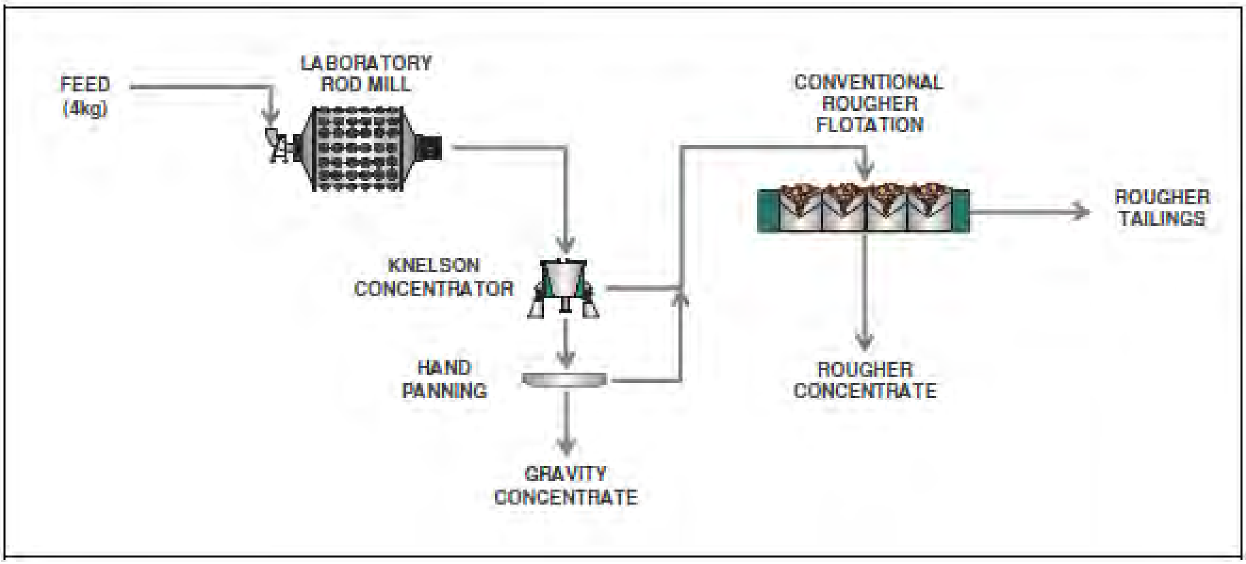
Two main flowsheet designs were investigated in this test program. The design concept for Cochrane Hill was concentration of gold values to deliver a low mass high grade concentrate to the existing Touquoy process plant operation, using a coarse grind size and alternative flotation technologies. Flotation technologies based on coarse particles size coupled with hydroflotation have the potential to reduce equipment and power costs.

The first flowsheet (Figure 13-14) included primary grinding to a P_{80} particle size range of approximately 100 to 200 µm, gravity concentration, and conventional froth flotation. The second flowsheet (Figure 13-15) included primary grinding to P_{80} particle size range of approximately 250 to 450 µm gravity concentration, screening at 150 µm, then concentrate production from separate coarse and fine flotation circuits (split circuit).

Table 13-16: Grindability Testwork Results, ALS Kamloops (2017)

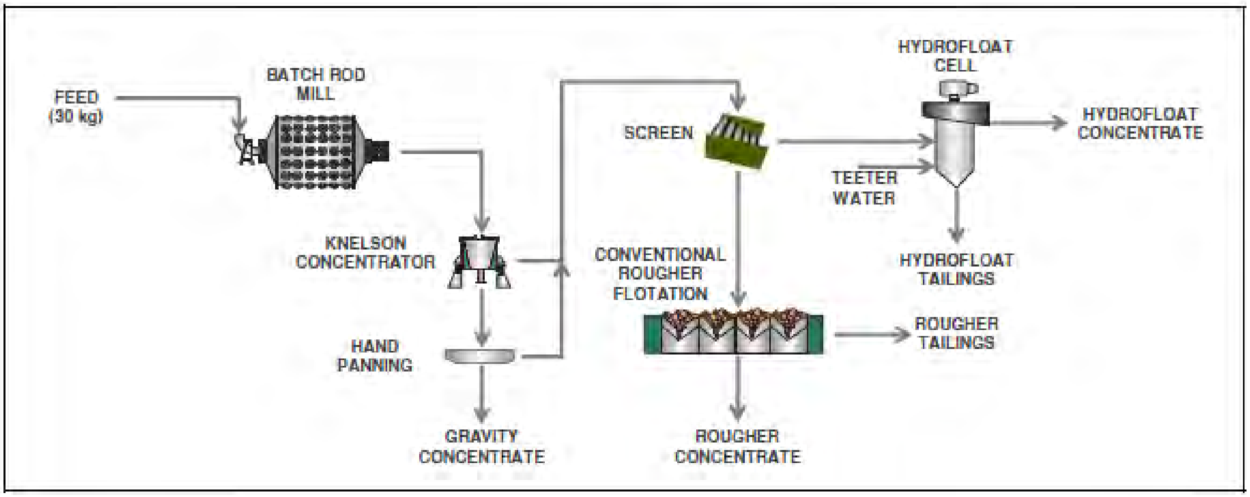
Sample ID	Aperture Test Sieve (µm)	BMWi (kW-hr/t)
Central Bottom	106	16.1
East Top	106	16.5
Central Top	106	15.7
Central Bottom	300	16.6
East Bottom	300	16.6
West Bottom	300	15.7

Figure 13-14: Conventional Test Flowsheet



Note: Figure prepared by Ausenco, 2018.

Figure 13-15: Split Circuit Test Flowsheet



Note: Figure prepared by Ausenco, 2018.

The fine (<150 µm) flotation circuit used conventional flotation cell and the coarse (>150 µm) flotation circuit employed HydroFloat™ cells. Because the HydroFloat™ cell operates with a rising column of teeter water, most of the -150 µm particles attendant in the feed report to the concentrate due to elutriation. Therefore, it is important to minimize the -150 µm content in the material treated by the HydroFloat™ cell.

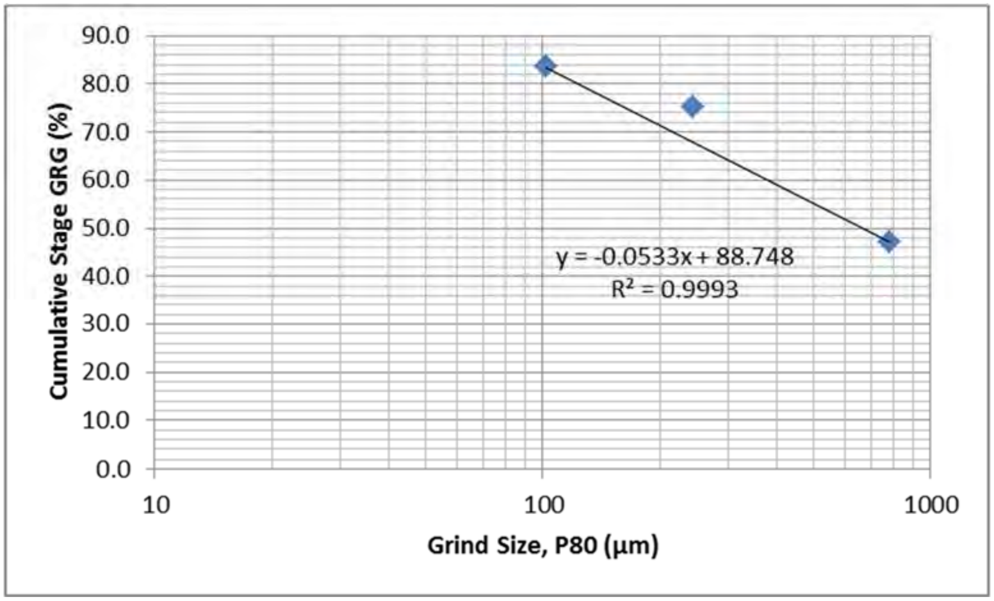
Both first and second flowsheet options tested gravity concentration by hand panning a Knelson concentrate to obtain a low mass recovery that is expected to be more representative of a plant circuit.

A single GRG test was completed on a 10 kg sample of master composite 1 to investigate gold recovery using a GRG test protocol. The results are presented in Figure 13-16 and Figure 13-17. The results indicate that a high proportion of the gold contained in the master composite, greater than 80% could be recovered by conventional gravity concentration.

The sum of all the fractions shown in Figure 13-17 give an overall gravity gold recovery of 84%.

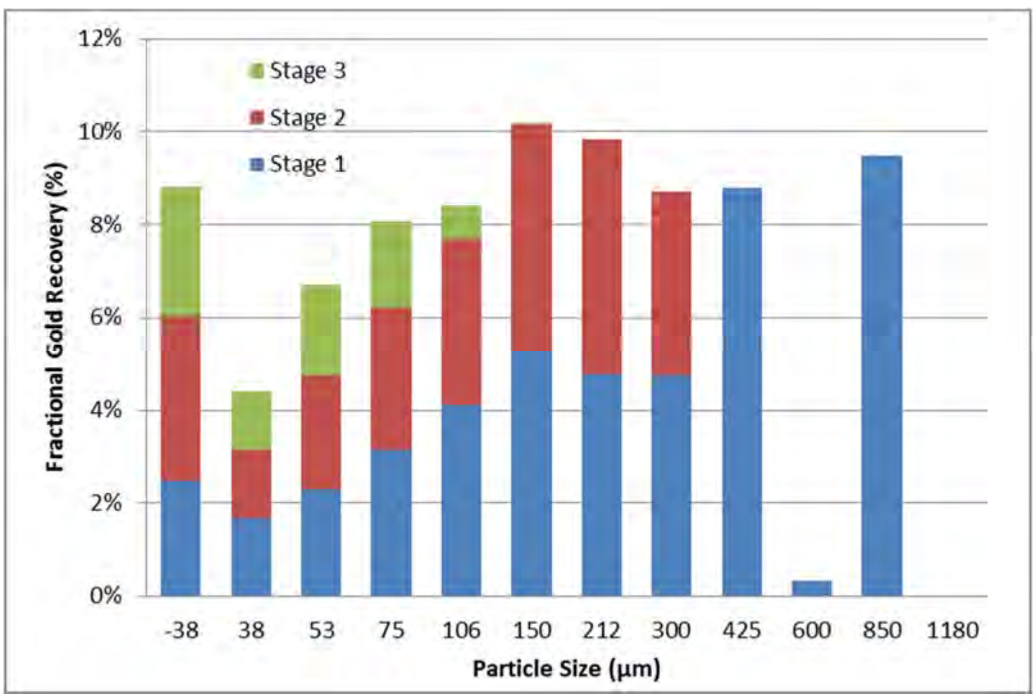
Gravity gold recovery data are presented for both the conventional and split circuit tests for with the variability and master composite samples.

Figure 13-16: Cumulative Stage GRG vs Grind Size for Gold



Note: Figure prepared by Ausenco, 2018.

Figure 13-17: Fractional Gravity Gold Recovery vs Particle Size



Note: Figure prepared by Ausenco, 2018.

13.4.5 Flotation Testwork

Conventional Rougher and Cleaner Flotation Performance

Gravity plus conventional rougher flotation tests were conducted at primary grind sizes ranging from P_{80} of 95 to 189 µm on master composite and variability samples. Rougher flotation circuit gold recoveries for the master composite ranged from 78–92%, at mass flotation recoveries of 5.8–8.6%. The three zone variability samples tested resulted in lower rougher recoveries. The East Bottom sample had the lowest arsenopyrite and elevated pyrrhotite contents of the variability samples tested. The higher pyrrhotite and low arsenopyrite contents in this sample is a likely to have contributed to the reduced flotation performance. More variability testwork needs to be completed to understand the response of ores from different zones to flotation.

Two open-circuit cleaner tests, each with two stages of cleaning flotation were completed on the master composite. Samples were prepared to target P80 particle size of 95 µm prior to testing and with a regrind of the rougher concentrate to a P80 of 32 µm. Results of the cleaner flotation tests showed that 0.9 and 2% of the gold in the feed reported to the cleaner tails, and as these were open circuit tests, these are reported as losses. In a closed-circuit test, some of this gold would be expected to be recoverable. Current cleaner flotation circuit includes the cleaner circuit tails to be re-circulated to the fines rougher flotation circuit. The concentrate mass was reduced from an average of 8% of the feed mass at rougher flotation concentrate to an average of 1.5% after two stages of cleaning. Additional tests are recommended to optimize the cleaning flotation circuit.

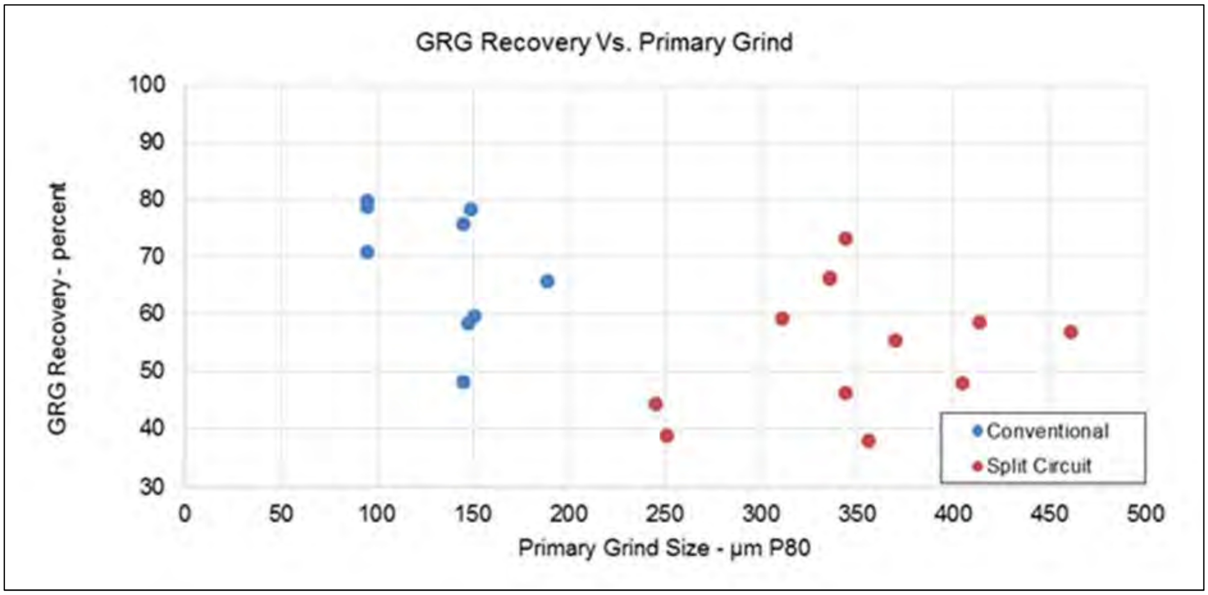
Figure 13-18 shows the GRG recovery versus primary grind size. Figure 13-19 and Figure 13-20 present the GRG recovery versus feed grade and GRG recovery versus feed grade mass recovery, respectively.

Split Circuit Performance

A series of tests based on a split circuit flowsheet were completed with several of the variability samples. The split circuit concept is based on classification of the gravity tails into coarse and fine fractions (150 um split size), with the coarse fraction being treated by coarse particle flotation (hydroflotation) and the fine fraction by conventional flotation, and the disparate concentrates be collected and combined for further treatment.

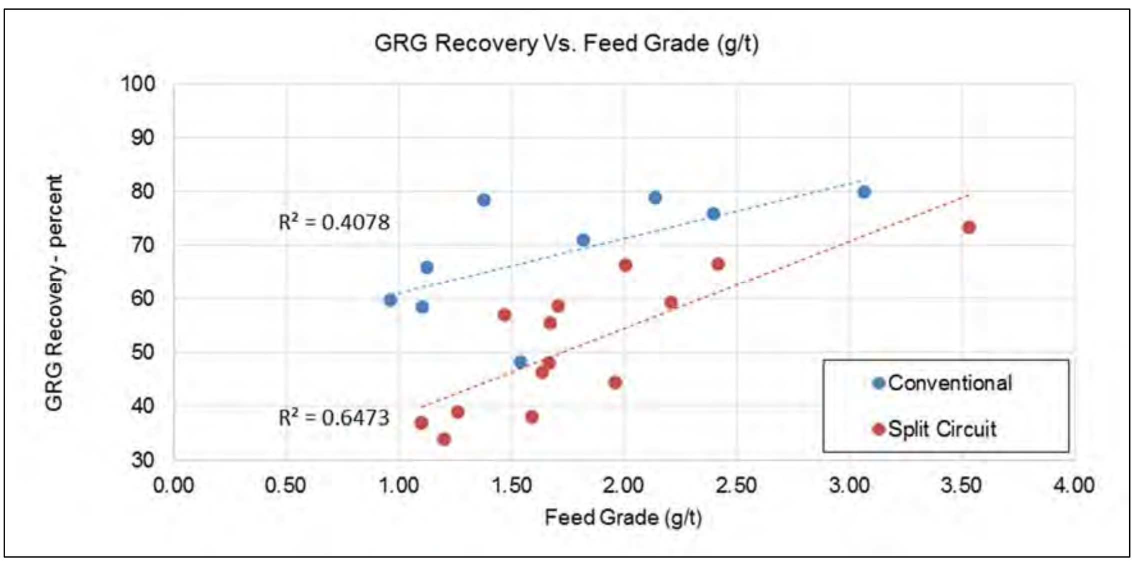
The ground feed 50:50 mass split with a screen aperture of 150 µm, corresponding to P80 of 350 µm grind size, was chosen for the plant equipment design as shown on Figure 13-21.

Figure 13-18: GRG Recovery vs Primary Grind



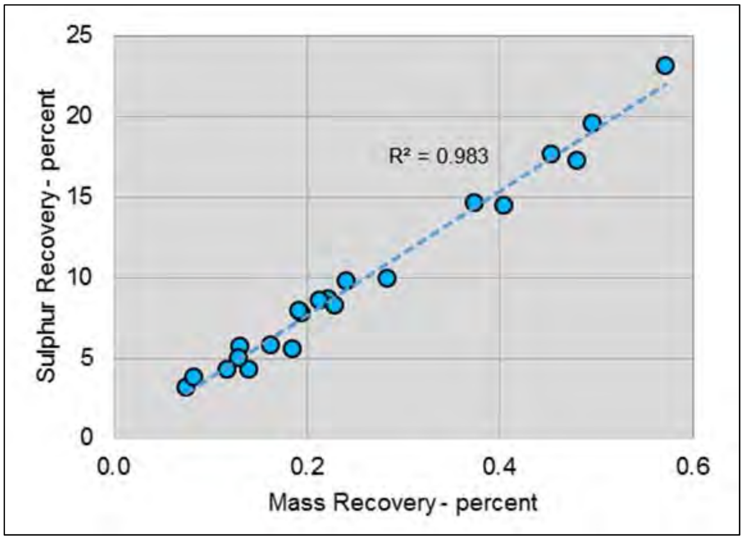
Note: Figure prepared by Ausenco, 2018.

Figure 13-19: GRG Recovery vs Feed Grade



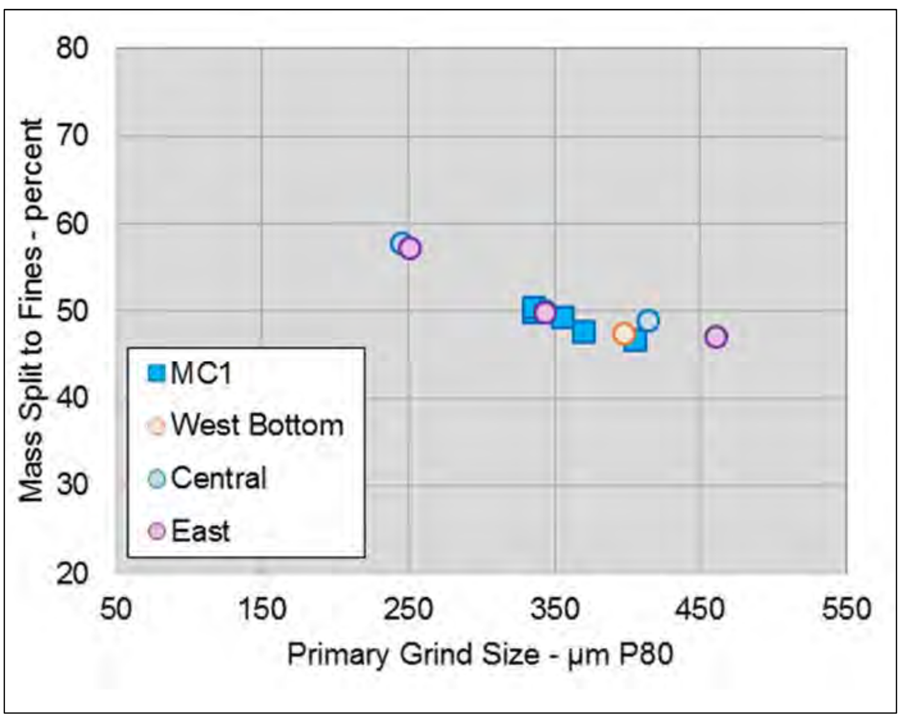
Note: Figure prepared by Ausenco, 2018.

Figure 13-20: GRG Recovery vs Feed Grade Mass Recovery



Note: Figure prepared by Ausenco, 2018.

Figure 13-21: Mass Split to Fines vs Grind size



Note: Figure prepared by Ausenco, 2018.

Gravity tests followed by split circuit flotation tests were completed at primary grind P80 sizes ranging from 311 to 414 µm for the master composite sample, and P80s between 245 to 461 µm for the three variability samples.

Total gold recovery to the combined hydroflotation and fines rougher concentrates averaged approximately 87%. Some of the tests showed a clear recovery trend versus grind size (Figure 13-22), although a group of tests on the master composite and West Bottom composite averaged 90% gold recovery. The final tailings grades ranged between 0.07 and 0.17 g/t Au, but did not consistently trend with primary grind size.

Gold recovery across the HydroFloatTM cell averaged 85%. Tests on the Central and East composites tended to show a steep decrease in recovery with increasing primary grind size, but the trend was not consistent for the master composite and the West Bottom composite.

Gold recoveries across the conventional fines flotation circuit averaged 89%. The combined hydroflotation and conventional flotation concentrate mass recoveries averaged 9.6%; 4.5% from the fines rougher concentrate and 5.1% from the hydroflotation concentrate.

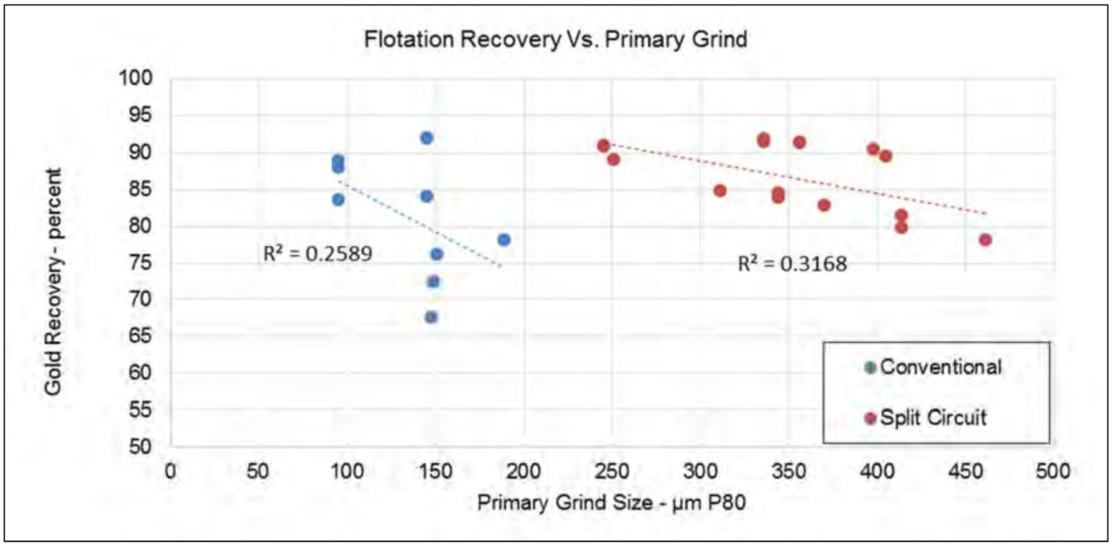
Overall recoveries, ore to gravity plus flotation concentrates, were comparable between conventional and split circuits, albeit there was an approximately 200 µm offset in the grind size–recovery relationship (Figure 13-23).

Circuit Performance Comparison

There was not a clear difference in overall gold recoveries between the conventional and split circuits. The conventional circuit feed grades averaged 1.73 g/t Au, while the split circuit feeds averaged 1.94 g/t Au. The flotation feed gold grades were also generally higher for the split circuit tests, as less gold was recovered by gravity than at the finer feed sizes for the conventional tests.

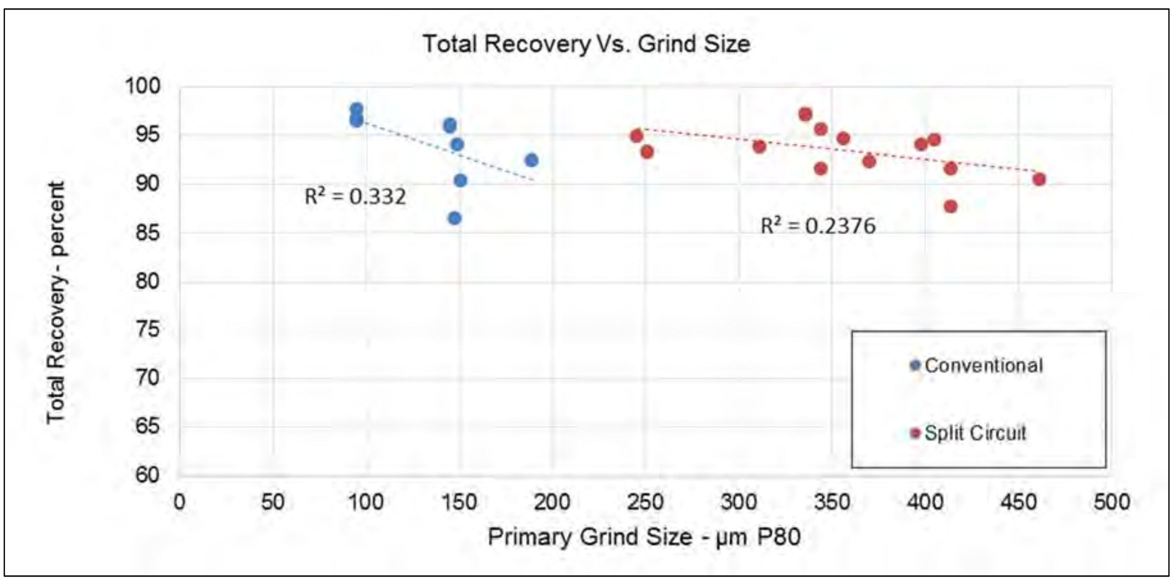
Table 13-17 compares test results of conventional tests completed at a primary grind P80 of about 150 µm with split circuit tests completed with a P80 of 340–400 µm. The conventional circuit gold averaged 91.7% while the split circuit gold recoveries averaged 94.2%. However, the average split circuit feed grade was somewhat greater than that of the conventional tests. On average, the split circuit tails grade was 0.01 g/t Au higher than the conventional circuit tails grade for this selection of tests. This difference is not significant in the context of the accuracy of the testwork, particularly as there was a significant difference in calculated head grades.

Figure 13-22: Flotation Recovery vs. Primary Grind



Note: Figure prepared by Ausenco, 2018.

Figure 13-23: Total Recovery vs. Grind Size



Note: Figure prepared by Ausenco, 2018.

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Table 13-17: Comparison of Metallurgical Results

Composite	Conventional Circuit				Split Circuit			
	Feed (g/t Au)	Grind (K_{80} µm)	Total Recovery (%)	Tails (g/t Au)	Feed (g/t Au)	Grind (K_{80} µm)	Total Recovery (%)	Tails (g/t Au)
MC1	1.97	145	96.0	0.09	1.92	350	95.3	0.1
West Bottom	1.38	149	94	0.09	1.1	398	94	0.07
Central Top	0.96	151	90.3	0.1	3.53	344	95.6	0.17
East Bottom	1.11	148	86.4	0.16	1.64	344	91.6	0.15
Average	***1.35***	***148***	***91.7***	***0.11***	***2.05***	***359***	***94.2***	***0.12***
MC3					2.21	311	93.8	0.15
Central Bottom					1.96	245	94.9	0.11
East Top					1.26	251	93.3	0.09

Note: MC1 results are the average of two tests for the conventional circuit and four tests for the split circuit. These split circuit tests included three tests on MC2 which did not contain any west top material.

The East Bottom sample tended to have lower gold recoveries than the other sample tested by both flowsheets. The Central Bottom and East Top samples required a primary grind P80 of 250 µm to achieve tail grades in the 0.10 g/t Au range using the split circuit flowsheet. More variability sample tests are required to understand the sensitivities to metallurgical performances.

Flotation Concentrate Upgrading (Cleaning)

Both fines rougher flotation and hydroflotation concentrates were upgraded.

Hydroflotation concentrates produced with master composite samples were reground and upgraded using one or two stages of flotation cleaning. The concentrates ranged in mass from 4.5 to 5.3% of the feed mass, and contained between 14 to 35% of the feed gold. In all tests, a considerable reduction in concentrate mass was achieved; with first cleaner concentrate masses ranging from 0.3–0.8% of the feed mass.

The hydroflotation concentrate regrind P80 of 81 µm resulted in an overall 2% loss of gold to the cleaner tails. Subsequent tests used additional regrinding to P80 of 40 µm, which reduced the 1st cleaner tail gold losses from 0.9–1.3% with stage recoveries from 95.6–98.0%.

Fines rougher concentrate cleaner flotation tests on the master composite sample indicated that the concentrate mass could be reduced by 60% after one stage of dilution cleaning, with only 0.6% Au lost to tailings (in open circuit).

Figure 13-24 shows the HydroFloatTM cleaner concentration results, and Figure 13-25 shows the results for the fines concentrate.

Concentrate Cyanide Leach Testing

A series of cyanide bottle roll tests was completed on samples of cleaner flotation concentrate, to confirm the expected leach extractions upon processing in the Touquoy process plant leach circuit.

Samples of first cleaner concentrate produced from conventional flowsheet tests completed at a primary grind P80 of 150 µm were selected for cyanide leach testing. In addition, a single leach test was completed on a sample of combined first cleaner concentrate produced in a split circuit. Cyanide leach tests were 48 h in duration with periodic adjustments throughout the test to maintain 2,000 mg/L. Despite the high sulphur content in the concentrate samples, greater than 90% recoveries were achieved without pre-aeration.

On average, 92% of the gold was extracted from the rougher concentrates within 24 hours. Gold extraction from the first cleaner concentrate was nearly 98% with tails gold grade of 0.99 g/t Au. The increase in gold extraction from the cleaner concentrate relative to the rougher concentrate is attributed to the fact that the hydroflotation concentrate had been reground to a P80 of 39 µm prior to flotation upgrading. Future testwork is recommended to determine the optimal regrind particle size, with a view to maximizing leach recoveries.

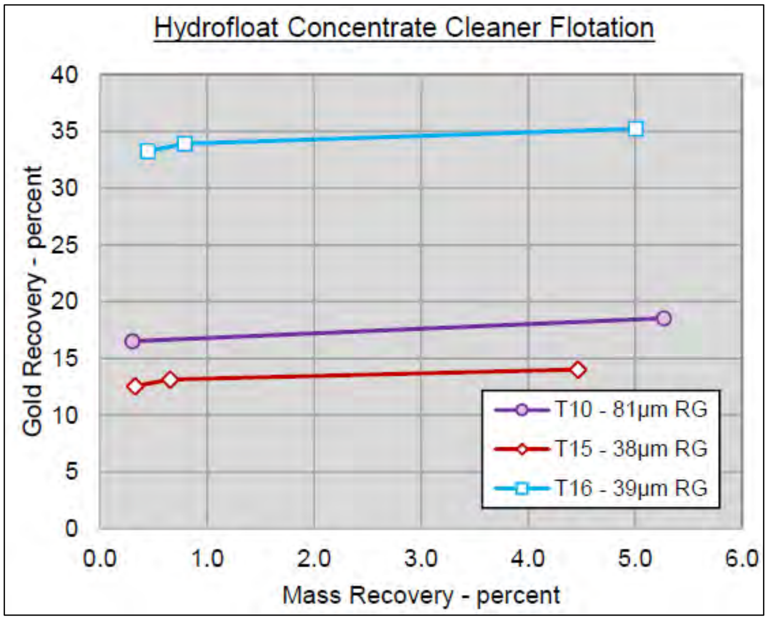
A single leach test was conducted with carbon, to determine the loading of potentially deleterious elements such as copper, lead, arsenic and mercury. The test was conducted using a carbon concentration of 15 g/L. Approximately 19% of the copper in the leach feed was extracted to the leach solution, but <1% reported to the loaded carbon. This was a consequence of the high cyanide concentrations and copper complex speciation. Minor amounts of lead and arsenic were measured on the carbon. Mercury values were below detection limits. Further work is required to confirm leach with solids and cyanide soluble assays.

Figure 13-26 shows the leach extraction curves.

13.4.6 Projected Recovery

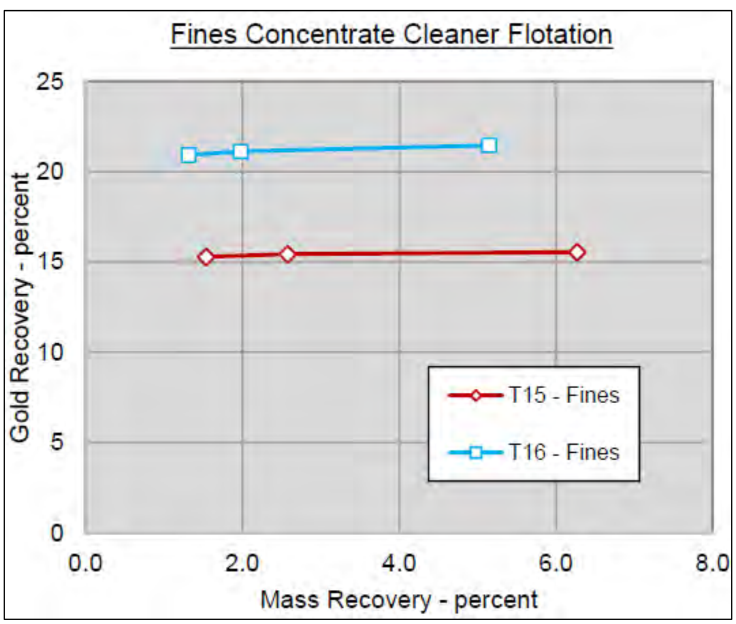
The projected plant performance for Cochrane Hill ore process is summarised in Table 13-18. An explanation of the derivation of the inputs for performance prediction is provided in the following sub-sections.

Figure 13-24: HydroFloat™ Concentrate Cleaner Flotation



Note: Figure prepared by Ausenco, 2018.

Figure 13-25: Fines Concentrate Cleaner Flotation



Note: Figure prepared by Ausenco, 2018.

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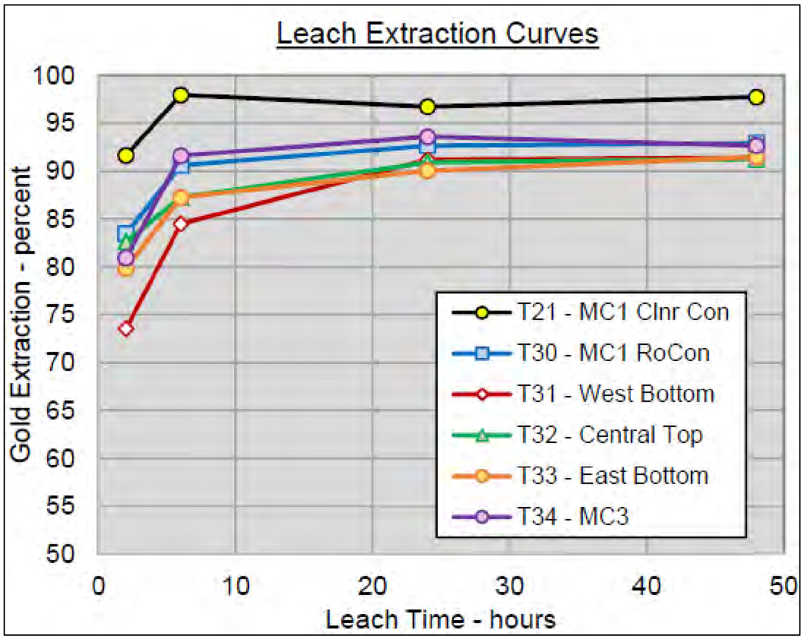
Figure 13-26: Leach Extraction Curves



Note: Figure prepared by Ausenco, 2018.

Table 13-18: Overall Gold Recovery

Description	Units	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11
Mill feed	kt	1,700	2,000	2,000	2,000	2,000	1,457
Gold in LOM mill feed	g/t	1.21	1.33	1.24	1.25	0.98	0.40
Feed gold	oz	66,146	85,534	79,734	80,365	63,012	18,740
Gold reporting to gravity concentrate	%	51.5	51.5	51.5	51.5	51.5	51.5
Gold reporting to flotation feed	%	48.5	48.5	48.5	48.5	48.5	48.5
Gold flotation recovery	%	88.2	88.7	88.4	88.4	69.1	44.0
Gold reporting to flotation concentrate	%	42.8	43.0	42.9	42.9	33.5	21.3
Total gold recovered to concentrates	%	94.3	94.5	94.4	94.4	85.0	72.8
Flotation concentrate grade	g/t	21.16	22.91	21.68	21.9	17.14	6.99
ILR recovery (gravity concentrate to doré)	%	99.0	99.0	99.0	99.0	99.0	99.0
Gold in leach tail	g/t	0.5	0.5	0.5	0.5	0.5	0.5
Leach recovery (flotation concentrate to doré)	%	97.6	97.8	97.7	97.7	97.1	92.8
Gold overall recovery (ore to doré)	%	**92.8**	**93.1**	**92.9**	**92.9**	**83.5**	**70.8**
Flotation mass pull (dry)	%	**2.45**	**2.50**	**2.45**	**2.45**	**1.92**	**1.22**

Note: ILR = intensive leach reactor

Gravity Recoverable Gold

A fixed gravity gold recovery has been applied across the LOM. Gravity gold recovery was estimated by taking the average recovery of fourteen, 30 kg GRG tests, completed over a range of feed grades, sample sizes and ore types, prior to split circuit flotation analysis as shown on Figure 13-27. The GRG values from the 30 kg sample tests were lower than the 4 kg sample tests, but are believed to be more representative given the larger sample size. The average head grade of samples used in the GRG tests was 1.82 g/t Au and corresponding average recovery was 51.5%, which was applied to the recovery estimation model.

Flotation recoveries for feed grades below 1.15 g/t Au were estimated by fixing the GRG recoveries and maintaining a constant tails grade; the constant rails grade was based on results of the testwork and Ausenco's experience. By fixing the GRG recoveries, flotation recoveries were variable in order to maintain the constant tails grades.

Future testwork is recommended, including additional 30 kg GRG and flotation/split circuit tests with head grades representative of the yearly mine plan head grades are warranted.

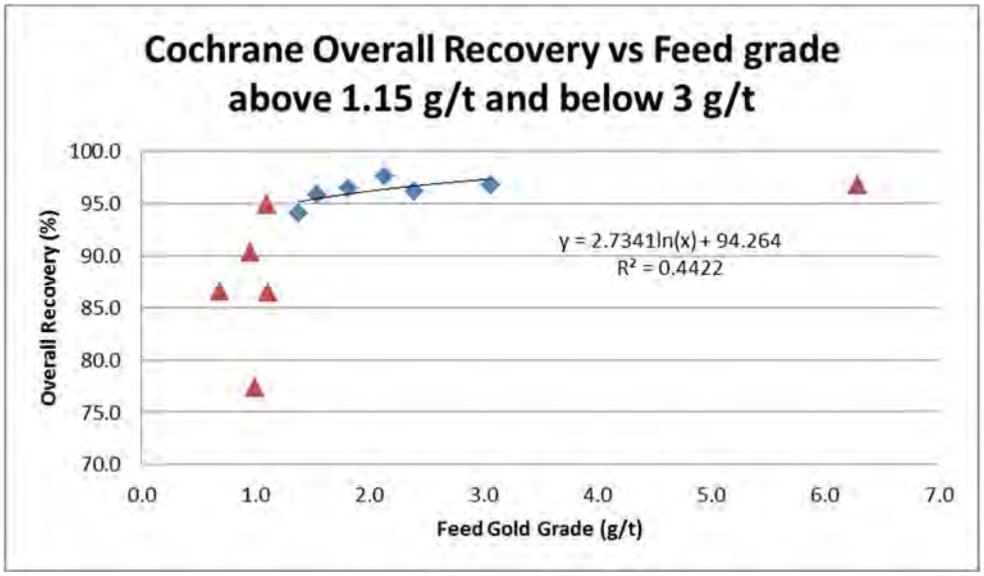
13.4.7 Total Gold Recovery

Total gold recoveries from ore to gravity plus flotation concentrates were calculated based on the extrapolation of overall gravity and flotation testwork recoveries as a function of feed grade, as shown on Figure 13-27. This estimation was applied only to samples with a head grade >1.15 g/t Au.

Recoveries for feed grades <1.15 g/t Au decrease rapidly and no clear correlation was observed. In the absence of a clear correlation between grade and recovery at the lower feed grades, tails grades were estimated at 0.15 g/t Au for a feed grade of 0.98 g/t Au and 0.11 g/t Au for a feed grade of 0.40 g/t Au, based on Ausenco's experience. Once the tails grades constrained and, GRG recoveries were fixed, the flotation recoveries were calculated accordingly.

Average recoveries for Cochrane Hill are expected to range from 93% in the first year of the mine plan to 87% in the final year of mining. The overall average LOM recovery is expected to be 91.4%.

Figure 13-27: Overall Recovery vs Feed Grade



Note: Figure prepared by Ausenco, 2018.

Cleaner Flotation Recovery

An estimated 1% gold loss by cleaning rougher flotation concentrate was used based on open cleaning flotation tests. Locked-cycle testing should be performed to establish additional confidence in the cleaning stage gold losses for use in more detailed design.

Touquoy Process Plant Leach Circuit Recoveries

The CIL circuit tails grade was estimated as 0.5 g/t Au based on one test result of 0.48 g/t Au achieved in the cyanide leach tests. Intensive leach circuit recovery from gravity concentrate to doré was estimated as 99%, based on Ausenco's experience. More cyanide leach testwork is recommended to add further confidence to these recoveries.

13.4.8 Deleterious Elements

There are no known deleterious elements that will negatively impact metallurgical recovery of the Cochrane Hill mineralization.

No deleterious elements are expected in the doré. Copper head grades range from 30–140 g/t Cu. Copper reporting to carbon at the Touquoy process plant can be minimised by adjustment of cyanide addition. Alternatively, the copper content will be reduced through the smelting process.

14.0 MINERAL RESOURCE ESTIMATES

14.1 Introduction

Information from previous technical reports has been used as a basis for the descriptions in this section (Schulte et al., 2014; Schofield, 2014a, 2014b, 2015a, 2015b; Parks et al., 2015, Staples et al., 2017; and Staples et al., 2018.).

14.2 Recoverable Resource Estimation with Multiple Indicator Kriging

For all of the resource estimates presented in this section of the Report, the method of multiple indicator kriging (MIK) with block support correction was used to estimate the Mineral Resources based on an anticipated approach to mill feed material selection in mining. Some details of the method are explained in Deutsch and Journel (1992). The MIK approach to resource estimation in gold deposits provides two important improvements over the use of ordinary block kriging and other linear estimation methods like Inverse distance weighting methods:

- It deals more robustly with the high coefficient of variation (CV), and the continuity of extreme values in the composite data of gold deposits which typically exhibit CVs in excess of 2;
- It provides a more reasonable approach to the estimation of resources to be recovered using highly-selective mining practices than can be achieved with the linear methods.

For a typical implementation of the MIK approach to estimate resources for open pit mining, the basic unit of estimation is a panel with horizontal dimensions equal to the average drill hole spacing. For example, in the Touquoy deposit, these dimensions are 25 mE and 20 mN. The vertical dimension is usually set at some integer multiple of the mining block height to be used for mill feed material selection in mining. For example, in the Touquoy deposit, now in production, selective mining of ore is done on 5 m flitches and a panel height of 5 m was used in the resource estimation. In the other deposits, panel sizes have varied slightly to suit the drill spacing and the overall deposit geometry. In production in these deposits, ore selection on 5 m flitches, similar to that at Touquoy is planned.

The MIK approach makes greater demands than many other methods in terms of modelling parameters. A detailed description of the histogram of samples grades for each mineralized domain is required, and is usually provided in the form of a set of conditional statistics for a range of grade thresholds. The method also requires a variogram model for the indicator data defined for each grade threshold at which the histogram is defined. For each mineralized domain, this requires the calculation and modelling of 14 indicator variograms as well as the variogram model of the composite gold grades.

For each of the mineral deposits discussed in the following sub-sections, details of the conditional statistics and some details of the indicator variograms are presented.

14.3 Mineralization Domains

The approach to resource estimation used in this Report uses mineralized domains to report the grade properties of areas of mineralization where the statistical properties of the composites appear consistent in terms of their histogram and spatial continuity. The domains attempt to identify areas of consistent mineralization style based on their statistical properties.

For some of the resource models, a single mineralized domain has been used. However, Cochrane, Touquoy and the Egerton Zone, different mineralization styles with clearly different histograms of composite grade were identified and modelled with different statistical parameters.

14.4 Touquoy

14.4.1 Data Supporting the Estimate

A total of 389 diamond drill holes (37,572 m) and 28 RC drill holes (1,728 m) form the sample basis of the Touquoy resource estimate. Of these, 44 diamond holes (5274 m) and all of the RC holes were added to the database in 2018. From these drill holes, 31,284 one-metre composites were selected for use for modelling and estimating the Mineral Resources.

The resource model has been cut by a triangulated surface modelled to the base of the pit surface as of December 31, 2018. The resource estimates do not take into account the small tonnages extracted by historical underground mining, much of which has not been mined through.

14.4.2 Domains

Detailed geological models of the Touquoy Mineral Resource were constructed by the project geologists during the exploration and development phases of the project, and are being maintained during the mining phase. These provide a guide to the construction of the mineralization domains used in estimation.

Domaining of the mineralization styles in the deposit used mainly geostatistical analysis to indicate the limits of the two mineralization domains. Domain 1, which corresponds to a more pervasive style of gold mineralization at the northwestern end of the deposit, has a much smaller proportion of very low gold grades, a lower maximum gold grade, and a lower CV than does Domain 2. Domain 2, which identifies the more classical Meguma-style of gold mineralization, has lower grade overall than Domain 1, covers a much larger area of the deposit, and has a higher maximum composite gold grade and a significantly higher CV.

14.4.3 Composites

The one metre drill-hole composite data have been separated into two mineralization domains, based mainly on the observation of higher grades and higher sampling density in the northwestern corner of the sampled area.

No sub-horizontal oxide domains were defined on the sampling data. Sampling of the few metres of till covering the mineralization was not included in the data supporting resource estimation.

14.4.4 Exploratory Data Analysis

Table 14-1 shows the univariate statistics of the 1 m composite data for each of the mineralized domains in the Touquoy deposit. These data confirm the higher-grade smaller character of the Domain 1 mineralization compared to the large, lower grade and much more variable nature of Domain2.

Conditional statistics of the 1 m composite gold grades were evaluated for 15 cumulative frequency thresholds for each of Domain 1 and Domain 2. These are shown in Table 14-2.

14.4.5 Density Assignment

The global bulk density used is 2.79 t/m^3.

14.4.6 Grade Capping/Outlier Restrictions

No grade capping or extreme sample grade restrictions were used.

14.4.7 Variography

Directional sample variograms and variogram models were generated for both domains, which resulted in a total of 28 variogram models. Review of the variograms indicated:

- In Domain 1 there is clear anisotropy in the directional variograms, which, at larger lags, shows a much greater sub-vertical continuity (Table 14-3);
- In Domain 2 there is clear evidence of short-scale anisotropy (lags <20 m) and at larger scales at both indicator thresholds (Table 14-4).

Table 14-1: Univariate 1 m Composite Statistics, Domain 1 and Domain 2

Statistic	Domain 1	Domain 2
No of Data	9699	21585
Mean	0.90	0.44
Variance	10.18	8.43
CV	3.54	6.63
Minimum	0.00	0.00
Q1	0.005	0.005
Median	0.128	0.012
Q3	0.804	0.131
Maximum	117.66	175.27

Table 14-2: Indicator Class Statistics, Domains 1 and 2

Cumulative Proportion	Domain 1		Domain 2	
	Indicator Threshold	Class Mean	Indicator Threshold	Class Mean
0.10	0.001005	0.000	0.001043	0.000
0.20	0.003002	0.001	0.001259	0.001
0.30	0.010017	0.006	0.005142	0.004
0.40	0.045001	0.025	0.010022	0.007
0.50	0.128001	0.080	0.012009	0.010
0.60	0.288000	0.202	0.034001	0.022
0.70	0.576000	0.419	0.082001	0.055
0.75	0.804000	0.680	0.131001	0.106
0.80	1.120000	0.950	0.223000	0.172
0.85	1.510001	1.310	0.392000	0.296
0.90	2.182000	1.824	0.770000	0.558
0.95	3.484000	2.742	1.760000	1.172
0.97	4.995000	4.138	2.830000	2.204
0.99	10.21400	7.040	7.220000	4.368
1.00	117.6580	22.918	175.2740	18.113

Table 14-3: Indicator and Gold Variogram Parameters, Domain 1

Gold Threshold	Cumulative Proportion	Nugget C0	Structure 1					Structure 2				
			T1	C1	Ax	Ay	Az	T2	C2	Ax	Ay	Az
0.001	0.10	0.09	exp	0.49	55	9	15	exp	0.01	56	226	16
0.003	0.20	0.09	exp	0.25	7.5	46	3	exp	0.41	8	117	61
0.010	0.30	0.05	exp	0.3	17	38	2.5	exp	0.45	25	89	355
0.045	0.40	0.05	exp	0.34	14	46	3.5	exp	0.18	15	47	227
0.128	0.50	0.03	exp	0.35	2.5	18	3	exp	0.5	76	57	820
0.288	0.60	0.01	exp	0.42	38	38	2.5	exp	0.05	38	45	279
0.576	0.70	0.01	exp	0.49	2.5	38	38	exp	0.19	409	56	42
0.804	0.75	0.06	exp	0.49	38	38	2.5	exp	0.14	39	49	574
1.120	0.80	0.09	exp	0.50	38	38	2.5	exp	0.14	53	39	584
1.510	0.85	0.17	exp	0.49	38	38	2.5	exp	0.22	54	58	806
2.182	0.90	0.22	exp	0.51	14	4	2.5	exp	0.01	28	15	3
3.484	0.95	0.23	exp	0.62	8	3	2.5	exp	0.01	10	41	3
4.995	0.97	0.69	exp	0.27	16	5	15	exp	0.02	45	653	131
10.214	0.99	0.4	exp	0.59	4	32	2.5	exp	0.01	5	46	3
gold		0.18	exp	0.50	19	20	2.5	exp	0.05	21	34	57

Gold Threshold	Structure 3					3D Rotations					
	T3	C3	Ax	Ay	Az	Axis / Angle					
0.001	sph	0.41	59	391	26	z	-2	y	-12	x	1
0.003	sph	0.25	652	154	62	z	-2	y	8	x	-11
0.010	sph	0.19	148	90	946	z	79	y	-8	x	35
0.045	sph	0.44	148	48	515	z	3	y	-5	x	55
0.128	sph	0.11	686	58	846	z	27	y	17	x	61
0.288	sph	0.52	126	46	289	z	-81	y	12	x	-30
0.576	sph	0.31	581	57	126	z	74	y	51	x	58
0.804	sph	0.3	63	102	761	z	77	y	48	x	61
1.120	sph	0.26	109	65	642	z	5	y	-14	x	5
1.510	sph	0.12	62	131	847	z	4	y	-11	x	77
2.182	sph	0.26	73	48	113	z	-2	y	10	x	16
3.484	sph	0.14	48	106	27	z	70	y	-67	x	-79
4.995	sph	0.02	47	698	135	z	15	y	24	x	9
10.214	sph	0.01	69	79	5	z	1	y	-23	x	44
gold	sph	0.27	112	54	58	Z	5	Y	-2	X	14

exp(h) = 1.0-exp(-3*h/a); sph(h) = 1.5*h/a-0.5*(h/a)**3 for h <=a, = 1.0 for all h > a

Table 14-4: Indicator and Gold Variogram Parameters, Domain 2

Gold Threshold	Cumulative Proportion	Nugget C0	Structure 1					Structure 2				
			T1	C1	Ax	Ay	Az	T2	C2	Ax	Ay	Az
0.001	0.1	0.08	exp	0.37	43	4	5.5	exp	0.03	48	15	6
0.001	0.2	0.31	exp	0.34	40	10	12	exp	0.19	40	265	36
0.005	0.3	0.33	exp	0.27	8	16	6	exp	0.16	12	50	88
0.010	0.4	0.34	exp	0.32	67	37	12	exp	0.15	68	75	124
0.012	0.5	0.18	exp	0.29	2.5	5	3.5	exp	0.25	20	60	43
0.034	0.6	0.17	exp	0.31	2.5	3	4	exp	0.27	17	45	36
0.082	0.7	0.2	exp	0.27	2.5	30	7.5	exp	0.31	18	31	267
0.131	0.75	0.19	exp	0.34	3	17	2.5	exp	0.27	19	35	280
0.223	0.8	0.21	exp	0.42	19	4	3.5	exp	0.1	61	15	50
0.392	0.85	0.16	exp	0.49	13	3	2.5	exp	0.08	63	34	11
0.770	0.9	0.28	exp	0.46	38	28	2.5	exp	0.25	107	29	79
1.760	0.95	0.48	exp	0.34	2.5	3	25	exp	0.16	53	24	54
2.830	0.97	0.69	exp	0.27	4	4	5.5	exp	0.02	71	35	520
7.220	0.99	0.78	exp	0.19	37	38	2.5	exp	0.01	39	47	3
gold		0.41	exp	0.27	7	5	2.5	Exp	0.27	11	17	3

Gold Threshold	Structure 3					3D Rotations					
	T3	C3	Ax	Ay	Az	Axis / Angle					
0.001	sph	0.52	50	332	22	z	-2	y	-12	x	1
0.001	sph	0.16	41	617	202	z	-2	y	8	x	-11
0.005	sph	0.24	61	199	110	z	79	y	-8	x	35
0.010	sph	0.19	688	76	126	z	3	y	-5	x	55
0.012	sph	0.28	190	61	98	z	27	y	17	x	61
0.034	sph	0.25	92	796	80	z	-81	y	12	x	-30
0.082	sph	0.22	156	62	349	z	74	y	51	x	58
0.131	sph	0.2	176	55	334	z	77	y	48	x	61
0.223	sph	0.26	312	50	51	z	5	y	-14	x	5
0.392	sph	0.27	150	48	44	z	4	y	-11	x	77
0.770	sph	0.02	109	57	248	z	-2	y	10	x	16
1.760	sph	0.02	66	38	353	z	70	y	-67	x	-79
2.830	sph	0.02	72	56	649	z	15	y	24	x	9
7.220	sph	0.02	91	107	7	z	1	y	-23	x	44
gold	Sph	0.21	84	41	26	Z	15	Y	-5	X	35

exp(h) = 1.0-exp(-3*h/a); sph(h) = 1.5*h/a-0.5*(h/a)**3 for h <=a, = 1.0 for all h > a

14.4.8 Estimation / Interpolation Methods

Table 14-5 provides details of the panel dimensions and basic search sizes and search criteria used for the modelling.

The Touquoy block model assumes mineralized material can be selected down to a minimum mining width of 5 m on 2.5 m benches. After the following variance ratio adjustment, the resultant block histograms are assumed to be log-normal in shape:

- Domain 1: variance ratio of 0.14;
- Domain 2: variance ratio of 0.07.

A grade control drill-hole pattern of 10 m by 5 m is assumed with a down-hole sampling interval of 2.5 m.

14.4.9 Model Validation

The resource predictions of the most recent resource model of the Touquoy gold deposit have been compared to those predicted prior to production using a data set of 31,284 one-metre composites. They have also been compared in detail to the resource extracted since the beginning of mining until December 31, 2018.

On the basis of these comparisons, the downgrade of the grade estimates in those panels affected by the KMS-15 sampling, which was introduced into the resource estimates since 2008 has been removed for the current grade estimates because the reconciliation data from resource estimates, grade control and production do not support the 22% downgrade introduced into the Touquoy estimates since 2008. However, the downgrade of the panel classifications from Measured to Indicated for those panels affected by the KMS-15 sampling has been maintained.

14.4.10 Classification of Mineral Resources

The resource estimate for each panel was initially classified as Category 1, 2 or 3 based on the results of the data search in the panel neighbourhood:

- Category 1: uses search radii (1), and search parameters (1). If the data found in this search satisfy these criteria (at least 16 samples found in at least four octants), the panel is given a Category 1 flag;
- Category 2: If the first search criteria are not satisfied, search radii (2) are used with search parameters (1). If these criteria are satisfied, the panel is given a Category 2 flag;

Table 14-5: Model Panel Parameters, Touquoy

Criteria	Model Parameters		
	East	North	Elevation
Panel dimensions (m)	25	20	5
Panel origin	21350	9880	902.5
Number of panels	38	24	46
Panel discretization	5	5	5
Block dimensions (m)	5	5	5
Criteria	**Search Parameters: Radii**		
Search radii (1) (m)	25	20	7.5
Search radii (2) (m)	33	27	10
Search radii (3) (m)	33	27	10
Criteria	**Search Parameters: Data and Octants**		
Search	(1)	(2)	(3)
Minimum data	16	16	8
Minimum octants	4	4	2
Maximum data	48	48	48

- Category 3: If the second search criteria are not satisfied, search radii (2) are used with search parameters (2) (at least eight samples found in at least two octants). If these criteria are satisfied, a Category 3 flag is applied. If not, no estimate for the panel is generated.

In reporting the resource estimates, Category 1 panel estimates were assigned to Measured Mineral Resources, Category 2 to Indicated Mineral Resources and Category 3 to Inferred Mineral Resources.

An additional constraint on the estimates is applied to take into account the uncertainty associated with the KMS-15 data that are used in the resource estimation. Panel estimates that are significantly affected by KMS-15 data in their neighbourhood and were initially assigned a category 1 flag were downgraded to a category 2 flag. This condition was activated if the weighted proportion of KMS-15 samples in the neighbourhood exceeded 0.20. Approximately 5 Mt of mineralization affected by the KMS-15 sampling was downgraded from Measured to Indicated.

Mineral Resources were initially classified using the 2004 JORC Code, and have been reconciled to the 2014 CIM Definition Standards.

14.4.11 Reasonable Prospects for Eventual Economic Extraction

Mineral Resources are reported at a base-case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations:

- Assumption of open pit mining methods;
- Gold price of US$1,400/oz;
- 94% metallurgical recovery;
- Pit bench face angles that range from 40–65º;
- Mining costs of $13.40/t;
- Processing costs of $11.94/t;
- General and administrative (G&A) costs of $1.71/t.

14.5 Beaver Dam

14.5.1 Data Supporting the Estimate

The current Mineral Resource estimate is based on the drilling completed by Acadian from 2005–2009 and Atlantic Gold from 2014–2015. Combined, these drilling programs comprise some 191 drill holes (28,632 m).

The topographic surface used to generate the resource estimates takes into account the excavations of previous surface mining to the extent possible from surveys of the drill hole collars. The details of previous underground development were made available by Acadian as a DXF file. This was used to deplete the resource estimate where those underground workings intersected blocks for which a resource had been estimated.

14.5.2 Domains

No geological models were constructed.

The requirement to domain the deposit was evaluated using geostatistical techniques. All data are considered to represent a single mineralized domain, Domain 1.

14.5.3 Composites

Data were composited into 2 m intervals.

14.5.4 Exploratory Data Analysis

A cumulative histogram of the mineralized 2 m composite gold grades indicated that grades are strongly positively skewed with a coefficient of variation of 9.4, indicating a high proportion of very low-grade samples and a small tail of high composite grades greater than 100 g/t Au. The maximum composite grade of 257 g/t Au is some 490 times the average composite grade for the data set.

An evaluation of the conditional statistics indicated that the 95 highest-grade composites account for approximately 48% of the total gold content of the composites.

Plans and cross section plots of drill sections were reviewed, with samples coloured by gold grade. The plan views indicated that the strike of the mineralization is around 6º north of west. The cross section shows a broad scatter of gold grades which plunge at around 65º to the north.

14.5.5 Density Assignment

The global bulk density used is 2.73 t/m^3.

14.5.6 Grade Capping/Outlier Restrictions

No grade capping or extreme sample grade restrictions were used.

14.5.7 Variography

Directional sample variograms in which reasonable spatial statistics can be generated were conducted for eight directions.

For the 60th percentile, the directional anisotropy is pronounced with directions normal (azimuth ~90) to the strike of the mineralization showing the shortest ranges and those sub-parallel to the strike (azimuth 155–165) showing the longest ranges. For the 90th percentile, the directional anisotropy is still present but much reduced.

Overall, there is greater continuity of mineralization along strike and the lesser continuity in the cross dip and down dip directions.

14.5.8 Estimation/Interpolation Methods

Table 14-6 provides details of the panel dimensions and basic search sizes and orientations used for the resource estimate.

The Beaver Dam resource model assumes mineralization can be selected down to a minimum mining width of 5 m on 5 m benches. After variance adjustment, the resultant block histograms are assumed to be log-normal in shape. The variance ratio for the domain, which includes an adjustment for the information effect introduced by grade control sampling, is 0.020. A grade control drill-hole pattern of 5 m by 5 m is assumed with a down-hole sampling interval of 2.5 m.

Table 14-6: Model Panel Parameters, Beaver Dam

Criteria	Model Parameters		
	East	North	Elevation
Panel dimensions (m)	25	10	5
Model origin	562.5	905.0	602.5
Number of Panels	34	35	120
Panel discretization	5	2	2
Assumed grade control selective mining unit size (m)	5	5	5
Criteria	**Kriging Parameters**		
	Measured	Indicated	Inferred
Min no. of data	16	16	8
Max no. of data per octant	4	4	2
Min no. of octants with data	4	4	2
X (east) search radius (m)	25	37.5	37.5
Y (north) search radius (m)	8	12	12
Z (RL) search radius (m)	25	37.5	37.5
Criteria	**Search Rotations**		
Order of rotations (anticlockwise rotations are +ve)	Rotation Axis		Rotation Angle
1	X		25
2	Z		-6

14.5.9 Block Model Validation

At a global level, the mean grade of the panel estimates was compared to the declustered mean grade of the drill hole composites used to create the panel estimates and found to be within 5%.

At a local level, section plots of the panel estimates of gold grade were compared to section drill hole gold grades to check for reasonable coincidence of higher and lower grade areas in both. There comparisons were found to be reasonable.

14.5.10 Classification of Mineral Resources

The resource estimate for each panel was initially classified as Category 1, 2 or 3 based on the results of the data search in the panel neighbourhood (refer to Table 14-6):

- Category 1: uses search radii (1), and search parameters (1). If the data found in this search satisfy these criteria (at least 16 samples found in at least four octants), the panel is given a Category 1 flag;

- Category 2: If the first search criteria are not satisfied, search radii (2) are used with search parameters (1). If these criteria are satisfied, the panel is given a Category 2 flag;
- Category 3: If the second search criteria are not satisfied, search radii (2) are used with search parameters (2) (at least eight samples found in at least two octants). If these criteria are satisfied, a Category 3 flag is applied. If not, no estimate for the panel is generated.

In reporting the resource estimates, Category 1 panel estimates were assigned to Measured Mineral Resources, Category 2 to Indicated Mineral Resources and Category 3 to Inferred Mineral Resources.

14.5.11 Reasonable Prospects of Eventual Economic Extraction

Mineral Resources are reported at a base-case cut-off grade of 0.3 g/t Au. The cut-off grade includes the following considerations:

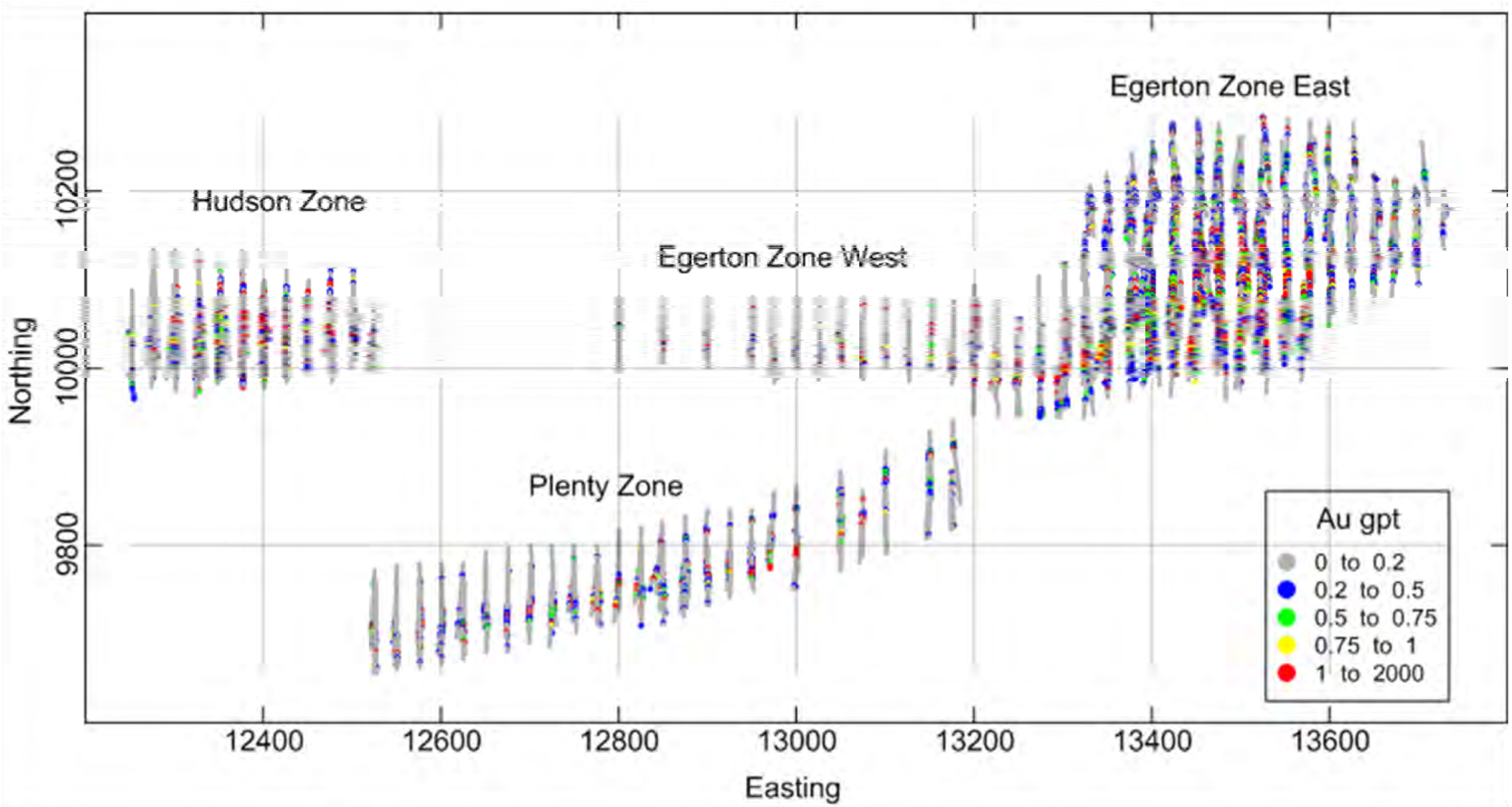
- Assumption of open pit mining methods;
- Gold price of US$1,400/oz;
- Exchange rate of C$1:US$0.90;
- 95% metallurgical recovery;
- Pit bench face angles that range from 40–70º;
- Mining costs of $2.90/t mined, and a $0.015/t bench increment;
- Process costs of $13.51/t milled;
- G&A costs of $1.71.

14.6 Fifteen Mile Stream

14.6.1 Data Supporting the Estimate

The gold mineralisation at Fifteen Mile Stream has been explored by drilling over a strike length of some 4 km and to a depth of approximately 600 m. A total of 500 drill holes (51,770 m) are included in the drill-hole data set. The bulk of the available sample information is located on sections between 12200 and 13800mE in three main zones of mineralization known as the Hudson Zone in the west, the Egerton–MacLean Zone in the east and the Plenty Zone to the south (Figure 14-1). The average drill section spacing is around 25 m in all zones.

Figure 14-1: Map of the Fifteen Mile Stream Mineralized Zones



Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2019. Note Egerton Zone = Egerton–MacLean Zone.

The topographic surface used to generate the resource estimates was constructed from the drill hole collars in the area of the resource model as well as the most recent LiDAR imagery. For the overburden surface (base of the till), the depth to the start of coring in each hole was taken as the depth to bedrock and a surface constructed from this information. The impact of previous underground development, for which only information of shafts and drives is available, was considered negligible and was not incorporated into the estimate.

14.6.2 Domains

No geological models were constructed for the Mineral Resource estimation.

Deposit domaining uses geostatistical techniques. The drill-hole composites have been assigned to four mineralization domains comprising the Egerton–MacLean Zone West, the Egerton–MacLean Zone East, the Hudson Zone and the Plenty Zone. Figure 14-1 included the spatial layout of the drill holes of the various mineralized zones at Fifteen Mile Stream.

14.6.3 Composites

Drill holes were composited on 2 m intervals.

14.6.4 Exploratory Data Analysis

Mineralized composite data sets for the Egerton–MacLean Zone West, Egerton–MacLean Zone East, the Hudson Zone, and the Plenty Zone were constructed, and univariate statistics were calculated for all zones. These are presented in Table 14-7. Table 14-8 shows the conditional statistics at 15 thresholds for all of these mineralized zones.

The data from all domains have high to very high CVs. The highest CV is in the Plenty Zone where the statistics are strongly influenced by a single very high-grade composite with a grade of 131 g/t Au, and a high proportion of low gold grades. The Egerton–MacLean Zone is by far the most significant body of mineralization with the largest number of composites and the highest average gold grade.

In the Egerton–MacLean Zone, four out of a total of 17,767 two-metre composite grades are >750 g/t Au with three of these >1,500 g/t Au. These four composites occur as adjacent pairs in two drill holes which are widely separated. Extensive visible gold was observed in the core for each pair of composites. All four samples were reduced to 300 g/t Au prior to calculating the summary and conditional statistics.

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Table 14-7: Summary Univariate Statistics, Mineralized Zones

Statistic	Egerton–MacLean East	Egerton–MacLean West	Hudson	Plenty
No of Data	15541	2226	3920	6226
Mean	0.54	0.18	0.30	0.25
Variance	36.10	2.27	1.58	8.15
CV	11.15	8.28	4.26	11.3
Minimum	0.00	0.00	0.00	0.00
Q1	0.005	0.00	0.005	0.005
Median	0.035	0.005	0.010	0.007
Q3	0.285	0.015	0.120	0.040
Maximum	300.0	44.16	35.86	131.7

Table 14-8: Summary Conditional Statistics, Mineralized Domains

Cumulative Proportion	Egerton–MacLean East		Egerton–MacLean West		Hudson		Plenty	
	Grade Threshold	Class Mean	Grade Threshold	Class Mean	Grade Threshold	Class Mean	Grade Threshold	Class Mean
0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.20	0.005	0.002	0.000	0.000	0.005	0.004	0.000	0.000
0.30	0.005	0.005	0.002	0.000	0.005	0.005	0.000	0.000
0.40	0.015	0.009	0.005	0.005	0.007	0.006	0.000	0.000
0.50	0.040	0.025	0.005	0.005	0.013	0.009	0.001	0.000
0.60	0.090	0.062	0.007	0.005	0.028	0.018	0.002	0.001
0.70	0.200	0.139	0.010	0.008	0.075	0.045	0.012	0.005
0.75	0.295	0.243	0.015	0.012	0.128	0.098	0.027	0.019
0.80	0.415	0.352	0.022	0.017	0.215	0.170	0.053	0.038
0.85	0.585	0.498	0.040	0.031	0.385	0.294	0.100	0.073
0.90	0.877	0.713	0.115	0.072	0.680	0.518	0.215	0.149
0.95	1.515	1.136	0.560	0.268	1.390	0.998	0.535	0.341
0.97	2.255	1.831	1.090	0.808	2.200	1.745	1.053	0.754
0.99	5.960	3.389	2.985	1.734	4.398	3.103	4.210	2.144
1.00	300.0	26.885	44.16	11.27	35.86	9.195	131.715	14.219

14.6.5 Density Assignment

The global bulk density used is 2.78 t/m^3. This average bulk density is the mean of 95 bulk density measurements made on unwaxed core samples using the immersion method.

14.6.6 Grade Capping/Outlier Restrictions

As discussed in Section 14.6.5, in the Egerton–MacLean Zone, four 2 m composites with grades >750 g/t Au were capped at 300 g/t Au in the dataset used for resource estimation. The highest grade in a 2 m composite with grade <750 g/t Au was 259 g/t Au.

No grade capping or outlier restrictions were used in any of the other mineralized zones.

14.6.7 Variography

Egerton–MacLean Zone

Directional sample variograms were generated for 10 directions for which there were reasonable spatial statistics. Figure 14-2 show graphs of the sample variograms for the median threshold and the 90th percentile threshold that was highlighted in Table 14-8. Table 14-9 shows the variogram models for all indicator thresholds and gold.

At the median threshold (0.040 g/t Au), the continuity exhibits a weak anisotropy with greater continuity in a roughly east–west and horizontal direction and weaker continuity in the north–south direction. At the 90th percentile (0.877 g/t Au), the continuity is markedly weaker, with insignificant anisotropy.

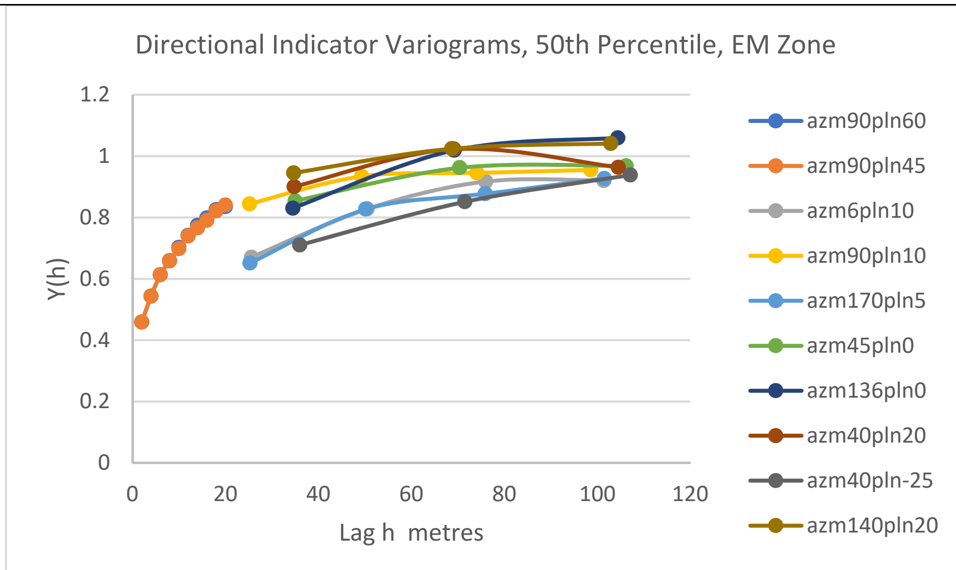
Hudson Zone

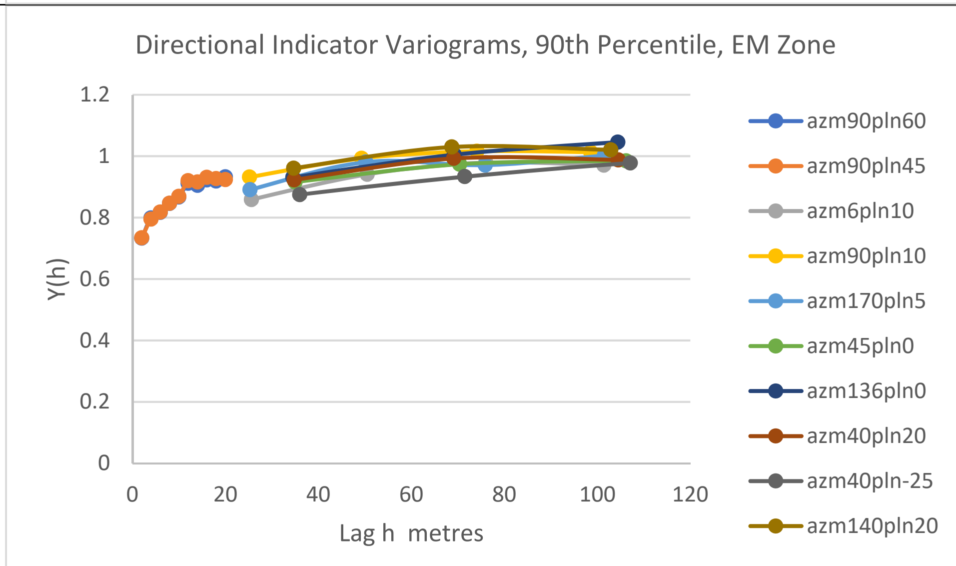
Directional sample variograms were generated for six directions for which there were reasonable spatial statistics. Figure 14-3 shows graphs of the sample variograms for the median threshold and the 90th percentile threshold identified in Table 14-8. The downhole variogram in each case is the only direction which exhibits any significant continuity.

Plenty Zone

Directional sample variograms were generated for nine directions for which there were reasonable spatial statistics. Figure 14-4 shows graphs of the sample variograms for the median threshold and the 90th percentile threshold identified in Table 14-8. In this zone, both sets of directional variograms indicate complex anisotropies in both the down-hole and larger-scale continuities.

Figure 14-2: Sample Indicator Variograms for the 50th and 90th Percentile Thresholds, Egerton–MacLean Zone





Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2019.

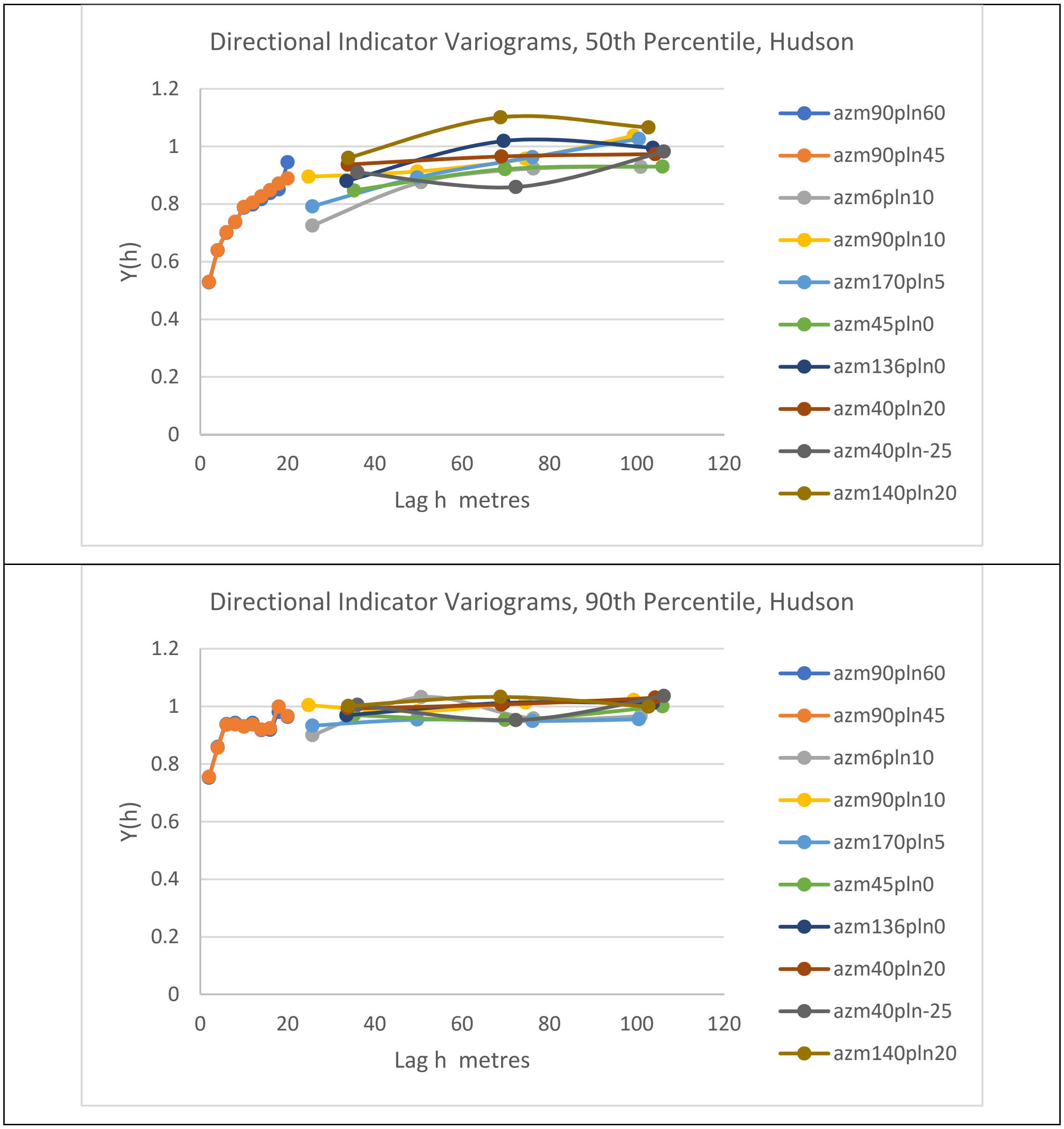
Table 14-9: Indicator and Gold Variogram Parameters, Domains 1 and 2, Egerton–MacLean Zone

Gold Threshold	Cumulative Proportion	Nugget C0	Structure 1					Structure 2				
			T1	C1	Ax	Ay	Az	T2	C2	Ax	Ay	Az
0.001	0.10	0.09	exp	0.49	55	9	15	exp	0.01	56	226	16
0.003	0.20	0.09	exp	0.25	7.5	46	3	exp	0.41	8	117	61
0.010	0.30	0.05	exp	0.3	17	38	2.5	exp	0.45	25	89	355
0.045	0.40	0.05	exp	0.34	14	46	3.5	exp	0.18	15	47	227
0.128	0.50	0.03	exp	0.35	2.5	18	3	exp	0.5	76	57	820
0.288	0.60	0.01	exp	0.42	38	38	2.5	exp	0.05	38	45	279
0.576	0.70	0.01	exp	0.49	2.5	38	38	exp	0.19	409	56	42
0.804	0.75	0.06	exp	0.49	38	38	2.5	exp	0.14	39	49	574
1.120	0.80	0.09	exp	0.5	38	38	2.5	exp	0.14	53	39	584
1.510	0.85	0.17	exp	0.49	38	38	2.5	exp	0.22	54	58	806
2.182	0.90	0.22	exp	0.51	14	4	2.5	exp	0.01	28	15	3
3.484	0.95	0.23	exp	0.62	8	3	2.5	exp	0.01	10	41	3
4.995	0.97	0.69	exp	0.27	16	5	15	exp	0.02	45	653	131
10.214	0.99	0.4	exp	0.59	4	32	2.5	exp	0.01	5	46	3
gold		0.18	exp	0.50	19	20	2.5	exp	0.05	21	34	57

Gold Threshold	Structure 3					3D Rotations						
	T3	C3	Ax	Ay	Az	Axis / Angle						
0.001	sph	0.41	59	391	26	z	-2	y	-12	x	1	
0.003	sph	0.25	652	154	62	z	-2	y	8	x	-11	
0.010	sph	0.19	148	90	946	z	79	y	-8	x	35	
0.045	sph	0.44	148	48	515	z	3	y	-5	x	55	
0.128	sph	0.11	686	58	846	z	27	y	17	x	61	
0.288	sph	0.52	126	46	289	z	-81	y	12	x	-30	
0.576	sph	0.31	581	57	126	z	74	y	51	x	58	
0.804	sph	0.3	63	102	761	z	77	y	48	x	61	
1.120	sph	0.26	109	65	642	z	5	y	-14	x	5	
1.510	sph	0.12	62	131	847	z	4	y	-11	x	77	
2.182	sph	0.26	73	48	113	z	-2	y	10	x	16	
3.484	sph	0.14	48	106	27	z	70	y	-67	x	-79	
4.995	sph	0.02	47	698	135	z	15	y	24	x	9	
10.214	sph	0.01	69	79	5	z	1	y	-23	x	44	
gold	sph	0.27	112	54	58	Z	5	Y	-2	X	14	

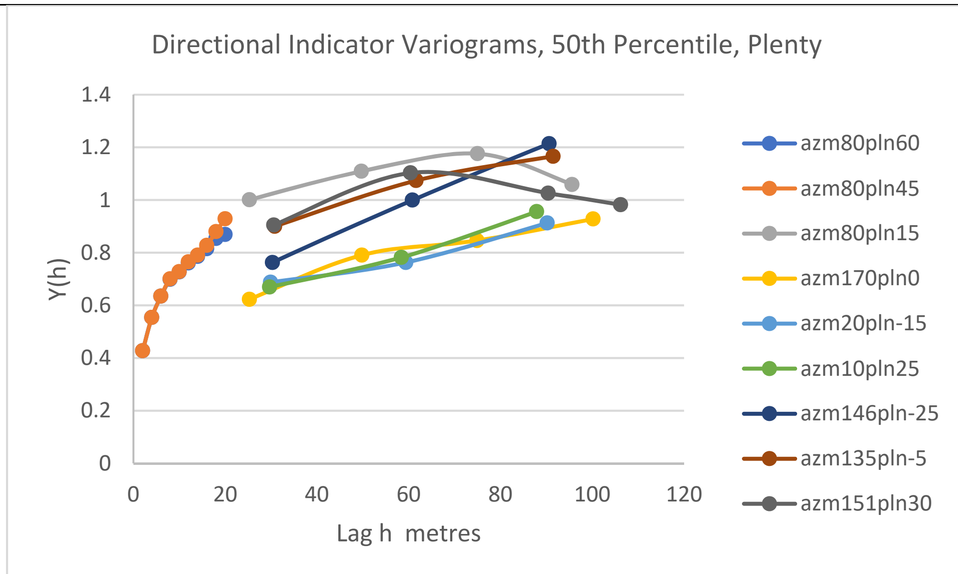
exp(h) = 1.0-exp(-3*h/a); sph(h) = 1.5*h/a-0.5*(h/a)**3 for h <=a, = 1.0 for all h > a

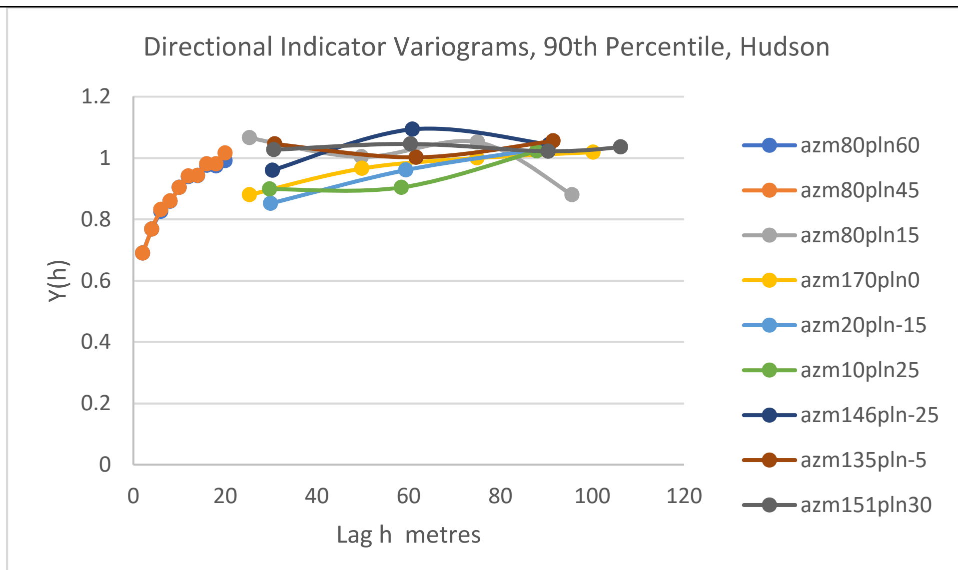
Figure 14-3: Indicator Variograms at Two Indicator Thresholds, Hudson Zone



Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2019.

Figure 14-4: Indicator Variograms at Two Indicator Thresholds, Plenty Zone





Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2017.

14.6.8 Estimation/Interpolation Methods

Egerton–MacLean Zone

Table 14-10 provides details of the panel and block dimensions and the data search parameters used for this resource estimate.

The Egerton–MacLean Zone resource model assumes mill feed material can be selected down to a minimum mining width of 5 m on 5 m benches. After variance adjustment, the resultant block histograms are assumed to be log-normal in shape. The variance ratio for each domain, which includes an adjustment for the information effect introduced by grade control sampling, is 0.032. A grade control drill-hole pattern of 5 m by 5 m is assumed with a down-hole sampling interval of 2.5 m.

Hudson Zone

Table 14-11 provides details of the panel and block dimensions and the data search parameters used for this resource estimate.

The Hudson Zone resource model assumes mill feed material can be selected down to a minimum mining width of 5 m on 5 m benches. After variance adjustment, the resultant block histograms are assumed to be log-normal in shape. The variance ratio for each domain, which includes an adjustment for the information effect introduced by grade control sampling, is 0.045. A grade control drill-hole pattern of 5 m by 5 m is assumed with a down-hole sampling interval of 2.5 m.

Plenty Zone

Table 14-12 provides details of the panel and block dimensions and the data search parameters used for this resource estimate. The Plenty Zone resource model assumes ore can be selected down to a minimum mining width of 5 m on 5 m benches. After variance adjustment, the resultant block histograms are assumed to be log-normal in shape. The variance ratio for each domain, which includes an adjustment for the information effect introduced by grade control sampling, is 0.023. A grade control drill-hole pattern of 5 m by 5 m is assumed with a down-hole sampling interval of 2.5 m.

Table 14-10: Panel Model Parameters, Egerton–MacLean Zone

Criteria	**Model Extents**		
	East	North	Elevation
Panel Dimensions (m)	25	25	5
Model origin (centroid)	12762.5	9887.5	-127.5
Number of Panels	40	17	51
Panel Discretization	5	5	2
GC SMU size (m)	5	5	5
Criteria	**Kriging Parameters**		
	Category 1	Category 2	Category 3
Min no. of data	20	20	10
Max no. of data per octant	6	6	6
Min no. of octants with data	4	4	2
X (east) search radius (metres)	25.0	37.5	37.5
Y (north) search radius (metres)	25.0	37.5	37.5
Z (RL) search radius (metres)	5.0	7.5	7.5
Criteria	**Search Rotations**		
Number of Rotations	Rotation Axis		Rotation Angle
1	X		+ 12
Note: Anticlockwise rotations around the +ve end of the axis are positive			

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Table 14-11: Panel Model Parameters, Hudson Zone

Criteria	**Model Extents**		
	East	North	Elevation
Panel Dimensions (m)	25	25	5
Model origin (centroid)	12237.5	9887.5	-127.5
Number of Panels	20	17	51
Panel Discretization	5	5	2
GC SMU size (m)	5	5	5
Criteria	**Kriging Parameters**		
	Category 1	Category 2	Category 3
Min no. of data	20	20	10
Max no. of data per octant	6	6	6
Min no. of octants with data	4	4	2
X (east) search radius (metres)	25.0	37.5	37.5
Y (north) search radius (metres)	25.0	37.5	37.5
Z (RL) search radius (metres)	5.0	7.5	7.5
Criteria	**Search Rotations**		
Number of Rotations	Rotation Axis		Rotation Angle
No rotations	No rotations		No rotations

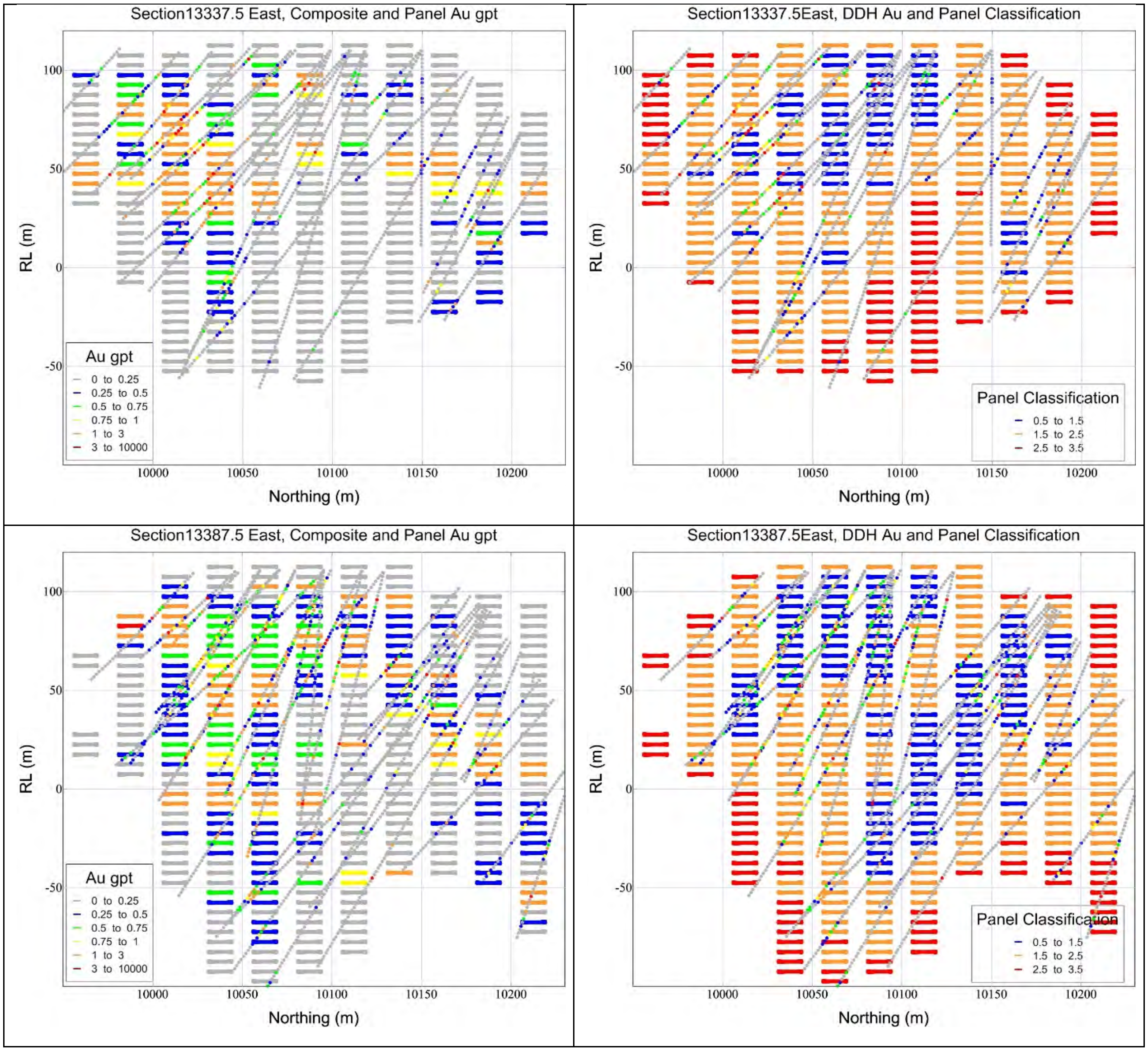
Table 14-12: Panel Model Parameters, Plenty Zone

Criteria	**Model Extents**		
	East	North	Elevation
Panel Dimensions (m)	25	25	5
Model origin (centroid)	12512.5	9707.5	-72.5
Number of Panels	28	14	39
Panel Discretization	5	5	2
GC SMU size (m)	5	5	5
Criteria	**Kriging Parameters**		
	Category 1	Category 2	Category 3
Min no. of data	20	20	10
Max no. of data per octant	6	6	6
Min no. of octants with data	4	4	2
X (east) search radius (metres)	25.0	37.5	37.5
Y (north) search radius (metres)	10.0	15.0	15.0
Z (RL) search radius (metres)	25.0	37.5	37.5
Criteria	**Search Rotations**		
Number of Rotations Anticlockwise rotations are +ve	Rotation Axis		Rotation Angle
1	X		+12

14.6.9 Block Model Validation

At a global level, the mean grade of the panel estimates was compared to the declustered mean grade of the drill hole composites used to create the panel estimates and found to be within 5%. At a local level, section plots of the panel estimates of gold grade were compared to section drill-hole gold grades to check for reasonable coincidence of higher and lower grade areas in both. These comparisons were found to be reasonable. Figure 14-5 presents two cross-section plots of the drill hole composites grades and the corresponding estimated panel grades in the Egerton–MacLean Zone.

Figure 14-5: Section Plots of Composite and Panel Gold Grade, and Panel Classification



Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2019. The panel classification colours are: Measured = blue, Indicated = orange and Inferred = red.

14.6.10 Classification of Mineral Resources

The resource estimate for each panel was initially classified as Category 1, 2 or 3 based on the results of the data search in the panel neighbourhood (refer to Table 14-9):

- Category 1: uses search radii (1), and search parameters (1). If the data found in this search satisfy these criteria (at least 20 samples found in at least four octants), the panel is given a Category 1 flag;
- Category 2: If the first search criteria are not satisfied, search radii (2) are used with search parameters (1). If these criteria are satisfied, the panel is given a Category 2 flag;
- Category 3: If the second search criteria are not satisfied, search radii (2) are used with search parameters (2) (at least 10 samples found in at least two octants). If these criteria are satisfied, a Category 3 flag is applied. If not, no estimate for the panel is generated.

In reporting the resource estimates, Category 1 panel estimates were assigned to Measured Mineral Resources, Category 2 to Indicated Mineral Resources and Category 3 to Inferred Mineral Resources.

Figure 14-5 showed two different cross sections (above and below) comparing drill hole composite grades with estimated average panel grade on the left and panel classification on the right. The panel classification colours are: Measured = blue, Indicated = orange, and Inferred = red.

14.6.11 Reasonable Prospects of Eventual Economic Extraction

The estimate is based on assumptions of conventional open pit mining, and considerations used in the constraining pit shell include the following:

- Gold price = US$1,400/oz;
- Exchange rate = 0.80 US$: C$;
- Mining cost = $3.25/t;
- Process costs (including G&A cost) = $11.73/t;
- Process recovery = 95%;
- Over-all pit slope angle: 45º.

14.7 Cochrane Hill

14.7.1 Data Supporting the Estimate

The gold mineralisation at Cochrane Hill has been defined over a strike of about 1.5 km and to about 320 m vertically. A total of 303 drill core holes (47,254 m), collared from the land surface are present in the drill-hole data set. The bulk of the available sample information is located on approximately 25 m spaced sections between 2600 and 3670mE.

The topographic surface used to generate the resource estimates takes into account the excavations of previous surface mining to the extent possible from surveys of the drill hole collars. No allowance was made for some 32,000 t of mineralization depleted by previous underground mining and bulk sampling.

14.7.2 Domains

No geological models were constructed for use in the resource estimation.

Deposit domaining uses geostatistical techniques. Composites have been divided into two spatial domains based mainly on the difference in the histograms of composite gold grades. The easterly Domain 1 has an average grade that is about 40% higher than Domain 2 and both domains have similar levels of grade variation with CVs around 7.

14.7.3 Composites

Drill data were composited on 2 m downhole intervals. Figure 14-6 shows plan views of the drill-hole layout, composite gold grades and mineralization domains.

14.7.4 Exploratory Data Analysis

Table 14-13 presents the summary univariate statistics of the composite gold grades within the two mineralization domains. Conditional statistics of the composite gold grades was performed using 15 indicator thresholds. The results are shown in Table 14-14.

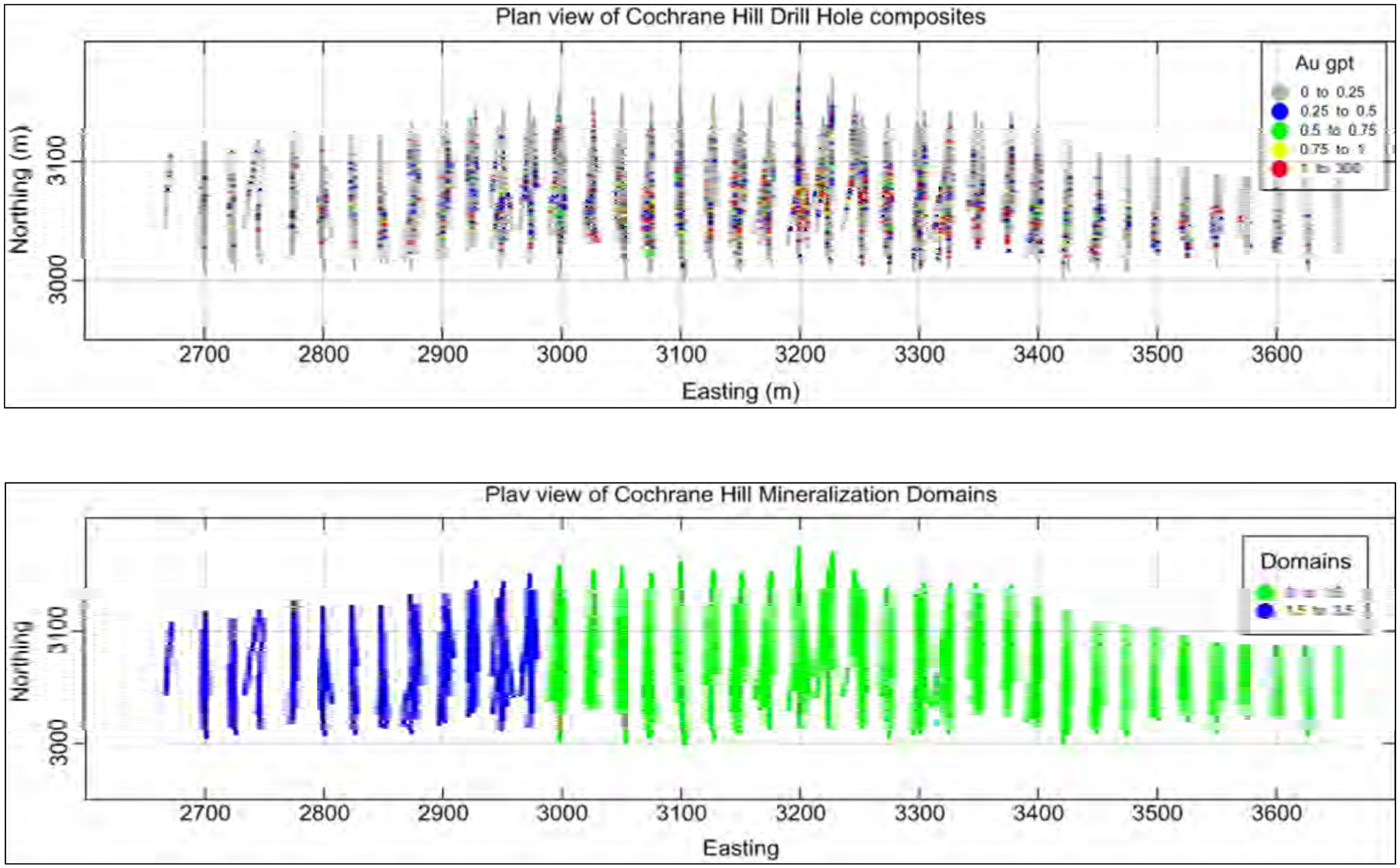
14.7.5 Density Assignment

The global bulk density used is 2.77 t/m^3. This represents the average of 74 bulk density measurements of unwaxed core using the immersion method.

14.7.6 Grade Capping/Outlier Restrictions

No grade capping was used.

Figure 14-6: Cochrane Hill Composite Gold Grades and Mineralization Domains



Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2017.

Table 14-13: Summary Statistics, 2 m Composites, Cochrane Hill

Statistic	Domain 1	Domain 2
No. of Data	10,581	5,489
Mean	0.59	0.37
Variance	16.77	6.95
CV	6.91	7.12
Minimum	0.000	0.000
Q1	0.007	0.005
Median	0.065	0.040
Q3	0.305	0.170
Maximum	233.8	120.5

Table 14-14: Conditional Statistics, Mineralized Domains, Cochrane Hill

Cumulative Proportion	Domain 1		Domain 2	
	Grade Threshold	Class Average	Grade Threshold	Class Average
0.10	0.000	0.000	0.000	0.000
0.20	0.005	0.003	0.000	0.000
0.30	0.013	0.008	0.007	0.004
0.40	0.030	0.021	0.020	0.012
0.50	0.065	0.047	0.040	0.028
0.60	0.120	0.090	0.070	0.053
0.70	0.220	0.163	0.125	0.098
0.75	0.290	0.253	0.170	0.146
0.80	0.410	0.344	0.230	0.198
0.85	0.600	0.499	0.315	0.266
0.90	0.900	0.740	0.500	0.397
0.95	1.840	1.264	1.070	0.707
0.97	3.015	2.355	2.170	1.505
0.99	7.770	4.687	6.020	3.600
1.00	233.8	24.49	120.5	16.21

14.7.7 Variography

Spatial continuity analysis and modelling were undertaken on the composite data of Domain 1 and Domain 2. Plots of the directional indicator variograms for the 50^{th} and 90^{th} percentile indicator thresholds in Domains 1 and 2, which were highlighted in Table 14-14, are shown in Figure 14-7.

Both domains show strong anisotropy at the median threshold with stronger continuities in the easterly direction along strike and down the dip of the structure. At the higher threshold, there is still some indication of anisotropy but the overall spatial continuity in all directions is much weaker.

14.7.8 Estimation/Interpolation Methods

Table 14-15 provides details of the panel dimensions and basic search sizes and orientations used for estimation.

The Cochrane Hill resource model assumes mineralization can be selected down to a minimum mining width of 5 m on 5 m benches. After variance adjustment, the resultant block histograms are assumed to be log-normal in shape. The variance ratios for each domain, which includes an adjustment for the information effect introduced by grade control sampling, are 0.046 for Domain 1 and 0.015 for Domain 2. A grade control drill-hole pattern of 5 m by 5 m is assumed with a down-hole sampling interval of 2.5 m.

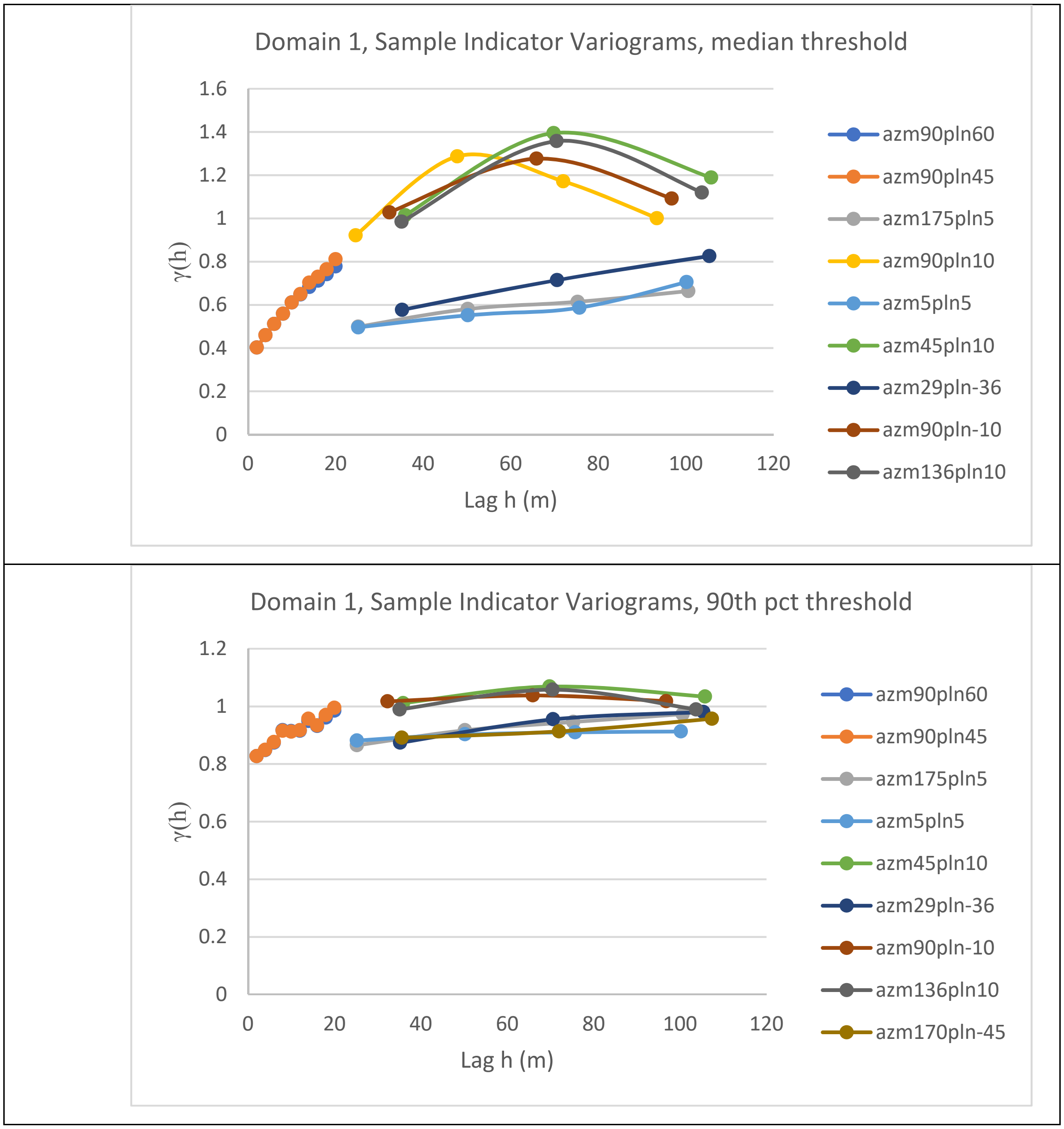
14.7.9 Block Model Validation

At a global level, the mean grade of the panel estimates was compared to the declustered mean grade of the drill hole composites used to create the panel estimates and found to be within 5%.

At a local level, section plots of the panel estimates of gold grade were compared to section drill hole gold grades to check for reasonable coincidence of higher and lower grade areas in both. There comparisons were found to be reasonable.

Figure 14-8 presents, on the left, two different cross sections of the drill hole composites grades and estimate average grades of the model panels. On the right, the figures show the drill hole composite grades plotted over the panel resource classification: Measured is blue, Indicated is orange and Inferred is red.

Figure 14-7: Indicator Variograms for Two Indicator Thresholds, Domain 1

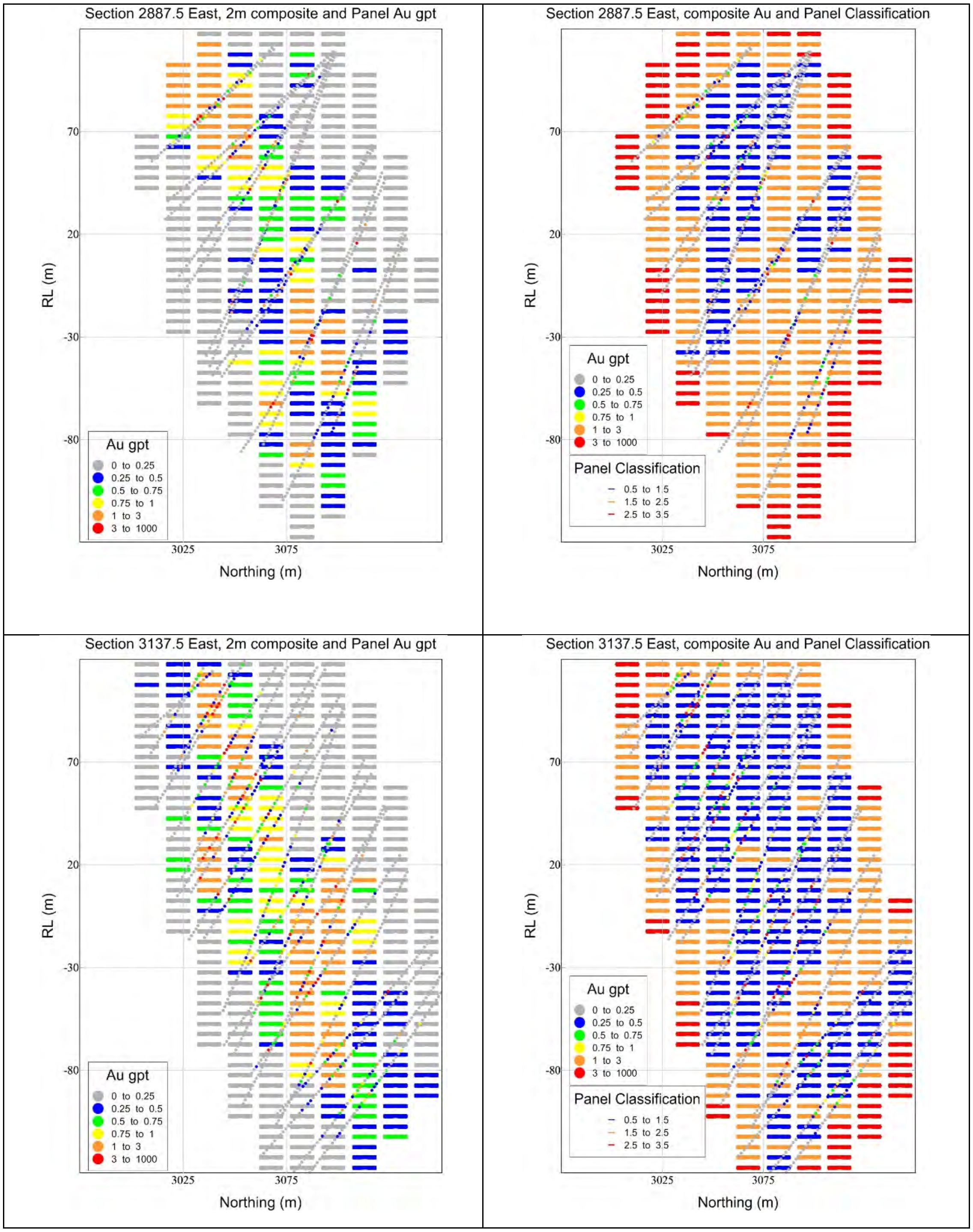


Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2019.

Table 14-15: Model Panel Parameters, Cochrane Hill

Criteria	**Model Extents**		
	East	North	Elevation
Panel Dimensions (m)	25	15	5
Model origin (centroid)	2512.5	2977.5	-207.5
Number of panels	49	16	70
Panel Discretization	5	5	2
GC SMU size (m)	5	5	5
Criteria	**Kriging Parameters**		
	Category 1	Category 2	Category 3
Min no. of data	24	24	12
Max no. of data per octant	4	4	2
Min no. of octants with data	4	4	2
X (east) search radius (metres)	25.0	37.5	37.5
Y (north) search radius (metres)	10.0	15.0	15.0
Z (RL) search radius (metres)	25.0	37.5	37.5
Criteria	**Search rotations**		
Number of rotation (anticlockwise rotations are +ve)	Rotation Axis		Rotation Angle
1	X		20

Figure 14-8: Section Plots of Composite and Panel Gold Grade and Panel Classification



Note: Figure prepared by FSSI Consultants (Australia) Pty Ltd, 2019. The panel classification colours are: Measured = blue, Indicated = orange and Inferred = red.

14.7.10 Classification of Mineral Resources

The resource estimate for each panel was initially classified as Category 1, 2, or 3 based on the results of the data search in the panel neighbourhood (refer to Table 14-15):

- Category 1: uses search radii (1), and search parameters (1). If the data found in this search satisfy these criteria (at least 24 samples found in at least four octants), the panel is given a Category 1 flag;
- Category 2: If the first search criteria are not satisfied, search radii (2) are used with search parameters (1). If these criteria are satisfied, the panel is given a Category 2 flag;
- Category 3: If the second search criteria are not satisfied, search radii (2) are used with search parameters (2) (at least 12 samples found in at least two octants). If these criteria are satisfied, a Category 3 flag is applied. If not, no estimate for the panel is generated.

In reporting the resource estimates, Category 1 panel estimates were assigned to Measured Mineral Resources, Category 2 to Indicated Mineral Resources and Category 3 to Inferred Mineral Resources.

Figure 14-8 showed two different cross sections comparing drill hole composite grades with estimated average panel grade on the left and panel classification on the right. The panel classification colours are: Measured = blue, Indicated = orange and Inferred = red.

14.7.11 Reasonable Prospects of Eventual Economic Extraction

The estimate is based on assumptions of conventional open pit mining, and considerations used in the constraining pit shell include the following:

- Gold price = US$1,400/oz;
- Exchange rate = 0.80 US$: C$;
- Mining cost = $3.25/t;
- Process costs (including G&A cost) = $11.73/t;
- Process recovery = 95%;
- Over-all pit slope angle: 45º.

14.8 Mineral Resource Statement

Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimates is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd, who is independent of Atlantic Gold.

Mineral Resources are reported using the 2014 CIM Definition Standards as follows:

- Mineral Resources for Touquoy are presented in Table 14-16. Table 14-17 is a sensitivity table that illustrates the estimate sensitivity to cut-off grades;
- Mineral Resources for Beaver Dam are presented in Table 14-18. Table 14-19 is a sensitivity table that illustrates the estimate sensitivity to cut-off grades;
- Mineral Resources for the various Fifteen Mile Stream deposits are presented in tables as follows: Egerton–MacLean Zone: Table 14-20, Hudson Zone: Table 14-22, and Plenty Zone: Table 14-24. Table 14-21, Table 14-23 and Table 14-25 are sensitivity tables that illustrates the estimate sensitivity to cut-off grades for the various deposits.
- Mineral Resources for Cochrane Hill are presented in Table 14-26. Table 14-27 is a sensitivity table that illustrates the estimate sensitivity to cut-off grades.

14.9 Factors That May Affect the Mineral Resource Estimates

Factors that may affect the estimates include:

- Metal price assumptions;
- Changes in interpretations of mineralization geometry and continuity of mineralization zones;
- Changes to MIK panel assumptions;
- Metallurgical recovery assumptions;
- Operating cost assumptions;
- Confidence in the modifying factors;
- Changes in land tenure requirements or in permitting requirements from those discussed in this Report.

In the case of Beaver Dam, Fifteen Mile Stream and Cochrane Hill, additional assumptions include:

- Surface rights to allow mining infrastructure to be constructed will be forthcoming;
- There will be no delays or other issues arising in reaching agreements with local or regulatory authorities and stakeholders

There are no other known environmental, legal, title, taxation, socioeconomic, marketing, political or other relevant factors known to the QP that would materially affect the estimation of Mineral Resources that are not discussed in this Report.

Table 14-16: Mineral Resource Statement, Touquoy

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	3.40	1.14	124.3
Indicated	7.86	1.27	320.7
Total Measured and Indicated	***11.26***	***1.23***	***445.1***
Inferred	1.14	1.30	47.8

Table 14-17: Sensitivity of Mineral Resource to Changes in Gold Cut-off Grade, Touquoy (base case is highlighted)

Confidence Category	Cut-off Grade (g/t Au	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	**0.3**	**3.40**	**1.14**	**124.3**
	0.4	2.89	1.28	118.6
	0.5	2.49	1.41	112.9
Indicated	**0.3**	**7.86**	**1.27**	**320.7**
	0.4	6.83	1.41	309.1
	0.5	5.97	1.55	269.7
Measured and Indicated	**0.3**	**11.26**	**1.23**	**445.6**
	0.4	9.72	1.37	428.6
	0.5	8.46	1.51	410.4
Inferred	**0.3**	**1.14**	**1.30**	**47.8**
	0.4	0.98	1.46	45.9
	0.5	0.85	1.61	44.1

Notes to accompany Touquoy Mineral Resource table:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported inclusive of Mineral Reserves. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. Mineral Resources are reported at a base case cut-off grade of 0.3 g/t Au. The cut-off grade includes the following considerations: assumption of open pit mining methods; gold price of US$1,400/oz; 94% metallurgical recovery; pit bench face angles that range from 40–65º; mining costs of $13.40/t; processing costs of $11.94/t, and general and administrative (G&A) costs of $1.71/t.
4. Estimates have been rounded, and may result in summation differences.
5. Table 14-17 is not additive to Table 14-16.

Table 14-18: Mineral Resource Statement, Beaver Dam

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	5.10	1.28	209.4
Indicated	4.59	1.23	182.1
Total Measured and Indicated	***9.69***	***1.26***	***391.5***
Inferred	1.03	1.41	46.7

Table 14-19: Sensitivity of Mineral Resource to Changes in Gold Cut-off Grade, Beaver Dam (base case is highlighted)

Confidence Category	Cut-off Grade (g/t Au	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	**0.3**	**5.10**	**1.28**	**209.4**
	0.4	4.44	1.42	202.7
	0.5	3.89	1.56	195.0
Indicated	**0.3**	**4.59**	**1.23**	**182.1**
	0.4	4.08	1.34	175.5
	0.5	3.67	1.44	169.5
Measured and Indicated	**0.3**	**9.69**	**1.26**	**391.4**
	0.4	8.52	1.38	378.5
	0.5	7.56	1.50	365.0
Inferred	**0.3**	**1.03**	**1.41**	**46.7**
	0.4	0.90	1.55	44.7
	0.5	0.78	1.71	43.0

Notes to accompany Beaver Dam Mineral Resource table:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported inclusive of Mineral Reserves. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
3. Mineral Resources are reported at a base case cut-off grade of 0.3 g/t Au. The cut-off grade includes the following considerations: assumption of open pit mining methods; gold price of US$1,400/oz; exchange rate of C$1:US$0.90; 95% metallurgical recovery; pit bench face angles that range from 40–70º; mining costs of $2.90/t mined, and a $0.015/t bench increment; process costs of $13.51/t milled; and general and administrative (G&A) costs of $1.71.
4. Estimates have been rounded, and may result in summation differences.
5. Table 14-19 is not additive to Table 14-18.

Table 14-20: Mineral Resource Statement, Fifteen Mile Stream, Egerton–MacLean Zone

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	2.71	1.33	116
Indicated	7.88	1.33	336
Total Measured and Indicated	***10.59***	***1.33***	***452***
Inferred	6.64	1.12	240

Table 14-21: Sensitivity of Mineral Resource to Changes in Gold Cut-off Grade, Fifteen Mile Stream – Egerton–MacLean Zone (base case is highlighted)

Confidence Category	Cut-off Grade (g/t Au	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	**0.3**	**3.38**	**1.22**	**132.9**
	0.35	3.13	1.29	130.1
	0.4	2.91	1.36	127.4
	0.5	2.47	1.51	119.9
Indicated	**0.3**	**11.18**	**1.14**	**410.7**
	0.35	10.24	1.21	399.7
	0.40	9.37	1.28	386.3
	0.5	7.90	1.43	363.9
Total Measured and Indicated	**0.3**	**14.57**	**1.16**	**543.5**
	0.35	13.37	1.23	529.8
	0.4	12.29	1.30	513.7
	0.5	10.36	1.45	483.8
Inferred	**0.3**	**1.36**	**1.28**	**55.8**
	0.35	1.20	1.40	54.1
	0.4	1.12	1.47	52.9
	0.5	0.96	1.64	50.4

Notes to accompany Fifteen Mile Stream Egerton Mineral Resource tables:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t; process costs (including general and administrative (G&A) cost) of C$11.73/t; process recovery of 95%; and overall pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.
4. Table 14-21 is not additive to Table 14-20.

Table 14-22: Mineral Resource Statement, Fifteen Mile Stream – Hudson Zone

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	0.81	0.88	22.7
Indicated	0.99	0.70	22.2
Total Measured and Indicated	***1.80***	***0.78***	***44.9***
Inferred	0.43	0.98	13.5

Table 14-23: Sensitivity of Mineral Resource to Changes in Gold Cut-off Grade, Fifteen Mile Stream – Hudson Zone (base case is highlighted)

Confidence Category	Cut-off Grade (g/t Au	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	**0.3**	**0.81**	**0.88**	**22.7**
	0.35	0.75	0.91	21.9
	0.4	0.68	0.96	21.1
	0.5	0.57	1.06	19.2
Indicated	**0.3**	**0.99**	**0.70**	**22.2**
	0.35	0.86	0.76	20.8
	0.40	0.75	0.80	19.3
	0.5	0.56	0.90	16.2
Total Measured and Indicated	**0.3**	**1.80**	**0.78**	**44.9**
	0.35	1.61	0.83	42.8
	0.4	1.43	0.88	40.4
	0.5	1.13	0.98	35.4
Inferred	**0.3**	**0.43**	**0.98**	**13.5**
	0.35	0.40	1.02	13.1
	0.4	0.36	1.09	12.7
	0.5	0.31	1.18	11.8

Notes to accompany Fifteen Mile Stream Hudson Mineral Resource tables:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t; process costs (including general and administrative (G&A) cost) of C$11.73/t; process recovery of 95%; and over-all pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.
4. Table 14-23 is not additive to Table 14-22.

Table 14-24: Mineral Resource Statement, Fifteen Mile Stream – Plenty

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	1.71	1.08	59.5
Indicated	0.94	0.93	28.2
Total Measured and Indicated	***2.66***	***1.03***	***87.7***
Inferred	0.28	1.69	15.0

Table 14-25: Sensitivity of Mineral Resource to Changes in Gold Cut-off Grade, Fifteen Mile Stream – Plenty (base case is highlighted)

Confidence Category	Cut-off Grade (g/t Au	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	**0.3**	**1.71**	**1.08**	**59.5**
	0.35	1.60	1.13	57.9
	0.4	1.52	1.17	57.2
	0.5	1.33	1.27	54.3
Indicated	**0.3**	**0.94**	**0.93**	**28.2**
	0.35	0.88	0.99	27.8
	0.40	0.82	1.03	27.0
	0.5	0.72	1.11	25.6
Total Measured and Indicated	**0.3**	**2.66**	**1.03**	**87.7**
	0.35	2.48	1.08	85.7
	0.4	2.34	1.12	84.3
	0.5	2.05	1.21	79.9
Inferred	**0.3**	**0.28**	**1.69**	**15.0**
	0.35	0.25	1.83	14.7
	0.4	0.25	1.84	14.7
	0.5	0.24	1.88	14.7

Notes to accompany Fifteen Mile Stream, Plenty Mineral Resource tables:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t; process costs (including general and administrative (G&A) cost) of C$11.73/t; process recovery of 95%; and over-all pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.
4. Table 14-25 is not additive to Table 14-24.

Table 14-26: Mineral Resource Statement, Cochrane Hill

Confidence Category	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	10.78	1.12	387.3
Indicated	6.67	1.02	219.2
Total Measured and Indicated	***17.45***	***1.08***	***606.5***
Inferred	1.82	1.24	72.7

Table 14-27: Sensitivity of Mineral Resource to Changes in Gold Cut-off Grade, Cochrane Hill (base case is highlighted)

Confidence Category	Cut-off Grade (g/t Au	Tonnage (Mt)	Grade (g/t Au)	Contained Gold (oz x 1,000)
Measured	**0.3**	**10.78**	**1.12**	**387.3**
	0.35	10.00	1.18	378.0
	0.4	9.24	1.24	367.0
	0.5	8.00	1.34	345.9
Indicated	**0.3**	**6.67**	**1.02**	**219.2**
	0.35	6.23	1.07	214.0
	0.4	5.74	1.12	207.2
	0.5	4.86	1.24	194.1
Total Measured and Indicated	**0.3**	**17.45**	**1.08**	**606.5**
	0.35	16.23	1.13	592.0
	0.4	14.98	1.19	574.2
	0.5	12.87	1.31	540.1
Inferred	**0.3**	**1.82**	**1.24**	**72.7**
	0.35	1.67	1.30	70.2
	0.4	1.53	1.39	68.4
	0.5	1.30	1.56	64.9

Notes to accompany Cochrane Hill Mineral Resource tables:

1. Mineral Resources have an effective date of 15 February, 2019. The Qualified Person for the estimate is Mr. Neil Schofield, MAIG, an employee of FSSI Consultants (Australia) Pty Ltd.
2. Mineral Resources are reported at a base case cut-off grade of 0.30 g/t Au. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$:C$; mining cost of C$3.25/t, process costs (including general and administrative (G&A) cost) of C$11.73/t; 95% process recovery; and overall pit slope angle of 45º.
3. Estimates have been rounded, and may result in summation differences.
4. Table 14-27 is not additive to Table 14-26.

15.0 MINERAL RESERVE ESTIMATES

15.1 Introduction

Mineral Reserves are supported by the 2019 LOMP.

15.2 Mineral Reserves Statement

Proven and Probable Mineral Reserves have been modified from Measured and Indicated Mineral Resources and are summarized in Table 15-1. Inferred Mineral Resources are set to waste. Mineral Reserves are classified using the 2014 CIM Definition Standards.

15.3 Mineral Reserves within Pit Phases

Open pits are based on the results of Lerchs-Grossman (L–G) sensitivity analysis, and then designed into detailed pit phases to develop pit reserves for production scheduling. The Mineral Reserves by pit phase are shown in Table 15-2. Table 15-3 summarizes the Inferred Mineral Resources within the designed pits that have been set to waste; these are included in the waste tonnage totals in Table 15-2.

15.4 Factors that May Affect the Mineral Reserve Estimates

Mineral Reserves are based on the engineering and economic analysis described in Sections 16 to 22 of this Report. Changes in the following factors and assumptions may affect the Mineral Reserve estimate:

- Metal prices;
- Interpretations of mineralization geometry and continuity of mineralization zones;
- Kriging assumptions;
- Geotechnical and hydrogeological assumptions;
- Ability of the mining operation to meet the annual production rate;
- Operating cost assumptions;
- Process plant and mining recoveries;
- Ability to meet and maintain permitting and environmental license conditions, and the ability to maintain the social license to operate.

Table 15-1: Proven and Probable Mineral Reserves

Mine Area	Reserve Class	Mill Feed (Mt)	Diluted Gold Grade (g/t Au)
Touquoy	Proven	3.36	1.10
	Probable	7.14	1.28
	Existing Stockpile Reserves	2.41	0.57
Beaver Dam	Proven	3.81	1.54
	Probable	3.09	1.43
Subtotal Touquoy and Beaver Dam	*Proven*	*7.17*	*1.33*
	Probable	*10.23*	*1.33*
	Existing Stockpile Reserves	*2.41*	*0.57*
Cochrane Hill	Proven	10.25	1.08
	Probable	5.13	0.96
Fifteen Mile Stream	Proven	5.58	1.09
	Probable	11.18	1.06
Subtotal Fifteen Mile Stream and Cochrane Hill	*Proven*	*15.83*	*1.08*
	Probable	*16.32*	*1.03*
Subtotal Touquoy, Beaver Dam, Fifteen Mile Stream, Cochrane Hill, and Stockpiles	***Proven***	***22.99***	***1.16***
	Probable	***26.55***	***1.14***
	Existing Stockpile Reserves	***2.41***	***0.57***
Grand Total	***Total Proven and Probable***	***51.95***	***1.12***

Notes to accompany the Mineral Reserves table:

1. The Mineral Reserve Estimates were prepared by Marc Schulte, P.Eng. (who is also the independent Qualified Person for these Mineral Reserve estimates), reported using the 2014 CIM Definition Standards, and have an effective date of March 13, 2019.
2. Touquoy Proven Mineral Reserves include existing stockpiled ore of 2.41 Mt at 0.57 g/t gold grade. This material is not included in, and is additional to, the Mineral Resource estimate.
3. Mineral Reserves are mined tonnes and grade, the reference point is the mill feed at the primary crusher.
4. Mineral Reserves are reported at a cut-off grade of 0.30 g/t Au for Touquoy, Fifteen Mile Stream and Cochrane Hill, and 0.50 g/t Au for Beaver Dam.
5. Cut-off grade assumes US$1,300/oz. Au at a currency exchange rate of 0.77 C$ per US$; 99.9% payable gold; $5.00/oz. offsite costs (refining and transport), a 2% royalty; and uses a 92% metallurgical recovery. The cut off-grade covers processing costs of $11.00/t at Touquoy, $8.22/t at Fifteen Mile Stream, $8.64/t at Cochrane Hill, and $18.00/t at Beaver Dam and general and administrative (G&A) costs of $2.50/t.
6. Mining recovery of 98.4% and external mining dilution of 1.6% at 0.20 g/t Au grade is applied in addition to the modelled in-block dilution.

7. As Touquoy is an ongoing operation, a surveyed topographic surface dated December 31, 2018 is used as the basis for the Mineral Reserves.
8. Numbers have been rounded as required by reporting guidelines.

Table 15-2: Proven and Probable Mineral Reserves within Designed Pit Phases

Pit Phase	Pit Name	Mill Feed (Mt)	Waste (Mt)	Strip Ratio (t/t)	Diluted Gold Grade (g/t Au)
Touquoy North Phase	T681	6.93	9.28	1.3	1.35
Touquoy South Phase	T682i	0.95	2.62	2.8	1.00
Touquoy East Phase	T683i	2.62	5.44	2.1	1.00
Existing Stockpiles	SPs	2.41	—	—	0.57
Total Touquoy	***T683 + SP***	***12.91***	***17.34***	***1.3***	***1.10***
Beaver Dam South Phase	B621	3.50	18.38	5.3	1.59
Beaver Dam North Phase	B622i	3.40	22.01	6.5	1.38
Total Beaver Dam	***B622***	***6.90***	***40.38***	***5.9***	***1.49***
Cochrane Hill Starter Pit	C611	—	8.94	—	—
Cochrane Hill South Phase	C621i	5.73	10.60	1.9	1.04
Cochrane Hill North Phase	C631i	9.65	33.86	3.5	1.04
Total Cochrane Hill	***C631***	***15.38***	***53.40***	***3.5***	***1.04***
Egerton–MacLean South Phase	F611	8.55	10.90	1.3	1.11
Egerton–MacLean North Phase	F621i	4.83	16.24	3.4	1.10
Hudson Phase	F631i	1.59	0.75	2.3	3.72
Plenty Phase	F641i	1.80	8.54	4.8	1.06
Total Fifteen Mile Stream	***F641***	***16.76***	***39.38***	***2.3***	***1.07***
Total All Deposits		***51.95***	***150.51***	***2.9***	***1.12***

Notes to accompany the pit phases table:

1. A cut-off grade of 0.30 g/t Au for Touquoy, Fifteen Mile Stream and Cochrane Hill, and 0.50 g/t Au for Beaver Dam is applied.
2. Mining Recovery of 98.4% and dilution of 1.6% at 0.20 g/t Au are applied.
3. Mineral Reserves in this table are not additive to the Mineral Reserves in Table 15-1. Footnotes to Table 15-1 apply to this table.

Table 15-3: Inferred Mineral Resources Within the Designed Pits

Mine Area	Waste (Mt)	Gold Grade (g/t Au)
Touquoy	0.64	1.16
Beaver Dam	0.37	1.75
Cochrane Hill	0.98	1.13
Fifteen Mile Stream	0.68	1.06
Total	***2.68***	***1.20***

Note to accompany the Inferred Mineral Resources within the pit designs table:

1. A cut-off gold grade of 0.30 g/t Au is applied to the Inferred Mineral Resources.
2. These Mineral Resources are not additive to the Mineral Resources in Table 14-16 to Table 14-27.

16.0 MINING METHODS

The Mineral Reserves are supported by the 2019 LOMP.

Mine plans, mine production schedules and mine capital and operating costs have been developed for the Touquoy, Beaver Dam, Fifteen Mile Stream and Cochrane Hill deposits.

This chapter of the Technical Report summarizes the mine planning.

16.1 Key Design Criteria

The following mine planning design inputs were used:

- Topography is based on a LiDAR surveys of the region;
  - As Touquoy is an ongoing operation, a surveyed topographic surface dated December 31, 2018 is used.
- Inferred Mineral Resources are treated as waste rock with no economic value;
- A gold process recovery of 92% is used for the pit optimization and cut-off grade estimations;
- A breakeven incremental cut-off grade of 0.30 g/t Au is used for Touquoy, Fifteen Mile Stream and Cochrane Hill, and 0.50 g/t Au for Beaver Dam;
- Geographical assumptions for Touquoy:
  - Open pits within currently permitted boundary on the north and west side, allowance for expansion to the south and east;
    - Waste rock storage within mine lease boundary;
- Geographical assumptions for Beaver Dam:
  - Open pits at least 50 m away from the outline of Cameron Flowage to the north;
  - Waste rock storage is planned to minimize wetland disturbance;
    - 40 m from all lakes and property boundaries;
    - 500 m from all surveyed Boreal Felt Lichen
    - 50 m from all surveyed Boreal Felt Lichen habitats;
    - 100 m from all surveyed Frosted Glass Lichen;
- Geographical assumptions for Fifteen Mile Stream:
  - Waste rock storage facilities restricted to within the same watershed catchment area as the open pit;

- Waste rock storage is planned to minimize wetland disturbance;

- Geographical assumptions for Cochrane Hill:
  - Waste rock storage is planned to minimize wetland disturbance.

16.1.1 Ore Loss and Dilution

Mining dilution and recovery factors were applied. The Mineral Resource estimates already include internal dilution as part of the estimated gold grades and mineralized percentage. Mining dilution accounts for dilution encountered along the identified ore and waste zone boundaries and a grade for the dilution is included. Mining recovery includes mining losses applied at these boundaries plus other losses in material handling.

The estimates were:

- Mining dilution = 1.6%;
- Mining dilution gold grade = 0.20 g/t Au;
- Mining recovery = 98.4%.

16.1.2 Pit Slopes

Pit designs are configured on 10 m bench heights, with 8m wide berms placed every two benches, or double benching. Bench face angles, and subsequent inter-ramp angles are varied based on prescribed azimuths and depth from surface, as specified by each geotechnical report.

The pit slope criteria for Touquoy are based on a 2011 geotechnical report by Peter O'Bryan & Associates (O'Bryan, 2011). Resulting pit slopes for the defined zones are shown in Table 16-1. The shallower slopes at the 60 m depth are based on the requirement for a 15 m wide catch berm at this bench. The Touquoy pit is split into two zones for slope configurations:

- North side inputs apply from 280º to 60º azimuths;
- South side inputs apply from 61º to 279º azimuths.

The pit slope zone criteria shown in Table 16-2 for Beaver Dam are based on a 2015 geotechnical report by Peter O'Bryan & Associates (O'Bryan, 2015). Resulting Beaver Dam pit slopes for the defined zones are shown in Figure 16-1.

The pit slope criteria for Fifteen Mile Stream are based on a geotechnical report by Golder (Golder, 2018). Resulting pit slopes for the defined zones are shown in Table 16-3.

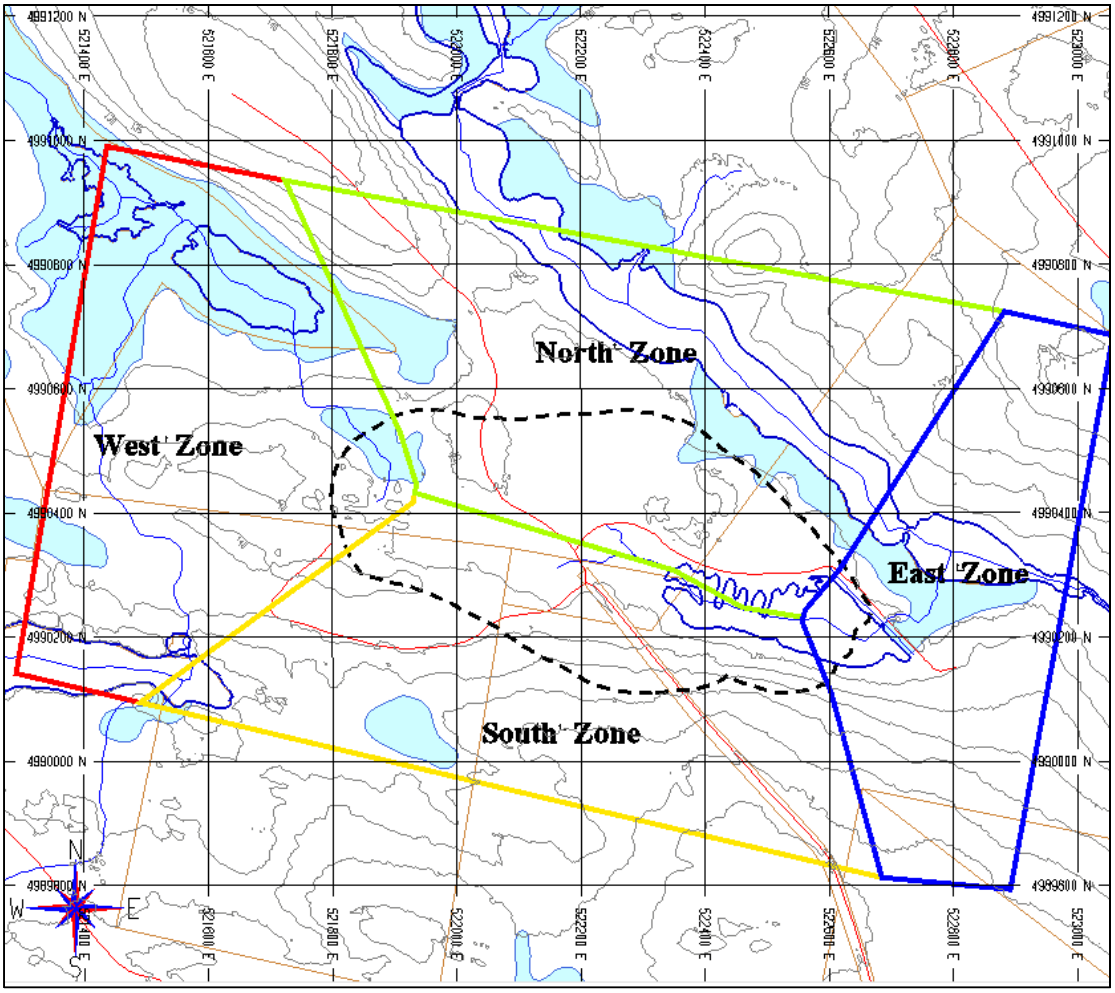
Table 16-1: Touquoy Bench Face and Inter-Ramp Angle Inputs

Domain	Zone	Bench Face Angle (º)	Inter-Ramp Angle (º)
Till zone	All	27	27
Till to 100 m bench	North	50	39
Till to 100 m bench	South	50	39
100 m to 80 m bench	North	60	46
100 m to 80 m bench	South	60	46
80 m to 60 m bench	North	60	46
80 m to 60 m bench	South	65	49
60 m to 40 m bench	North	60	37
60 m to 40 m bench	South	65	43
To bottom of model	North	65	49
To bottom of model	South	70	53

Table 16-2: Beaver Dam Bench Face Angle Inputs

Bench Height From	Bench Height To	Zone	Bench Face Angle (º)	Inter-Ramp Angle (º)
Topography surface	Till surface	All	40	40
Till surface	20 m below till	North	60	46
Till surface	20 m below till	East	65	49
Till surface	20 m below till	South	60	46
Till surface	20 m below till	West	65	49
20 m below till	Bottom of model	North	60	46
20 m below till	Bottom of model	East	70	53
20 m below till	Bottom of model	South	65	49
20 m below till	Bottom of model	West	70	53

Figure 16-1: Beaver Dam Pit Slope Zones



Note: Figure from Moose Mountain, 2015.

Table 16-3: Fifteen Mile Stream Bench Face and Inter-Ramp Angle Inputs

Bench Height From	Bench Height To	Zone	Bench Face Angle (º)	Inter-Ramp Angle (º)
Topography surface	Till surface	All	27	27
Till surface	20 m below till	North	60	44
Till surface	20 m below till	South	50	38
Till surface	20 m below till	Plenty	50	38
20 m below till	40 m below till	North	70	51
20 m below till	40 m below till	South	60	45
20 m below till	40 m below till	Plenty	60	45
40 m below till	Bottom of model	North	70	51
40 m below till	Bottom of model	South	70	51
40 m below till	Bottom of model	Plenty	70	47.5

The Fifteen Mile Stream pit is split into three zones for slope configurations:

- North side inputs apply from 300º to 60º azimuths in the Egerton–MacLean and Hudson areas;
- South side inputs apply from 61º to 299º azimuths in the Egerton–MacLean and Hudson areas;
- Plenty inputs apply in all azimuths of the Plenty Zone area.

The pit slope criteria for Cochrane Hill are based on a geotechnical report by Golder (Golder, 2018). Resulting pit slopes for the defined zones are shown in Table 16-4. The Cochrane Hill pit is split into two zones for slope configurations:

- North side inputs apply from 265º to 95º azimuths;
- South side inputs apply from 96º to 264º azimuths.

16.2 Pit Optimization

The economic pit limits are determined using the L–G algorithm, which uses the ore grades, mineralized percentage and specific gravity (SG) for each block of the three-dimensional (3D) block model and evaluates the costs and revenues of the blocks within potential pit shells. The routine uses input economic and engineering parameters and expands downwards and outwards until the last increment is at break-even economics.

Table 16-4: Cochrane Hill Bench Face and Inter-Ramp Angle Inputs

Bench Height From	Bench Height To	Zone	Bench Face Angle (º)	Inter-Ramp Angle (º)
Topography surface	Till surface	All	27	27
Till surface	20 m below till	North	60	44
Till surface	20 m below till	South	50	38
20 m below till	40 m below till	North	70	51
20 m below till	40 m below till	South	60	45
40 m below till	Bottom of model	North	75	54
40 m below till	Bottom of model	South	70	51

Additional cases are included in the analysis to evaluate the sensitivities of resources to strip ratio/topography and high grade/low grade areas of the deposit. In this study, the various cases or pit shells are generated by varying the input gold price and comparing the resultant waste and mill feed tonnages, and gold grades for each pit shell.

By varying the economic parameters while keeping inputs for metallurgical recoveries and pit slopes constant, various generated pit cases are evaluated to determine where incremental pit shells produce marginal or negative economic returns. This drop-off is due to increasing strip ratios, decreasing gold grades, increased mining costs associated with the larger or deeper pit shells, and the value of discounting costs before revenues. The economic margins from the expanded cases are evaluated on a relative basis to provide payback on capital and produce a return for the project. At some point, further expansion does not provide significant added value. A pit limit can then be chosen that has suitable economic return for the deposit.

For each pit shell, an undiscounted cashflow is generated based on the shell contents and the economic parameters listed in Table 16-5. The undiscounted cash flows for each case are compared to reinforce the selected point at which increased pit expansions do not increase the project value. Note that the economics are only applied for comparative purposes, to assist selection of an optimum pit shell for further mine planning, and do not reflect the actual financial results of the study.

The chosen pit shell is then used as the basis for more detailed design and economic modelling.

Price and operating cost assumptions for the L–G runs are provided in Table 16-5.

Table 16-5: Price and Operating Cost Inputs into L–G Shell Runs

Item	Unit
Gold price	US$1,300
Foreign exchange	0.77 US$:1.00C$
Payable gold	99.9%
Offsite costs	$5.00/oz Au (refining and doré transport)
Royalties	2%
Pit rim mining cost	$2.73/t, pit rim of 115 m at Touquoy
	$2.90/t, pit rim of 130 m at Beaver Dam
	$3.35/t, pit rim at 110 m at Fifteen Mile Stream
	$3.10/t, pit rim at 120 m at Cochrane Hill
Incremental haulage cost	$0.02 per every 5 m bench below pit rim
Processing cost	$11.00/t at Touquoy
	$18.00/t at Beaver Dam (includes ore haul from the crusher to Touquoy)
	$8.22/t at Fifteen Mile Stream (includes concentrate haul to Touquoy)
	$8.64/t at Cochrane Hill (includes concentrate haul to Touquoy)
General/administration cost	$2.50/t

16.2.1 Touquoy L–G Pit Limit

Figure 16-2 shows the contents of the generated L–G pit shells for Touquoy. The undiscounted cash flows are compared and indicate Case 25 as a point where increased pit expansions do not increase the project value.

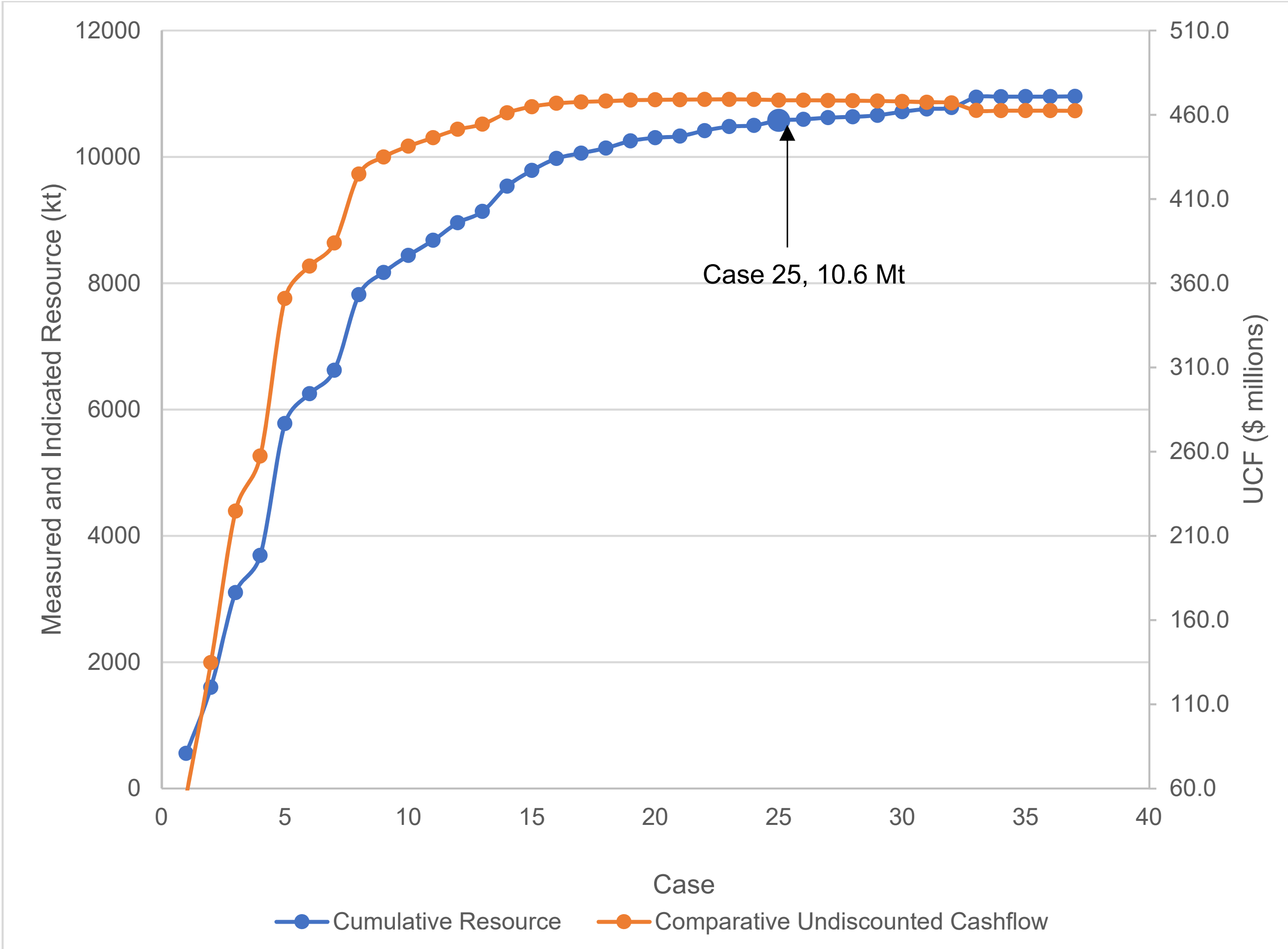
The pit shell generated from Case 25 is selected as the ultimate pit limits for Touquoy and is used for further mine planning as a target for detailed open pit designs with berms and ramps.

16.2.2 Beaver Dam L–G Pit Limit

Figure 16-3 shows the contents of the generated L–G pit shells for Beaver Dam. An inflection point can be seen in the curve of cumulative resources by pit case. Case 20 indicates a point at which larger pit shells will not produce significant increases to the project value. The undiscounted cash flows are compared and also indicates Case 20 as the point where increased pit expansions do not increase the project value.

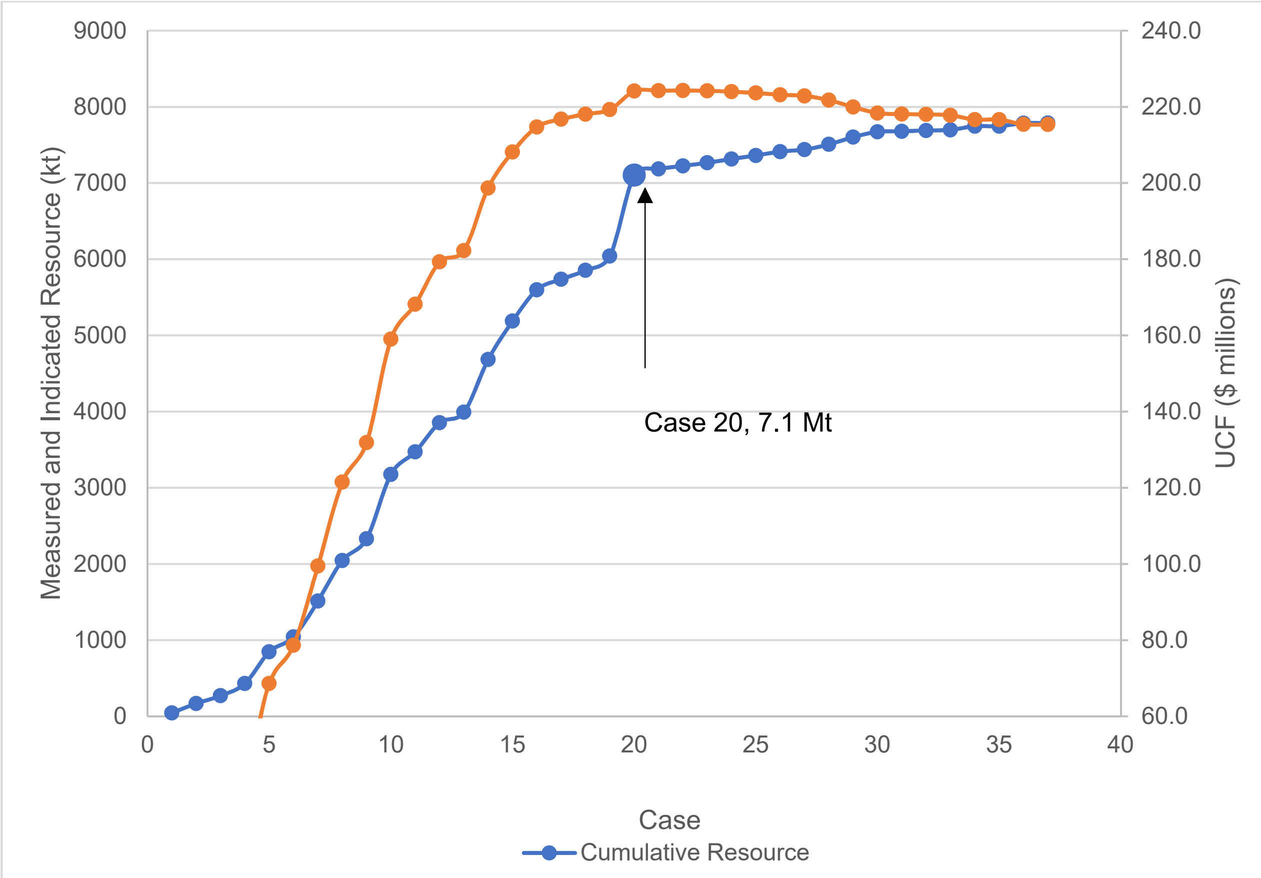
The pit shell generated from Case 20 is selected as the ultimate pit limits for Beaver Dam and is used for further mine planning as a target for detailed open pit designs with berms and ramps.

Figure 16-2: Touquoy L–G Pit Shell Resource Contents by Case



Note: Figure prepared by Moose Mountain, 2019.

Figure 16-3: Beaver Dam L–G Pit Shell Resource Contents by Case



Note: Figure prepared by Moose Mountain, 2019.

16.2.3 Fifteen Mile Stream L–G Pit Limit

Figure 16-4 shows the contents of the generated L–G pit shells for Fifteen Mile Stream, with curves for both the Egerton–MacLean and Hudson (EGMH) Zones and the Plenty Zone. Inflection points can be seen in the curve of cumulative resources by pit case. Case 16 for the EGMH Zones and Case 15 for the Plenty Zone indicate points at which larger pit shells will not produce significant increases to the project value. The undiscounted cash flows are compared and also indicates Case 16 for the EGMH Zones and Case 15 for the Plenty Zone as points where increased pit expansions do not increase the project value.

The pit shells generated from Case 16 at the EGMH Zones and Case 15 at the Plenty Zone are selected as the ultimate pit limits for Fifteen Mile Stream and are used for further mine planning as targets for detailed open pit designs with berms and ramps.

16.2.4 Cochrane Hill L–G Pit Limit

Figure 16-5 shows the contents of the generated L–G pit shells for Cochrane Hill. The undiscounted cash flows are compared and indicate Case 19 as a point where increased pit expansions do not increase the project value.

The pit shell generated from Case 19 is selected as the ultimate pit limits for Cochrane Hill and is used for further mine planning as a target for detailed open pit designs with berms and ramps.

16.3 Pit Designs

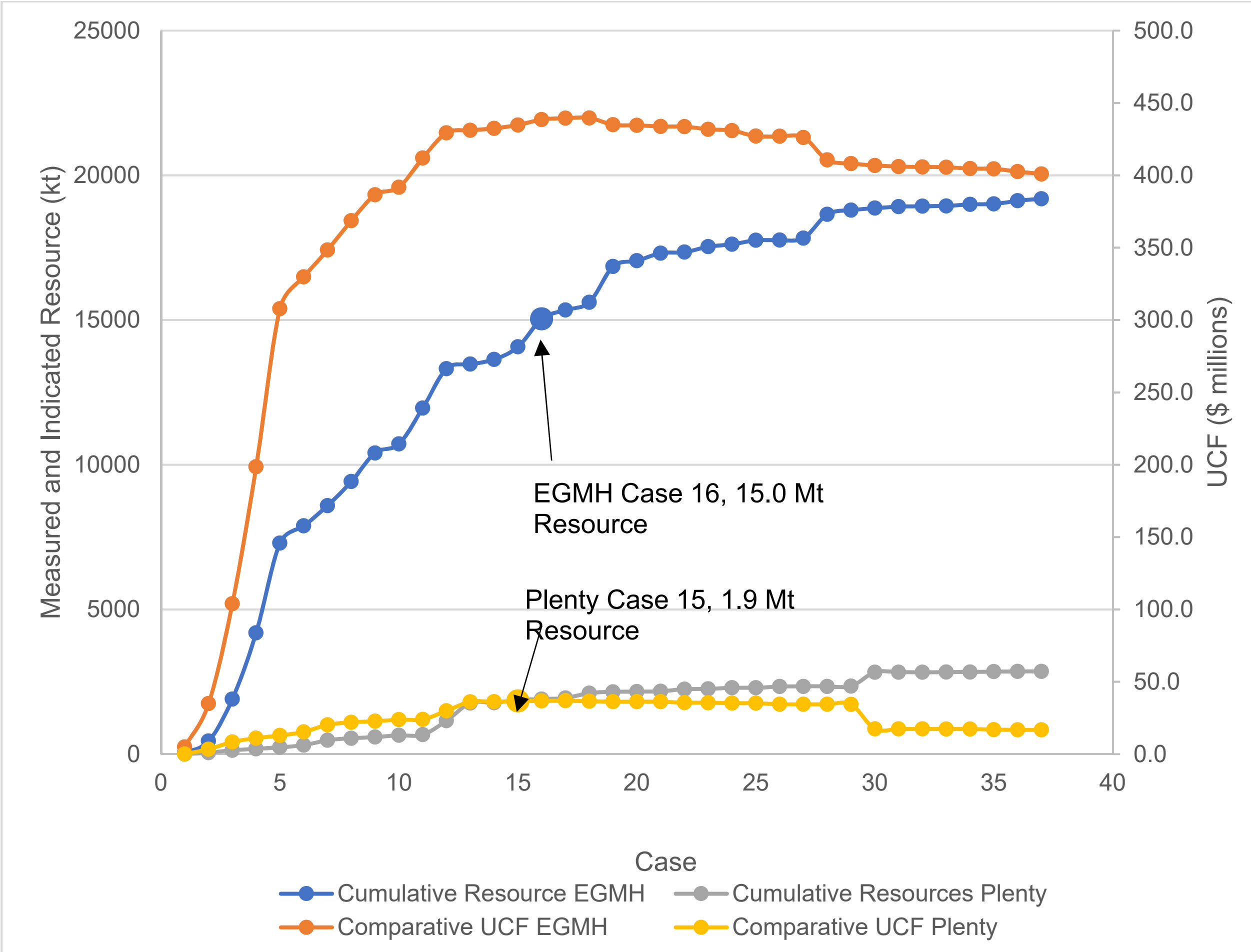
Contents of the designed open pits are presented in Table 15-2 and discussed in Section 15.3.

The contents for each designed pit phase are presented graphically in Figure 16-10.

16.3.1 In-pit Haul Roads

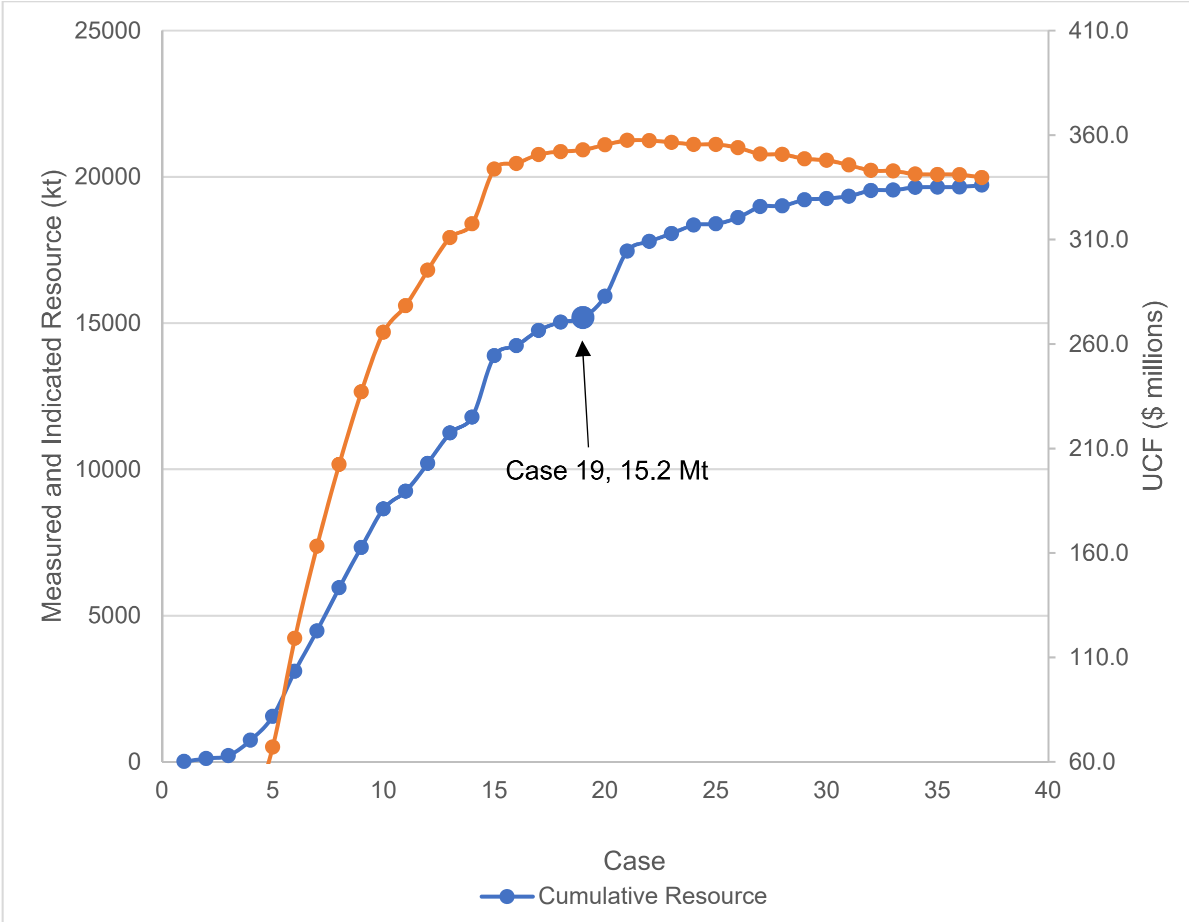
Two-way haul roads of 21 m width are designed. The bottom two ramped benches of the pit use one-way haul roads of 16 m width since bench volumes and traffic flow are reduced. Haul road grades are limited to a maximum of 10%.

Figure 16-4: Fifteen Mile Stream L–G Pit Shell Resource Contents by Case



Note: Figure prepared by Moose Mountain, 2019.

Figure 16-5: Cochrane Hill L–G Pit Shell Resource Contents by Case



Note: Figure prepared by Moose Mountain, 2019.

16.3.2 Pit Phases

Ultimate pit limits are generally split up into phases or pushbacks to target higher economic margin material earlier in the mine life:

- The Touquoy pit is split into north, south and east phases with the higher-grade, lower strip ratio north phase mined ahead of the south and east phase pushbacks;
- The Beaver Dam pit is split into south and north phases with the higher-grade and lower strip ratio south phase mined ahead of the north phase.
- At Fifteen Mile Stream, the Egerton–MacLean pit is split into south and north phases with the higher-grade and lower strip ratio south phase mined ahead of the north phase;
- At Fifteen Mile Stream, the Hudson and Plenty pits are mined as one phase each.
- The Cochrane Hill pit is split into south and north phases with the higher-grade and lower strip ratio south phase mined ahead of the north phase. A starter borrow pit constrained to identified areas of waste rock in the north and south portions of the ultimate pit limits are split out to supply waste rock requirements for tailings dam construction. The initial pit phases are kept at least 70 m from Provincial Highway 7 to delay development work re-routing this highway.

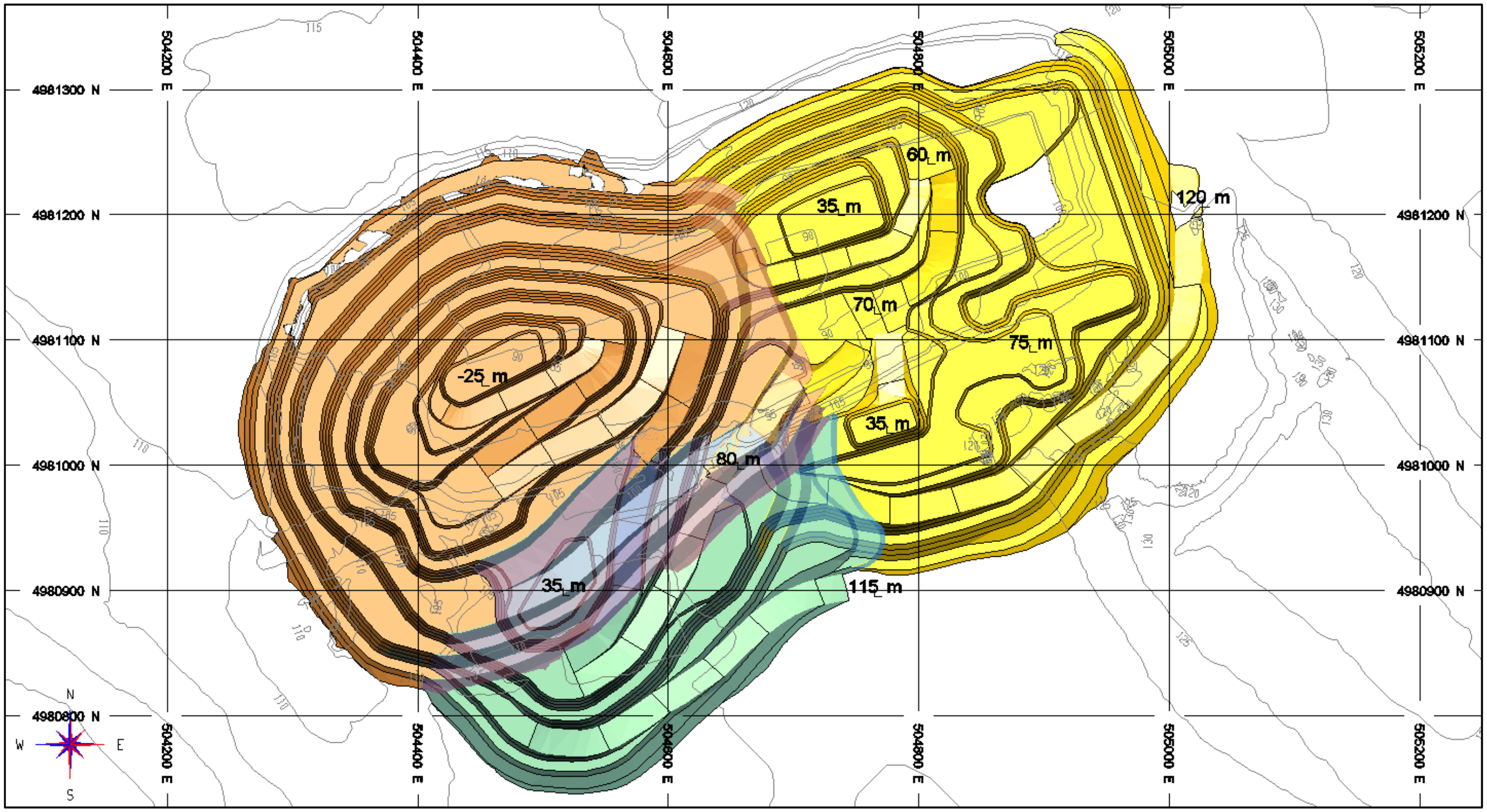
16.3.3 Touquoy Pit

The phased Touquoy pit designs are shown in Figure 16-6.

Touquoy Phase 1, T681, North Phase

This phase targets the northwest portion of the deposit, which contains higher grade gold than the east or south portions of the deposit. This phase contains about three years' worth of mill feed. This phase ties into the existing pit ramp at the 90 m bench on the east side of the phase and mines down to the pit bottom at the -25 m elevation. The ramp runs counter-clockwise down from the 115 m pit exit in the east end of the pit, switchbacks at the 60 m, 35 m, 15 m and 0 m bench elevations. The north portion of this phase is already mined to the 90 m bench. The south side of this phase is currently being mined from the 110 m crest to the 100 m bench off an internal temporary ramp. There is a narrow cut from the 115 m bench down to the 95 m bench in the west side of the phase, where the existing pit is already excavated. Accessing this west pit area will require a temporary external haul road from either the north or the south side of the current pit limits.

Figure 16-6: Touquoy Pit



Note: Figure prepared by Moose Mountain, 2019. Orange = North Phase 1, T681; Green = South Phase 2, T682; Yellow = East Phase 3, T683

Touquoy Phase 2, T682, South Phase

This phase targets the portion of the deposit south of phase 1 and contains about 0.5 years' worth of mill feed. It mines from the pit exit at the 115 m elevation, down to the 90 m elevation off a new ramp in the south side of the pit. From the 90 m bench, the ramping ties into the existing pit ramp and runs clockwise to the 60 m bench, then switchbacks to the pit bottom at the 35 m elevation. Material below the 90 m bench will come out the existing pit exit at the 115 m elevation in the east side of the pit. At the 45 m bench, the phase 2 ramp ties into the phase 1 ramp, so that material coming out of the phase 1 pit bottom can be mined concurrently with phase 2.

Touquoy Phase 3, T683, East Phase

This phase targets the remaining east portion of the deposit and contains just over one years' worth of mill feed. It mines from the pit exit at the 120 m elevation, down to the pit bottom at the 35 m elevation. The ramp runs clockwise down from the 120 m pit exit. Three separate pit bottoms are defined below the 80 m elevation, each is accessed through spurs off the main ramp. At the 80 m bench, the ramp ties into the ramps coming out of the first two phases, allowing concurrent mining as required by the mine schedule.

16.3.4 Beaver Dam Pit

The phased Beaver Dam pit designs are shown in Figure 16-7.

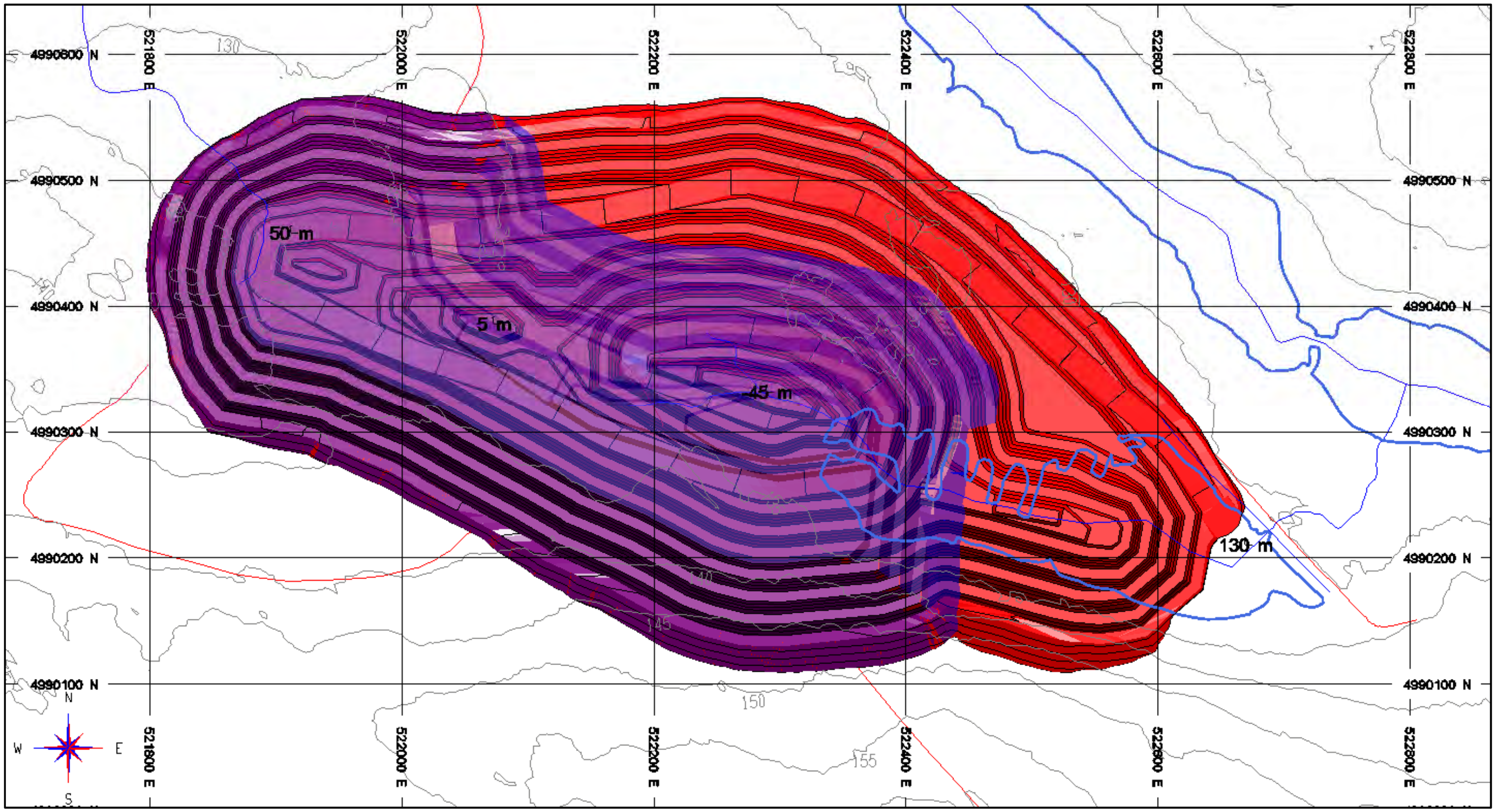
Beaver Dam Phase 1, B621, South Phase

B621 targets the south portion of the deposit, which contains a higher-grade gold and lower strip ratio than the north portion. This phase contains about 1.5 years of mill feed and mines from the pit exit at the 130 m elevation, down to the pit bottom at the 45 m elevation. The ramp runs counter-clockwise down from the 130 m pit exit in the east of the pit and switchbacks at the 85 m bench elevation.

Beaver Dam Phase 2, B622, North Phase

B622 pushes the north and east wall to the ultimate limits and extends the bottom of the pit below the first pit phase. This phase contains about 1.5 years of mill feed and mines from the pit exit at the 130 m elevation, down to the pit bottom at the -45 m elevation. The ramp runs counter-clockwise down from the 130 m pit exit in the east of the pit.

Figure 16-7: Beaver Dam Pit



Note: Figure prepared by Moose Mountain, 2019. Blue = South Phase 1, B621; red = North Phase 2, B622, roads shown as red lines, lakes and streams as blue lines.

16.3.5 Fifteen Mile Stream Pit

The phased Fifteen Mile Stream pit designs are shown in Figure 16-8.

Fifteen Mile Stream Phase 1, F611, Egerton‑MacLean South Phase

F611 targets the south portion of the Fifteen Mile Stream deposit, which contains higher-grade gold and a lower strip ratio than the north portion. This phase contains about four years of mill feed, mining from the pit exit at the 113 m elevation in the south of the pit, ramping clockwise down to the pit bottom at the -10 m elevation.

Fifteen Mile Stream Phase 2, F621, Egerton‑MacLean North Phase

F621 targets the remaining north portion of the deposit and contains about 2.5 years of mill feed. It mines from the pit exit at the 113 m elevation, down to the pit bottom at the -50 m elevation. The ramp will run counter-clockwise down from the pit exit in the east end of the pit and switchback at the 60 m and 5 m bench elevations. At the 60 m switchback the phase 2 ramping lines up with the phase 1 ramp, so material can exit the south side of the pit as well.

Fifteen Mile Stream Phase 3, F631, Hudson Phase

F631 mines the Hudson Zone and contains about one year of mill feed. This phase mines from the pit exit at the 108 m elevation in the east of the pit, ramping clockwise down to the pit bottom at the 40 m elevation.

Fifteen Mile Stream Phase 4, F641, Plenty Phase

F641 mines the Plenty Zone and contains about one year of mill feed. This phase mines from the pit exit at the 115 m elevation in the east of the pit, ramping counter-clockwise down to the pit bottom at the 20 m elevation.

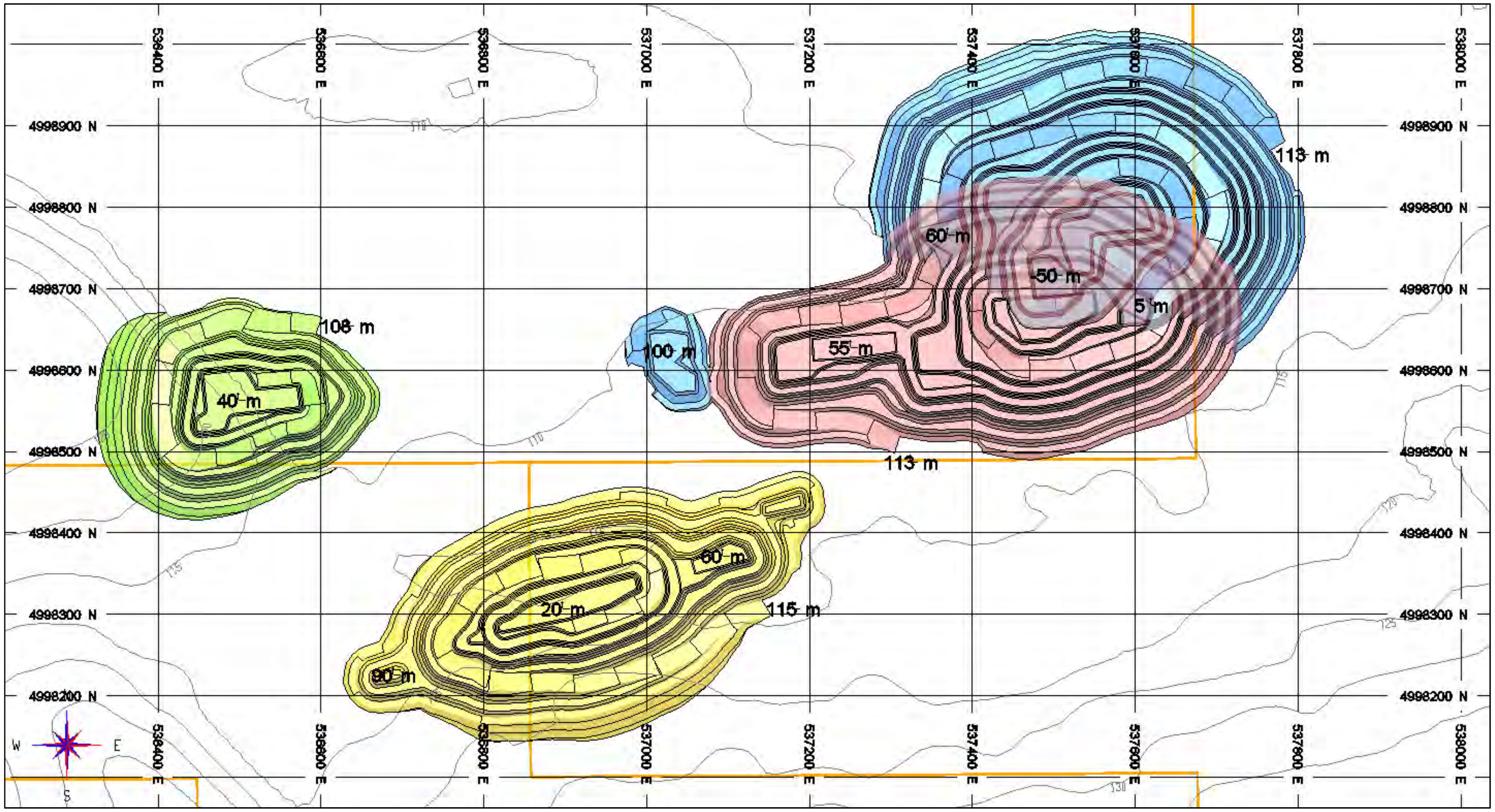
16.3.6 Cochrane Hill Pit

The phased Cochrane Hill pit designs are shown in Figure 16-9.

Cochrane Hill Phase 1, C611, Starter Borrow Phase

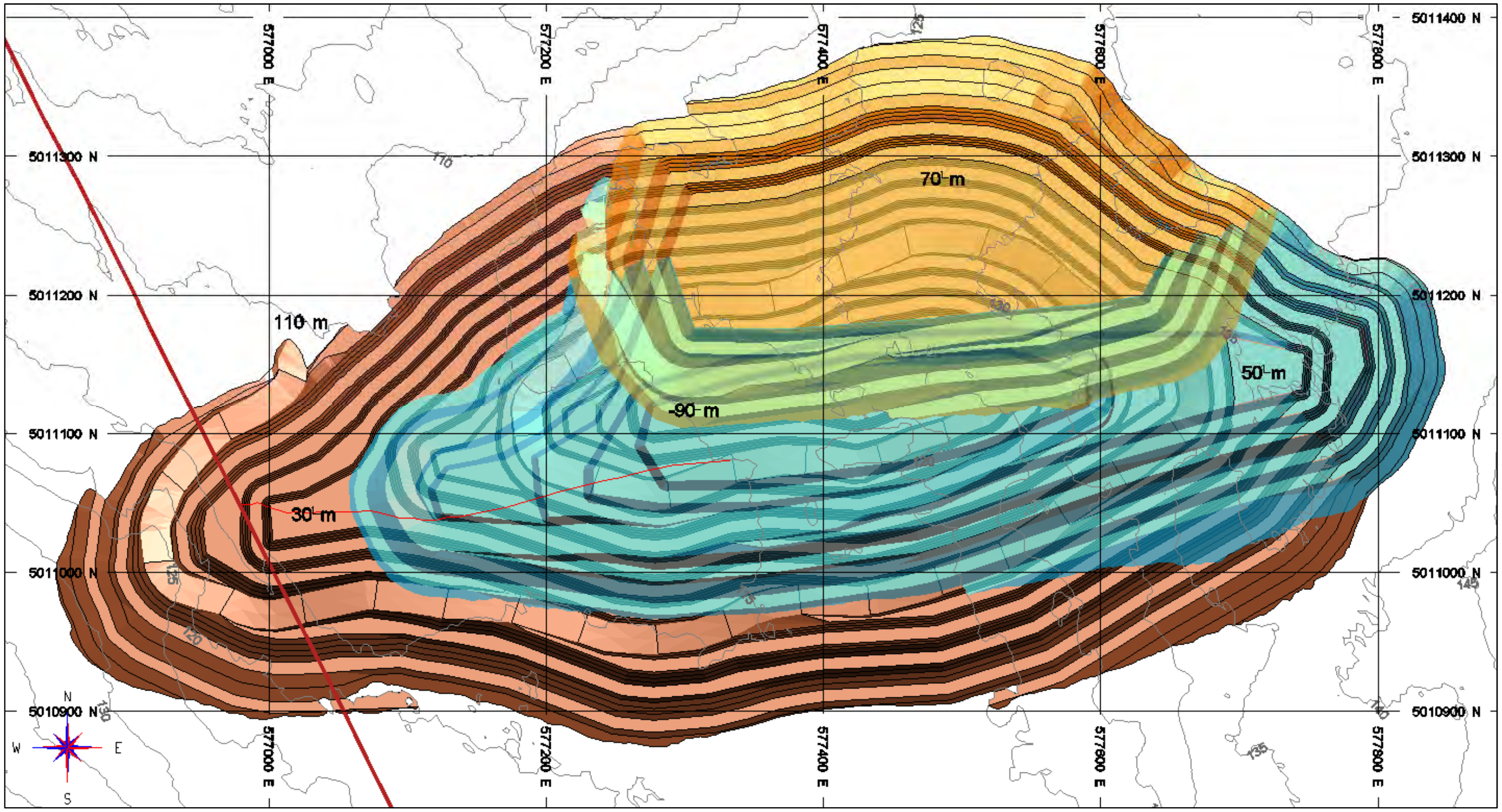
C611 targets identified waste rock in the north and south portions of the deposit, with enough capacity to supply starter tailings dam construction material. The pit will mine from the pit exit at the 120 m elevation on the north side of the pit, ramping counter clockwise down to the pit bottom at the 70 m elevation.

Figure 16-8: Fifteen Mile Stream Pit Phases



Note: Figure prepared by Moose Mountain, 2019. Blue = Egerton–MacLean South Phase 1, F611; blue = Egerton–MacLean North Phase 2, F621; green = Hudson Phase, F631; yellow = Plenty Phase, F641, property boundaries shown as orange lines.

Figure 16-9: Cochrane Hill Pit Phases



Note: Figure prepared by Moose Mountain, 2019. yellow = Borrow Phase 1, C611; blue = South Phase 2, C621; brown = North Phase 3, C631; roads shown as red line.

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Cochrane Hill Phase 2, C621, South Phase

C621 targets the south portion of the Cochrane Hill deposit, which contains a lower strip ratio than the north portion. This phase contains about three years of mill feed. This pit will mine from the pit exit at the 120 m elevation on the west side of the pit, ramping counter clockwise down to the pit bottom at the 30 m elevation.

Cochrane Hill Phase 3, C631, North Phase

C631 targets the remaining north portion of the deposit and contains about five years of mill feed. It will mine from the pit exit at the 110 m elevation in the northwest end of the pit, ramping counter-clockwise down to the pit bottom at the -90 m elevation.

16.4 Ex-Pit Haul Roads

Mine haul roads, external to the open pits, are designed to haul ore and waste materials from the open pits to the scheduled destinations. The mine haul roads are designed with the following key inputs:

- 27 m wide ex-pit haul roads that incorporate dual lane running width and berms on both edges of the haul road;
- 8% maximum grade.

The ex-pit haul roads are shown in the project layout drawings included in Section 16.7.1.

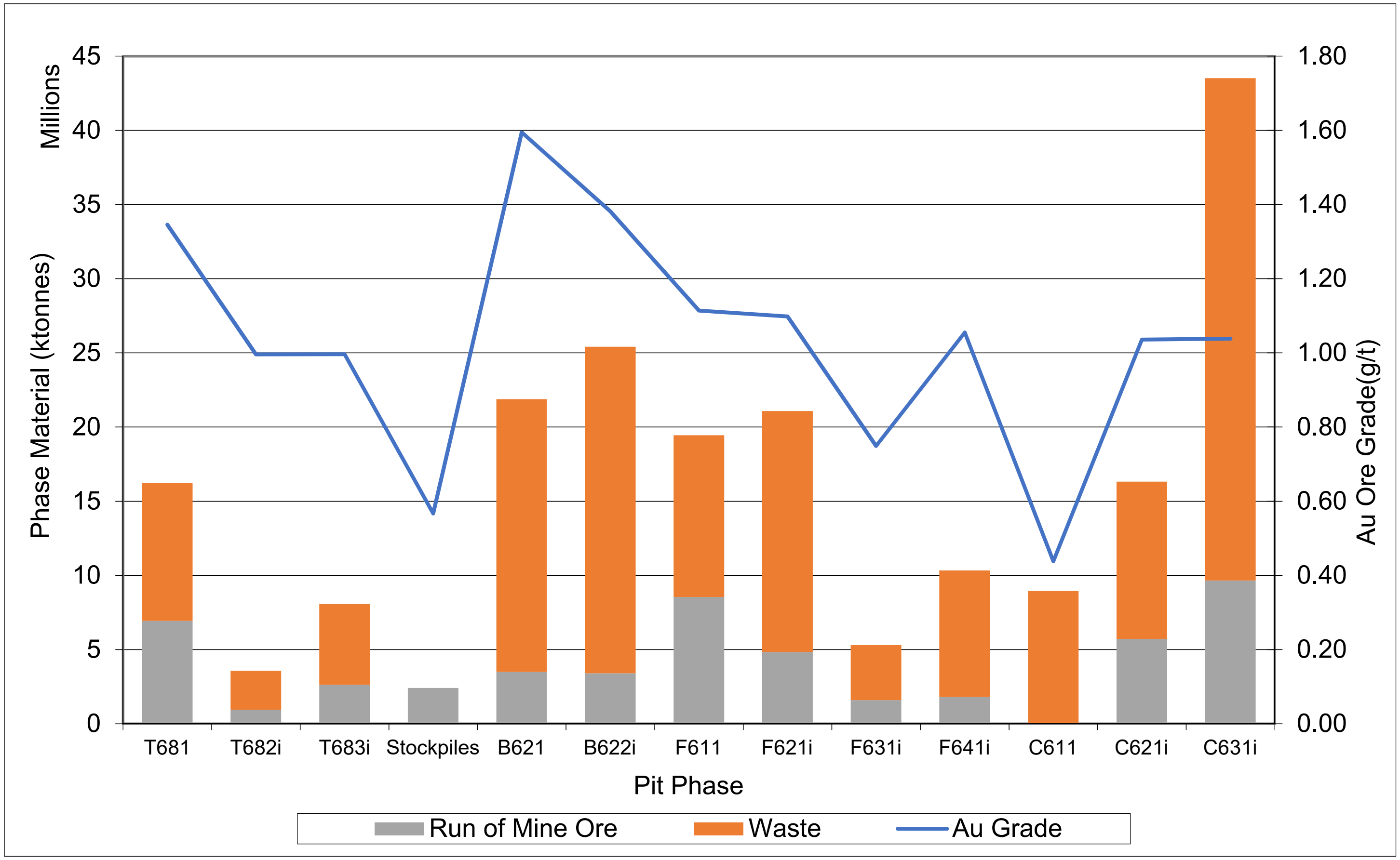
16.5 Ore Storage Facilities

When ore is mined from the pit it will either be delivered to the crusher, the run-of-mine (ROM) stockpile located next to the crusher, or the ore stockpiles.

Throughout the life of operations, all ore grading between 0.30 and 0.50 g/t Au will be stockpiled. Cut-off grade optimization on the mine production schedules also sends ore above 0.50 g/t Au to stockpiles in certain planned periods. The stockpiled Mineral Reserves are planned to be re-handled back to the crusher once the pits are exhausted.

At Touquoy, ore will be hauled to a crusher located 700 m north of the pit, which will feed the process plant. The Touquoy ore stockpiles are located about 1,000 m east of the crusher, and next to the waste rock storage facilities (WRSF). As of December 31, 2018, these stockpiles hold 2.4 Mt of ore grading 0.57 g/t Au. The ore stockpiles will accommodate an additional 1.5 Mt of ore.

Figure 16-10: Designed Phase Pit Contents (all deposits)



Note: Figure prepared by Moose Mountain, 2019.

At Beaver Dam ore stockpiling is limited to two days of feed for the Touquoy. There is opportunity to convert the waste rock stockpile directly north of the crusher to an ore stockpile if plans change.

At Fifteen Mile Stream, ore will be hauled to a crusher that will be located 1,500 m southeast of the Egerton–MacLean pit, which will feed the process plant. Ore stockpiles will be located 500 m north of the crusher and are sized to accommodate 6.0 Mt of ore.

At Cochrane Hill, ore will be hauled to a crusher that will be located 1,200 m east of the pit, which will feed the process plant. Ore stockpiles will be located 600 m northwest of the crusher and are sized to accommodate 4.8 Mt of ore.

The ore stockpiles are shown in the project layout drawings in Section .

16.6 Waste Rock Storage Facilities

Waste rock and till/topsoil storage facilities are planned at each site for waste materials from the open pit. In general, design considerations assumed:

- Bottom-up construction;
- 10 m lift heights;
- 1.3:1 active slopes on waste rock lifts;
- Berm allowances push slopes out to ~3:1.

Waste rock from the Touquoy pit will be stored 1,500 m northeast of the pit. Till waste from the pit will be stored 500 m southeast of the pit.

Waste rock from the Beaver Dam pit will be stored in three separate piles, 400 m, 800 m, and 2,000 m south and west of the pit. Topsoil and till from the pit will be stored in two separate piles, 300 m and 700 m southeast of the pit. Pile separation is planned to avoid environmentally sensitive areas, as well as accommodate water diversion structures.

Waste rock from the Fifteen Mile Stream pits will be stored in two separate piles 600 m south of the Egerton–MacLean pit. The western pile is intended to store non-potentially acid generating (NPAG) waste rock, and the eastern pile to store potentially acid generating (PAG) waste rock. Pile separation is planned to accommodate water diversion structures. Till and topsoil from the pit will be stored 400 m southeast of the Egerton–MacLean pit.

Waste rock from the Fifteen Mile Stream pits will be stored in two separate piles, 800 m north of the pit and 1,100 m northeast of the pit. The larger north pile is intended to store PAG waste rock, and the smaller northeast pile to store NPAG waste rock. Till and topsoil from the pit will be stored directly northeast of the pit.

The WRSFs are shown in the Project layout drawings in Section 16.7.1.

16.7 Production Schedule

Production requirements by period, mine operating considerations, product prices, recoveries, destination capacities, equipment performance, haul cycle times and operating costs are used to determine the optimal production schedule from the pit phase Mineral Reserves.

The overall production schedule is included as Table 16-6.

The open pit mine production schedule for all of the deposits is included as Figure 16-11 and shows the production tonnage and grade forecast; Figure 16-12 provides an illustration of the projected material mined and strip ratio. This is illustrated for each individual deposit in Figure 16-13 to Figure 16-18.

The production schedule is based on the following parameters:

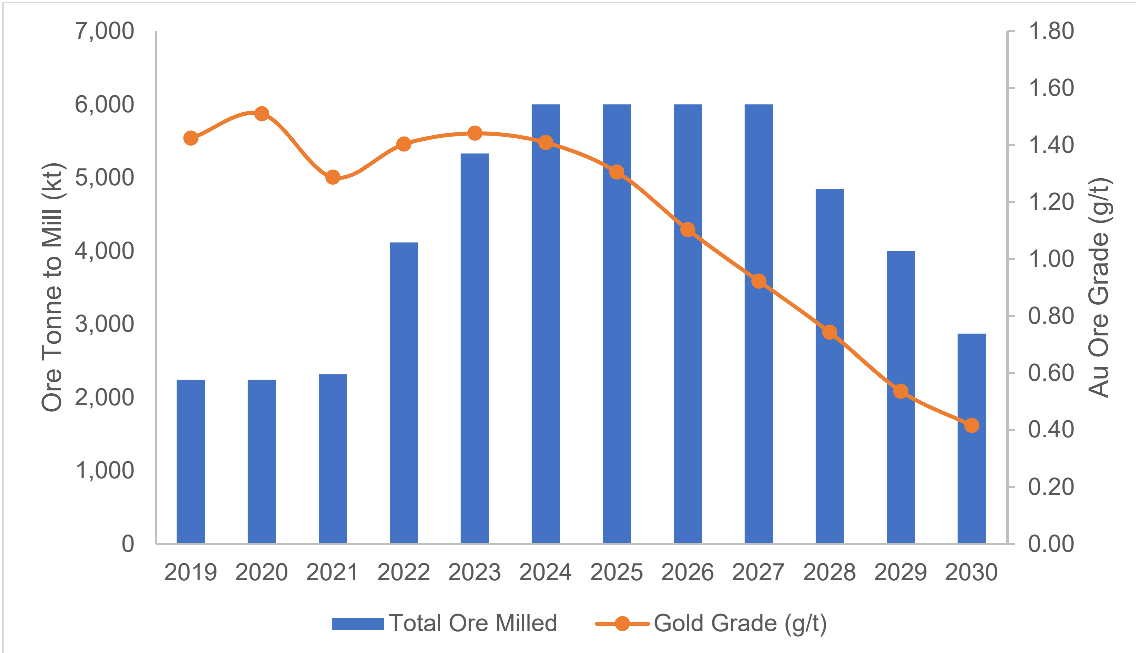
- The mine production schedule is based on the Mineral Reserve Estimate and are based on a start point of January 1, 2019;
- As of the end of 2018, the Touquoy mine and mill is producing gold from ore;
- Production scheduling continues at Touquoy in 2019, with the remaining deposits scheduled to start production based on estimated financing and permitting timelines;
- 2019 and 2020 at Touquoy and Pre-production and the first two years of mill operation at Fifteen Mile Stream and Cochrane Hill are scheduled out on quarterly periods; remaining operations are scheduled out on annual periods;
- Annual mill feed of 2,240 kt/a is targeted for Touquoy and 2,000 kt/a is targeted for Beaver Dam, Fifteen Mile Stream and Cochrane Hill;
- Beaver Dam production scheduling is combined with Touquoy, since the resources for mining (equipment, labour, supplies, etc.) are shared; Beaver Dam ore will be hauled to the Touquoy mill after Touquoy open pit is exhausted;
- Fifteen Mile Stream construction and mine operations start in April 2021, and mill operations begin in December 2021, with concentrate hauled to Touquoy for final doré production;
- Cochrane Hill construction and mine operations start in April 2022, and mill operations begin in April 2023, with concentrate hauled to Touquoy for final doré production;

Table 16-6: Production Plan

Total Mine Production	**Year**	**LOM**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**
Total ore milled	*kt*	*51,954*	*2,240*	*2,240*	*2,315*	*4,115*	*5,330*	*6,000*	*6,000*	*6,000*	*6,000*	*4,844*	*4,000*	*2,869*
Au	*g/t*	*1.12*	*1.42*	*1.51*	*1.29*	*1.40*	*1.44*	*1.41*	*1.31*	*1.10*	*0.92*	*0.74*	*0.54*	*0.42*
Mill feed gold	*koz.*	*1,877*	*103*	*109*	*96*	*186*	*247*	*272*	*252*	*213*	*178*	*116*	*69*	*38*
Total ore mined	kt	49,540	2,927	2,435	3,374	6,031	7,191	8,292	7,324	5,946	4,271	1,338	411	—
Au	g/t	1.15	1.22	1.42	1.15	1.10	1.21	1.17	1.14	1.07	1.03	1.10	1.17	—
Total stockpile retrieval to mill	kt	15,207	30	—	75	300	50	—	650	1,158	2,706	3,744	3,624	2,869
Au	g/t	0.55	0.63	—	1.30	1.15	0.69	—	0.67	0.63	0.59	0.59	0.46	0.42
Total waste mined	kt	150,508	3,859	4,365	11,454	26,247	31,920	28,879	23,637	15,207	4,310	580	51	—
Touquoy														
Ore milled	*kt*	*12,914*	*2,240*	*2,240*	*2,240*	*1,979*	*352*	—	*343*	*1,000*	*1,674*	*845*	—	—
Au	*g/t*	*1.10*	*1.42*	*1.51*	*1.29*	*1.17*	*1.11*	—	*0.62*	*0.62*	*0.53*	*0.42*	—	—
Ore mined	kt	10,500	2,927	2,435	2,492	2,280	365	—	—	—	—	—	—	—
Au	g/t	1.23	1.22	1.42	1.20	1.08	1.08	—	—	—	—	—	—	—
Stockpile retrieval to mill	kt	3,892	30	—	—	—	—	—	343	1,000	1,674	845	—	—
Au	g/t	0.54	0.63	—	—	—	—	—	0.62	0.62	0.53	0.42	—	—
Waste mined	kt	17,343	3,859	4,365	5,172	3,605	342	—	—	—	—	—	—	—
Beaver Dam														
Ore milled	*Kt*	*6,897*	—	—	—	*236*	*1,678*	*2,000*	*1,657*	*1,000*	*326*	—	—	—
Au	*G/t*	*1.49*	—	—	—	*1.74*	*1.60*	*1.52*	*1.42*	*1.32*	*1.38*	—	—	—
Ore mined	kt	6,897	—	—	—	236	1,685	2,000	1,650	1,000	326	—	—	—
Au	g/t	1.49	—	—	—	1.74	1.59	1.52	1.42	1.32	1.38	—	—	—
Stockpile retrieval to mill	kt	7	—	—	—	—	—	—	—	—	—	—	—	—

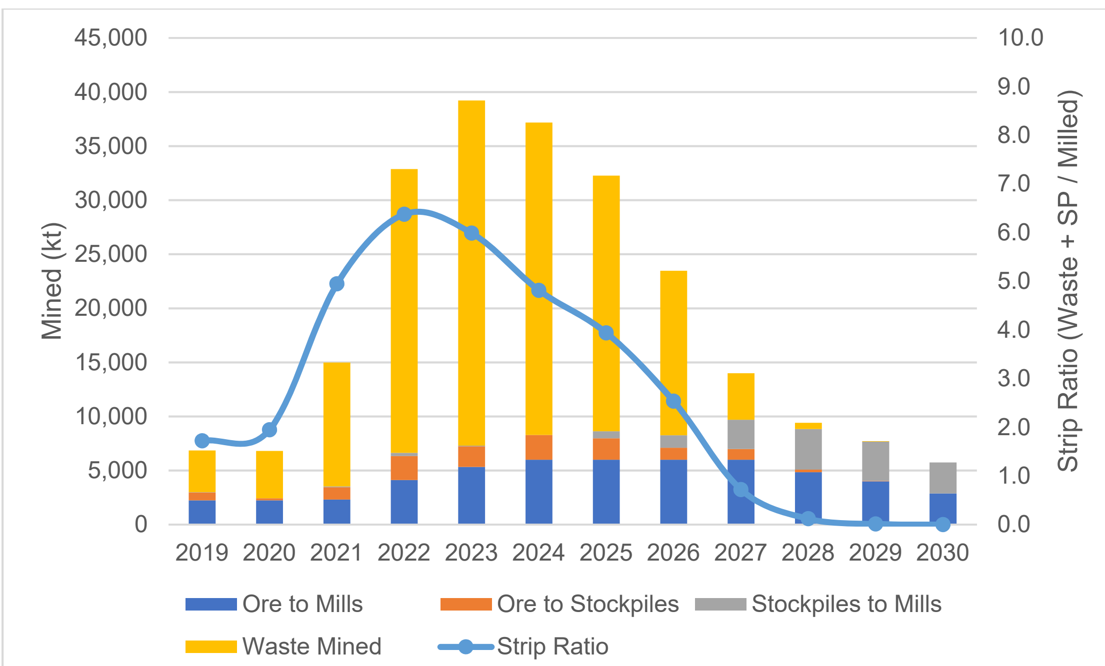
Au	g/t	0.62	—	—	—	—	—	—	0.62	—	—	—	—	—
Waste mined	kt	40,384	—	—	165	9,194	13,348	9,934	5,865	1,754	124	—	—	—
Fifteen Mile Stream														
Ore milled	*kt*	*16,764*	—	—	*75*	*1,900*	*2,000*	*2,000*	*2,000*	*2,000*	*2,000*	*2,000*	*2,000*	*789*
Au	*g/t*	*1.07*	—	—	*1.30*	*1.60*	*1.50*	*1.40*	*1.38*	*1.04*	*0.84*	*0.65*	*0.41*	*0.41*
Ore mined	kt	16,764	—	—	883	3,448	2,874	3,446	2,743	2,144	1,226	—	—	—
Au	g/t	1.07	—	—	1.00	1.08	1.20	1.04	1.12	0.97	0.90	—	—	—
Stockpile retrieval to mill	kt	6,554	—	—	75	300	—	—	300	158	932	2,000	2,000	789
Au	g/t	0.59	—	—	1.30	1.15	—	—	0.72	0.70	0.70	0.65	0.41	0.41
Waste mined	kt	39,384	—	—	6,117	7,214	6,968	4,641	6,557	7,030	856	—	—	—
Cochrane Hill														
Ore milled	*kt*	*15,380*	—	—	—	—	*1,300*	*2,000*	*2,000*	*2,000*	*2,000*	*2,000*	*2,000*	*2,080*
Au	*g/t*	*1.04*	—	—	—	—	*1.24*	*1.30*	*1.25*	*1.30*	*1.25*	*0.97*	*0.66*	*0.42*
Ore mined	k kt	15,380	—	—	—	67	2,266	2,846	2,931	2,802	2,720	1,338	411	—
Au	g/t	1.04	—	—	—	0.65	0.96	1.07	1.01	1.05	1.04	1.10	1.17	—
Stockpile retrieval to mill	kt	4,754	—	—	—	—	50	—	—	—	100	900	1,624	2,080
Au	g/t	0.50	—	—	—	—	0.69	—	—	—	0.64	0.63	0.53	0.42
Waste mined	kt	53,397	—	—	—	6,233	11,262	14,304	11,214	6,423	3,330	580	51	—

Figure 16-11: Production Schedule, Mill Feed Tonnes and Grade (all deposits)



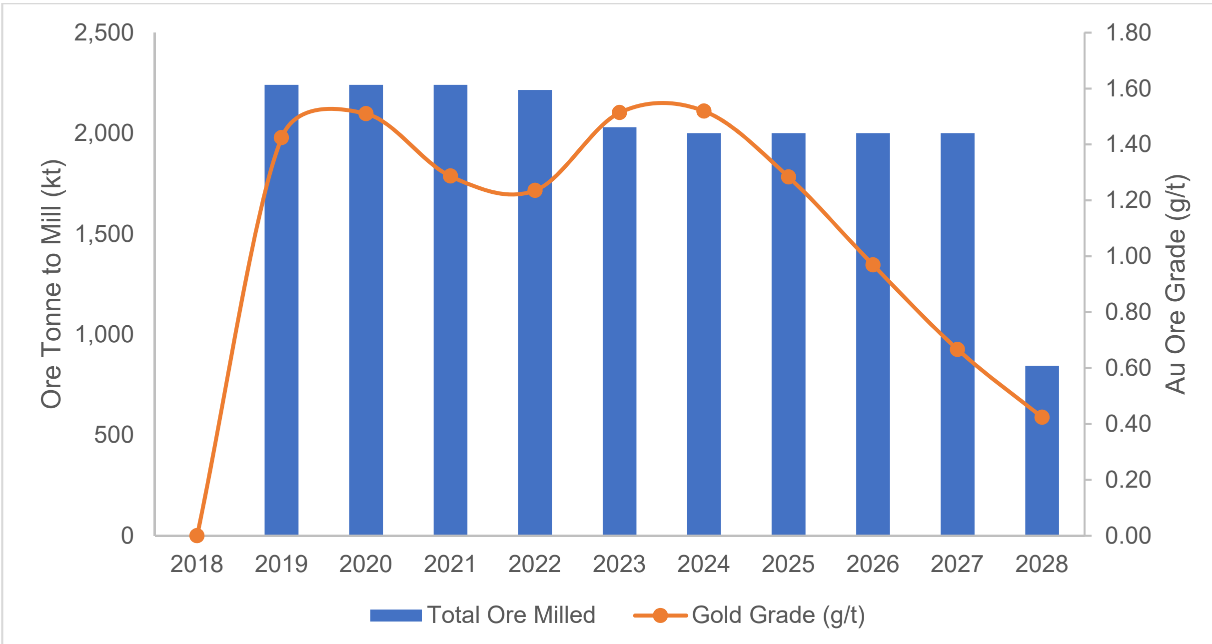
Note: Figure prepared by Moose Mountain, 2019.

Figure 16-12: Mine Production Schedule, Material Mined and Strip Ratio (all deposits)



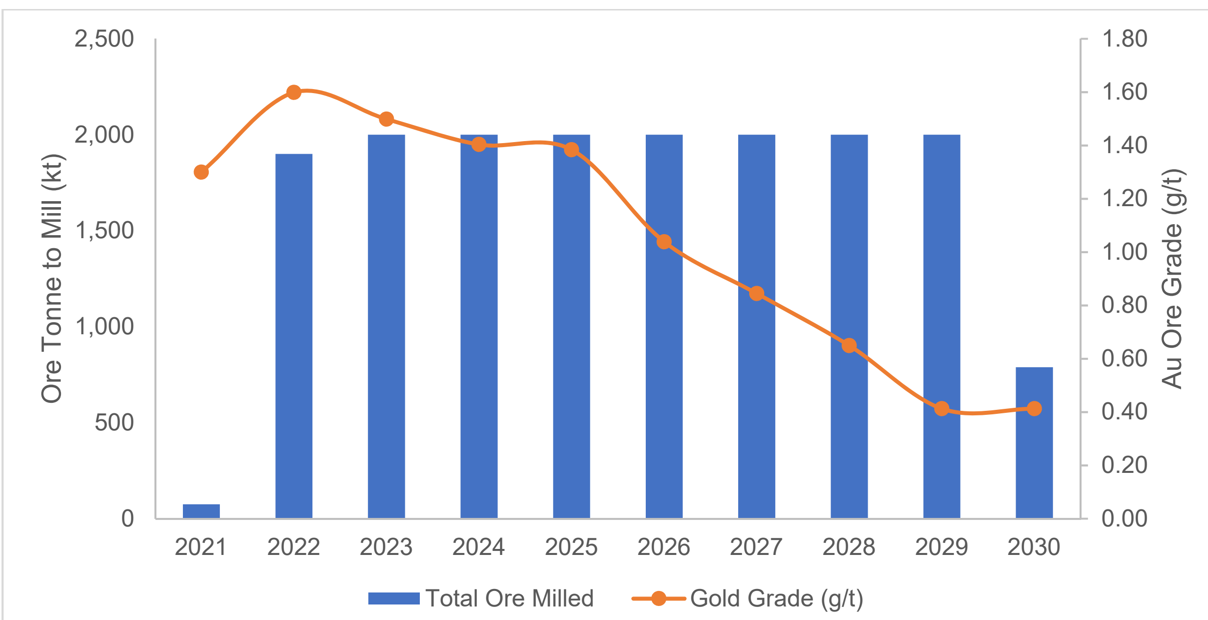
Note: Figure prepared by Moose Mountain, 2019.

Figure 16-13: Touquoy and Beaver Dam Production Schedule, Mill Feed Tonnes and Grade



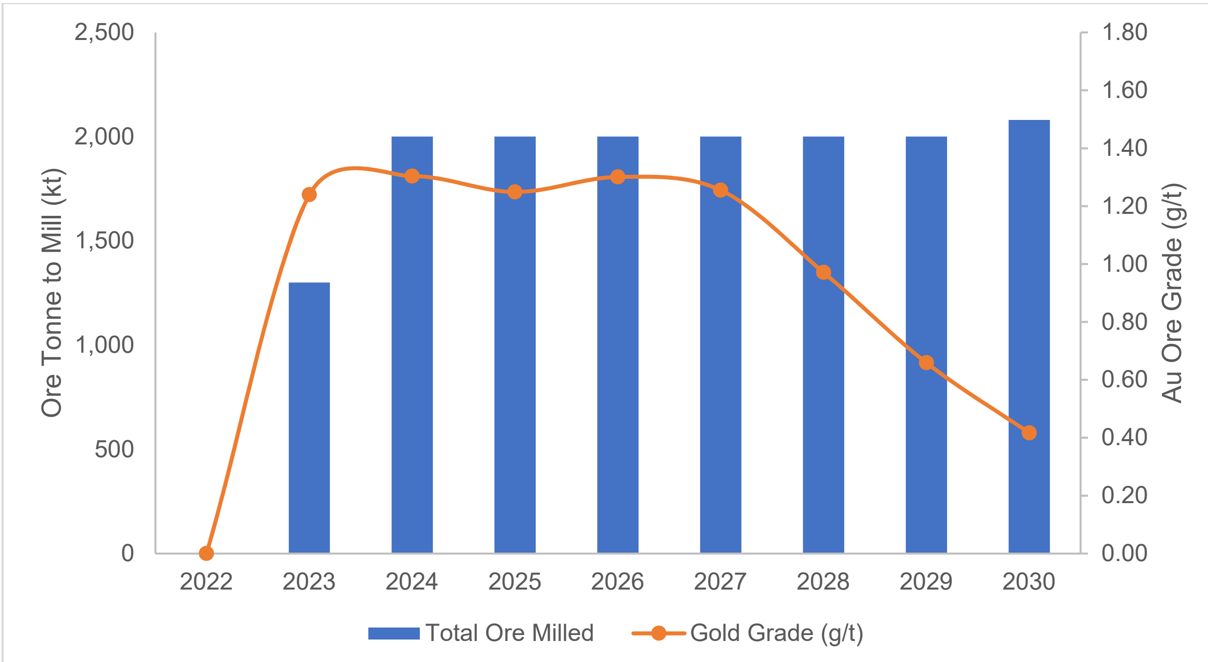
Note: Figure prepared by Moose Mountain, 2019.

Figure 16-14: Fifteen Mile Stream Production Schedule, Mill Feed Tonnes and Grade



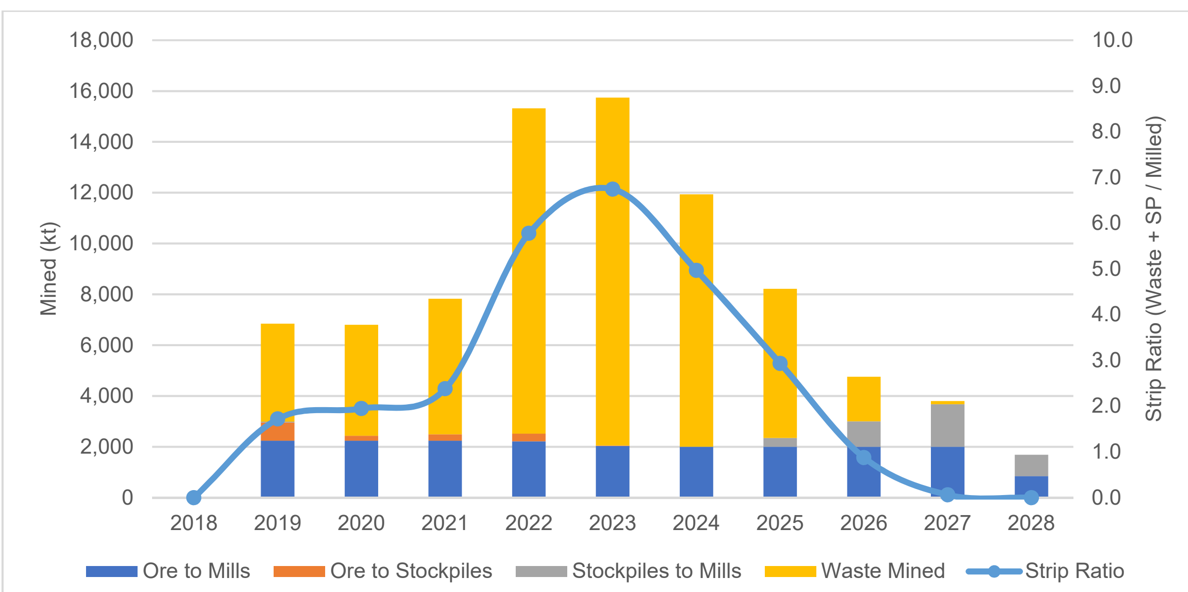
Note: Figure prepared by Moose Mountain, 2019.

Figure 16-15: Cochrane Hill Production Schedule, Mill Feed Tonnes and Grade



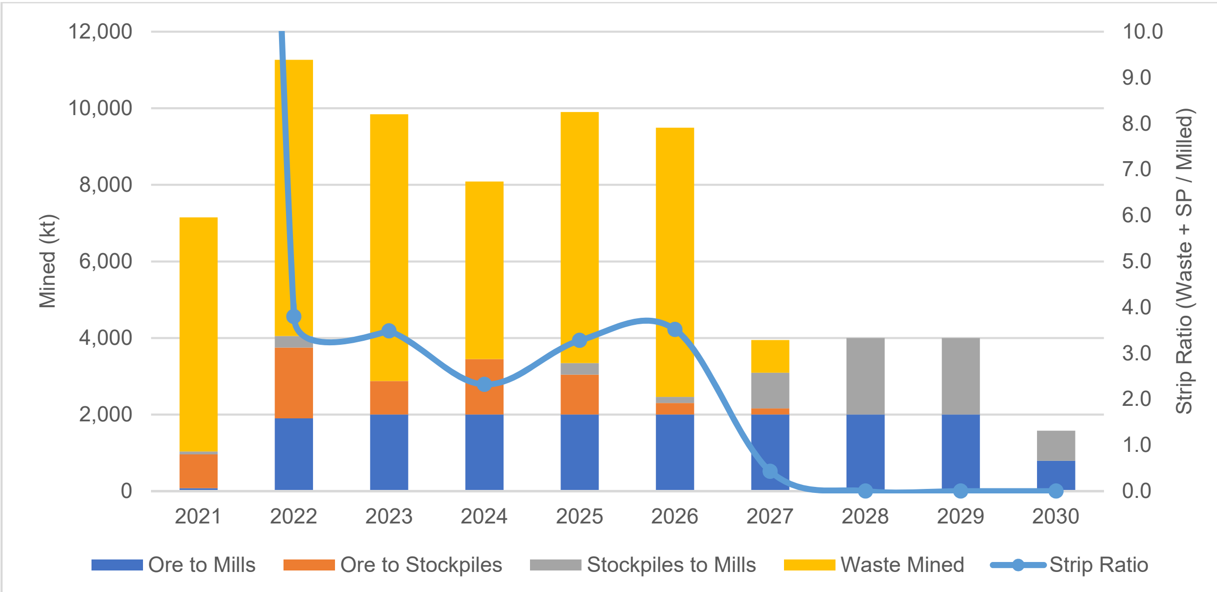
Note: Figure prepared by Moose Mountain, 2019.

Figure 16-16: Touquoy and Beaver Dam Mine Production Schedule, Material Mined and Strip Ratio



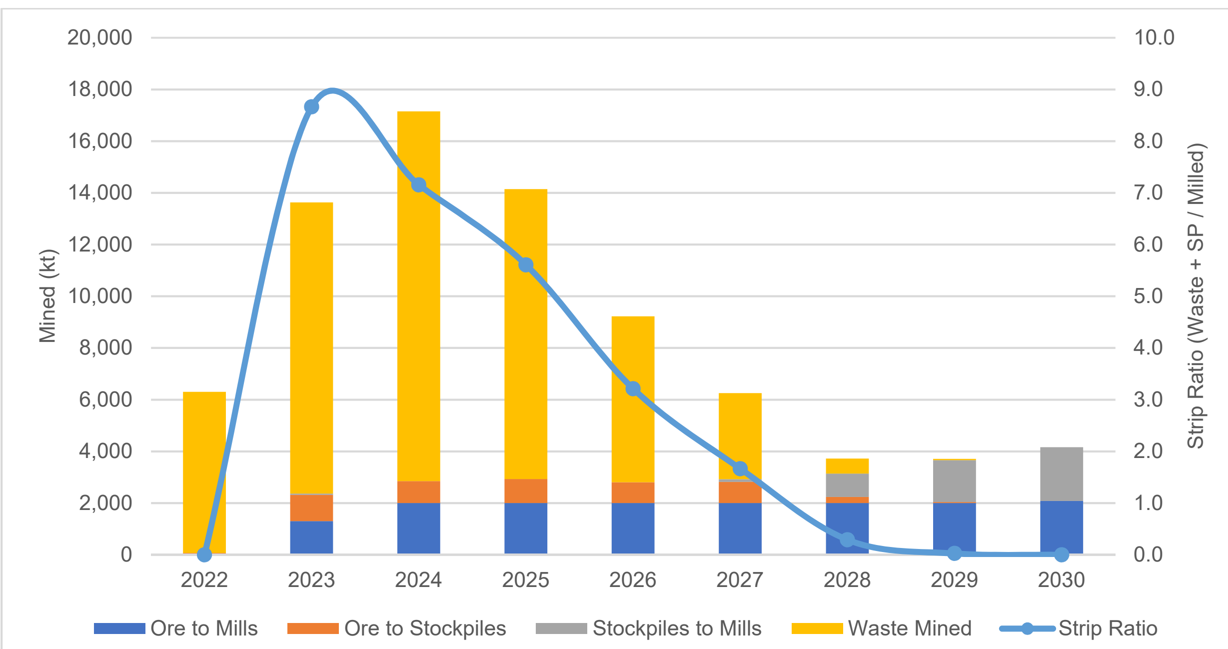
Note: Figure prepared by Moose Mountain, 2019.

Figure 16-17: Fifteen Mile Stream Mine Production Schedule, Material Mined and Strip Ratio



Note: Figure prepared by Moose Mountain, 2019.

Figure 16-18: Cochrane Hill Mine Production Schedule, Material Mined and Strip Ratio



Note: Figure prepared by Moose Mountain, 2019.

- Estimated ramp-up in the Fifteen Mile Stream and Cochrane Hill mills in first quarter targets 60% throughput (300 kt); followed by full capacity afterwards (2,000 kt/a);
- Phased pit bench reserves are used as input to the mine production schedule. Within a given phase, each bench is fully mined before progressing to the next bench;
- Pit phases are mined in sequence, where the second pit phase does not mine below the first pit phase;
- Pit phase vertical progression is limited to no more than 40 m in each year. Average annual phase progression is 30 m at Touquoy, 25 m at Beaver Dam, 25 m at Fifteen Mile Stream, and 30 m at Cochrane Hill;
- Pre-production mining requirements are as follows:
  - At Fifteen Mile Stream, rock waste requirements of 2.4 Mt for tailings dam construction, and 0.3 Mt for haul road construction, are mined as pre-production;
  - At Cochrane Hill, rock waste requirements of 2.6 Mt for tailings dam construction, and 0.2 Mt for haul road construction, are mined as pre-production;
  - Any insitu topsoil, till, PAG waste rock, and ore that must be moved to access this construction rock is stockpiled;
- Ore tonnes released in excess of the mill capacity are stockpiled;
- Low-grade ore is stockpiled and re-handled to the primary crushers at the end of mine life.

16.7.1 Mining Sequence

Touquoy

The Touquoy mine operations will run for five years until 2023. LOM activities are summarized in Table 16-7. The final layout plan is provided as Figure 16-19.

Beaver Dam

Starting at the end of 2021 the Touquoy mine operations begin to transition to Beaver Dam, which operates from 2021 through 2027. LOM activities are summarized in Table 16-8. The final layout plan is provided as Figure 16-20.

Table 16-7: Annual Mine Operations, Touquoy

Year	Activity
2019	Clearing and grubbing the southwest are of the Phase 1 pit. Removal and stockpiling of topsoil from areas cleared and grubbed. Relocation of existing access road from Mooseland Road, east of the waste rock stockpile. Mining of Phase 1 pit down to 70 bench. Grade control drilling within the Phase 1 pit, down to the 40 bench.
2020	Phase 1 pit mined down to 40 bench. Clearing and grubbing of Phase 2 pit area. Removal and stockpiling of topsoil from Phase 2 pit area. Mining and stockpiling of till materials from Phase 2 pit. Construction of ex-pit haul roads for Phase 2 pit access. Grade control drilling for initial benches of Phase 2 pit. Phase 2 pit mined down to the 95 bench.
2021	Phase 1 pit mined down to the 0 bench. Phase 2 pit mined down to the 60 bench. Clearing and grubbing of Phase 3 pit area. Removal and stockpiling of topsoil from Phase 3 pit area. Mining and stockpiling of till materials from Phase 3 pit. Grade control drilling for initial benches of Phase 3 pit. Phase 3 pit mined down to the 95 bench.
2022	Phase 1 pit mined down to the pit bottom on the -25 bench. Phase 2 pit mined down to the pit bottom on the 35 bench. Phase 3 pit mined down to the 60 bench.
2023	Phase 3 pit mined down to the pit bottom on the 35 bench.
2025 to 2028	Remaining stockpiled ore re-handled to the crusher.

Figure 16-19: Touquoy Layout Plan

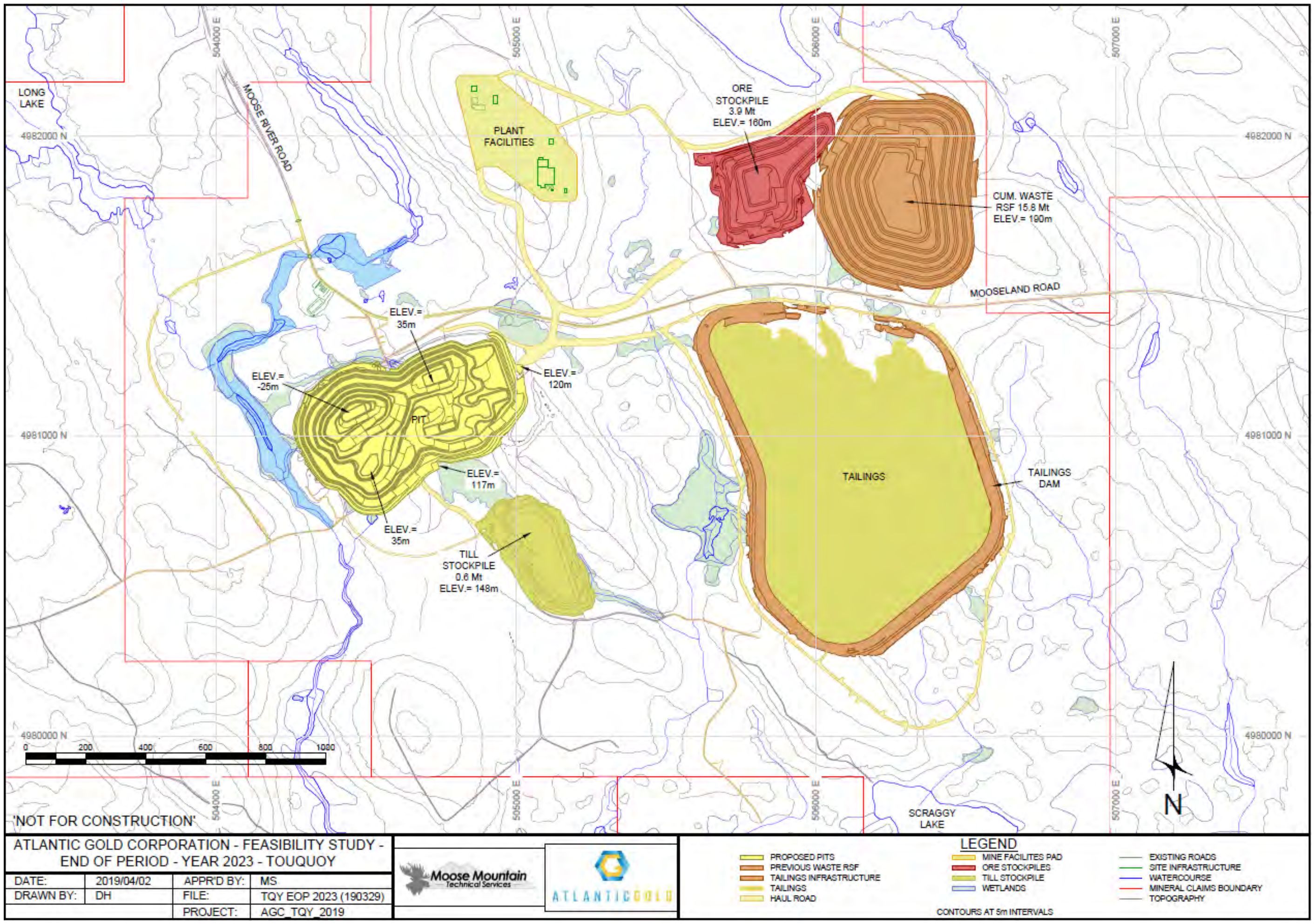
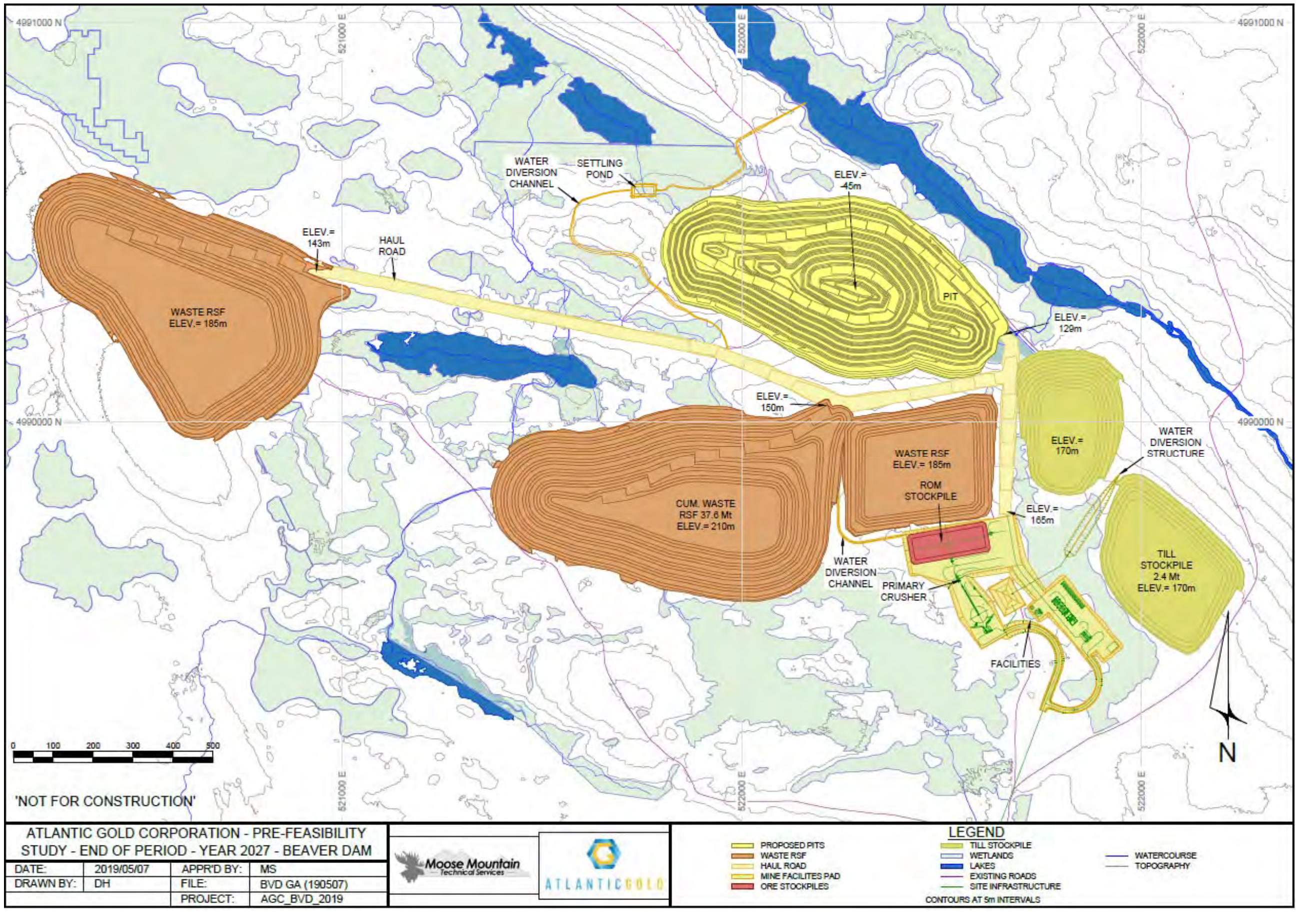


Table 16-8: Annual Mine Operations, Beaver Dam

Year	Activity
2021	Clearing and grubbing the following areas: open pit, till storage, waste rock storage, ex-pit haul roads. Removal and stockpiling of topsoil from areas cleared and grubbed. Ditch construction for water management plan. Mining and stockpiling of till materials from open pit.
2022	Mining and stockpiling of till materials from open pit. Grade control drilling for initial benches of open pit. Construction of ex-pit haul roads. Construction of surface water flood berm surrounding pit. Pit mined down to the 115 bench.
2023	Pit mined down to the 85 bench.
2024	Pit mined down to the 50 bench.
2025	Pit mined down to the 20 bench.
2026	Pit mined down to the -20 bench.
2027	Pit mined down to the bottom on the -45 bench.

Figure 16-20: Beaver Dam Layout Plan



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Fifteen Mile Stream

Fifteen Mile Stream will be a standalone mine operation, with pre-strip starting in 2021. Pre-production activities run for eight months, with mining continuing from 2022 through 2027. LOM activities are summarized in Table 16-9. The final layout plan is provided as Figure 16-21.

Cochrane Hill

Cochrane Hill will be a standalone mine operation, with pre-strip starting in 2022. Pre-production activities run for one year, with mining continuing from 2023 through 2029. LOM activities are summarized in Table 16-10. The final layout plan is provided as Figure 16-22.

16.8 Operations

The mining operations are planned to be typical of similar small-scale open pit operations in flat terrain. Mine operations will begin at Touquoy and move to Beaver Dam, with additional equipment and manpower brought in to achieve the increased production rate. Fifteen Mile Stream and Cochrane Hill are planned as independent standalone mine operations, with some general mine expense (GME) functions shared between these operations and Touquoy/Beaver Dam. Concentrate from these operations will be hauled to Touquoy plant for final processing.

Ore control drilling is carried out to better delineate the resource in upcoming benches. An ore control system is planned to provide field control for the loading equipment to selectively mine ore grade material separately from the waste.

In-situ rock is drilled and blasted on 5 m benches to create suitable fragmentation for efficient loading and hauling of both ore and waste rock. Till and topsoil material will not require blasting. Powder factors of 0.28 kg/t in ore and 0.24 kg/t in waste are proposed for all deposits. The blasting activities are planned to fall under a contract service agreement with the explosive supplier.

Loading in ore zones will be completed with hydraulic excavators on either 2.5 m or 5 m benches, depending on grade control requirements; and in waste zones with hydraulic excavators and wheel loaders on 10 m or 5 m benches.

Ore and waste rock will be hauled out of the pit and to scheduled destinations with off-highway haul trucks.

Table 16-9: Annual Mine Operations, Fifteen Mile Stream

Year	Activity
2021	Clearing and grubbing the following areas: Egerton–MacLean pit, till storage, waste rock storage, ex-pit haul roads. Removal and stockpiling of topsoil from areas cleared and grubbed. Construction of ex-pit haul roads. Ditch construction for water management plan. Mining and stockpiling of till materials from Egerton–MacLean pit. Grade control drilling for initial benches of Egerton–MacLean pit. Mining of Egerton MacLean pit down to 95 bench to provide construction rockfill for the TMF.
2022	Egerton–MacLean South Phase pit mined down to the 65 bench. Egerton–MacLean North Phase pit mined down to the 90 bench.
2023	Egerton–MacLean South Phase pit mined down to the 40 bench. Egerton–MacLean North Phase pit mined down to the 55 bench.
2024	Egerton–MacLean South Phase pit mined down to the 10 bench. Egerton–MacLean North Phase pit mined down to the 15 bench.
2025	Clearing and grubbing of the Hudson and Plenty pits. Removal and stockpile of topsoil from the Hudson and Plenty pits. Extension of ex-pit haul roads to the Hudson and Plenty pits. Mining and stockpiling of till materials from the Hudson and Plenty pits. Egerton–MacLean South Phase pit mined down to the bottom on the -15 bench. Egerton–MacLean North Phase pit mined down to the -25 bench. Plenty pit mined down to the 90 bench. Some stockpiled ore re-handled to the crusher.
2026	Egerton–MacLean North Phase pit mined down to the pit bottom on the -50 bench. Hudson pit mined to the 75 bench. Plenty pit mined to the 55 bench. Some stockpiled ore re-handled to the crusher.
2027	Hudson pit mined to the pit bottom on the 40 bench. Plenty pit mined to the pit bottom on the 20 bench. Some stockpiled ore re-handled to the crusher.
2028 to 2030	Remaining stockpiled ore re-handled to the crusher.

Figure 16-21: Fifteen Mile Stream Layout Plan

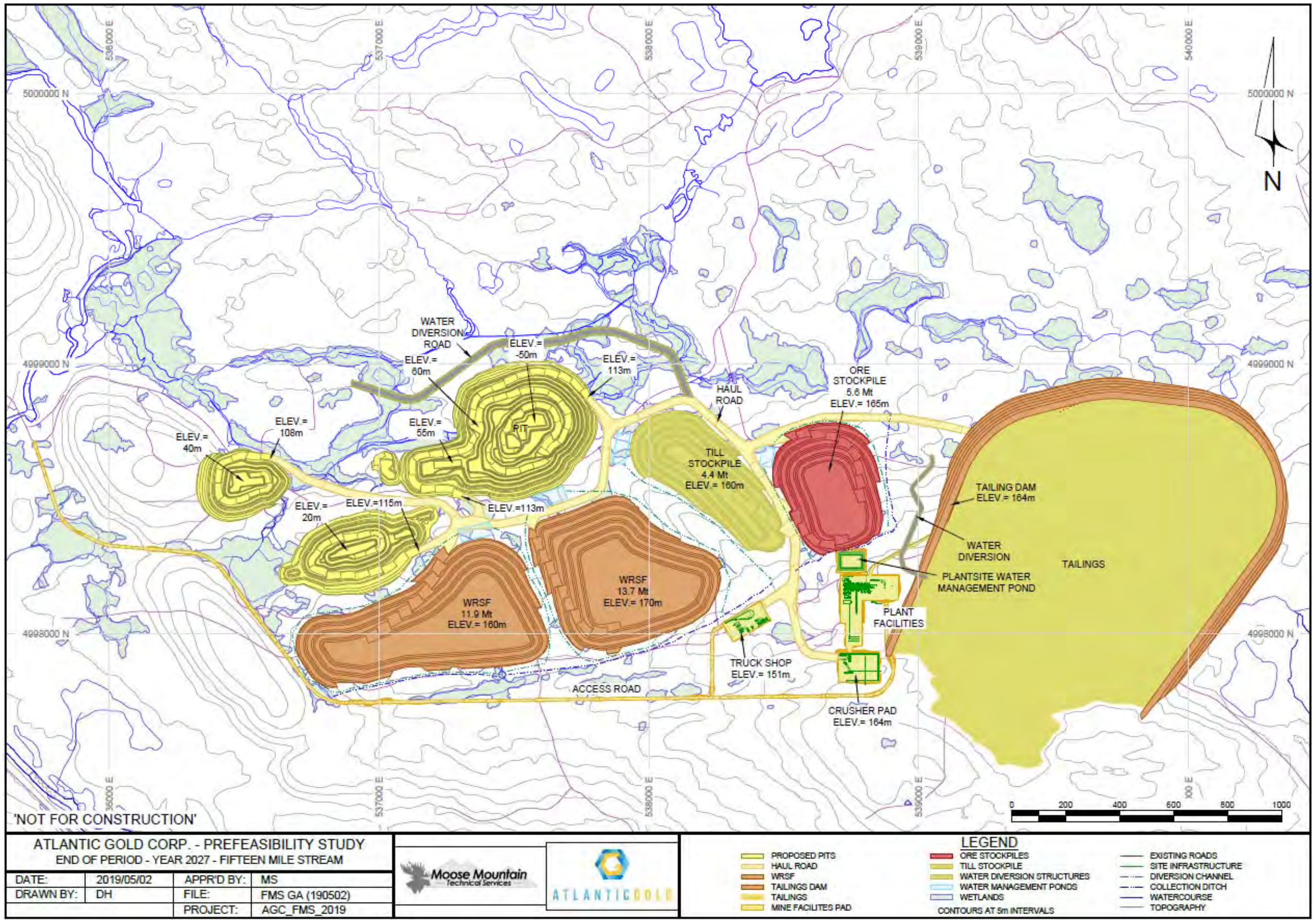
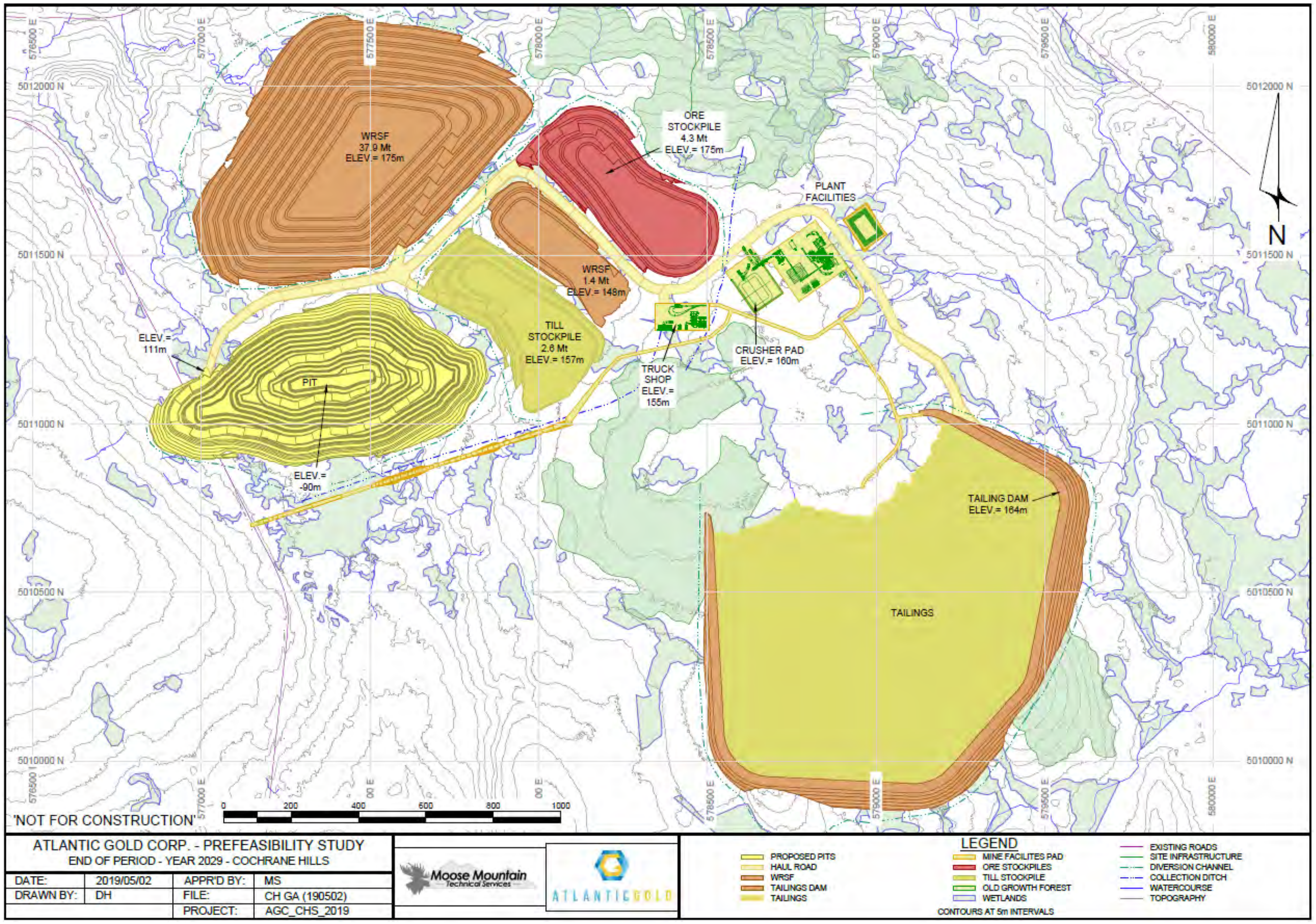


Table 16-10: Annual Mine Operations, Cochrane Hill

Year	Activity
2022	Relocation of existing Provincial Highway 7. Clearing and grubbing the following areas: Borrow and Phase 2 pits, till storage, waste rock storage, ex-pit haul roads. Removal and stockpiling of topsoil from areas cleared and grubbed. Construction of ex-pit haul roads. Ditch construction for water management plan. Mining and stockpiling of till materials from Borrow and Phase 2 pits. Grade control drilling for initial benches of Borrow and Phase 2 pit. Mining of Starter pit down to 100 bench to provide construction rockfill for the TMF. Mining of Phase 2 pit down to the 125 bench for ore access.
2023	Starter pit mined to the bottom on the 70 bench. Phase 2 pit mined down to 85 bench. Clearing and grubbing of Phase 3 pit area. Removal and stockpiling of topsoil from Phase 3 pit area. Mining and stockpiling of till materials from Phase 3 pit. Phase 3 pit mined down to 100 bench.
2024	Phase 2 pit mined down to the 55 bench. Phase 3 pit mined down to the 70 bench.
2025	Phase 2 pit mined down to the pit bottom on the 30 bench. Phase 3 pit mined down to the 30 bench.
2026	Phase 3 pit mined down to the -10 bench.
2027	Phase 3 pit mined down to the -45 bench. Some stockpiled ore re-handled to the crusher.
2028	Phase 3 pit mined down to the -75 bench. Some stockpiled ore re-handled to the crusher.
2029	Phase 3 pit mined down to the pit bottom on the -90 bench. Some stockpiled ore re-handled to the crusher.
2030	Remaining stockpiled ore re-handled to the crusher.

Figure 16-22: Cochrane Hill Layout Plan



Mine pit services include:

- Haul road maintenance;
- Pit floor and ramp maintenance;
- Waste dump maintenance;
- Ditching;
- Dewatering;
- Secondary blasting and rock breaking;
- Snow removal;
- Reclamation and environmental control;
- Lighting;
- Transporting personnel and operating supplies.

Direct mining and mine maintenance are planned as an Owner's fleet with the equipment ownership and manpower being undercharged to mine operations.

Mining operations are based on 365 operating days per year with two 12 hour shifts per day. An allowance of 12 days of no mine production has been built into the mine schedule to allow for adverse weather conditions.

The number of mine operations personnel including mine maintenance peaks at 75 when Touquoy is under operation. This increases to 120 persons when the operations move to Beaver Dam. Fifteen Mile Stream will need an additional 90 operations personnel and Cochrane Hill will need an additional 120 operations personnel. With the shift rotation considered, only one quarter of the above personnel numbers will be on shift at a given time at each site. Salaried personnel of approximately 20 people will be required at each site for the mine operations including the Mine and Maintenance supervision, Mine Engineering and Geology.

16.9 Mining Equipment

Grade control drilling will be carried out with 144 mm (5.5") diesel hydraulic RC drills. Production drilling will be carried out with 144 mm (5.5") diesel hydraulic down-the-hole (DTH) drills at each operation.

Reliable mining equipment commonly found in the construction and open pit mining industry and sized to meet the production requirements of the mining schedule have been selected for the loading and hauling fleet. Hydraulic excavators (5.0 m^3 bucket) are proposed based on their ability to minimize losses and dilution for the ore control operations. Front end wheel loaders (7.0 m^3 bucket) are proposed based on their ability to load the haulers in four to six passes, and their ability to load the crusher when required. Rigid frame haulers (64 t payload) are proposed to be flexible enough to use on the smaller pit benches and in selective mining scenarios designed for this project, yet not too small that the fleet size is excessive. At each operation, two articulated haulers (41 t payload) are proposed to supplement the fleet and provide additional flexibility for construction of the pits, haul roads and tailings dam.

Graders will be used to maintain the haul routes for the haul trucks and other equipment within the pits and on all routes to the various waste storage locations and the crusher. On-highway trucks that are outfitted with a water tank and a gravel spreader are included for haul road maintenance. Track dozers (325 kW and 233 kW) are included to handle waste rock, till, and topsoil to the various waste storage locations. Front end wheel loaders (4.5 m^3 bucket) and hydraulic excavators (3.0 m^3 bucket) are included as pit support and back-up loaders. Custom fuel/lube trucks are included for mobile fuel/lube support. Various small mobile equipment pieces are proposed to handle all other pit service and mobile equipment maintenance functions.

Mine fleet maintenance activities are generally performed in the maintenance facilities located near the plant sites at Touquoy, Fifteen Mile Stream and Cochrane Hill and near the crusher that will be constructed at Beaver Dam.

Primary mining equipment requirements are summarized in Table 16-11 and Table 16-12.

Table 16-11: Primary Mining Fleet Schedule

Equipment	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Drilling												
Diesel DTH tracked drill 144 mm (5.5") holes	2	2	4	6	6	7	7	6	4	1	1	0
Diesel RC tracked drill 144 mm (5.5") holes	2	2	4	5	6	6	6	6	4	1	1	0
Loading												
Wheel loader 7.0 m^3 bucket	1	1	2	3	3	3	3	3	3	3	2	2
Hydraulic excavator 5.0 m^3 bucket	2	2	6	10	12	12	10	8	4	2	1	0
Hauling												
Rigid frame haul truck 64 t payload	5	5	16	27	33	33	33	25	13	9	6	6
Articulated haul truck 41 t payload	2	2	4	6	6	6	6	4	4	0	0	0

Table 16-12: Fleet Units by Operations

Fleet	Unit	Function	Touquoy Units	Beaver Dam Units	Fifteen Mile Stream Units	Cochrane Hill Units
Primary	Diesel DTH tracked drill (144 mm (5.5") holes)	Production drilling	2	2	2	3
	Diesel RC tracked drill (144 mm (5.5") holes)	Bench scale exploration drilling	2	2	2	2
	Hydraulic excavator (5.0 m^3 bucket)	Production loading	2	5	3	4
	Wheel loader (7.0 m^3 bucket)	Production loading, stockpile re-handle	1	1	1	1
	Rigid frame haul truck (64 t payload)	Production hauling	5	11	9	13
	Articulated Haul truck (41 t payload)	Production hauling	2	2	2	2
Support	Motor grader (4.9 m blade)	Haul road maintenance	1	1	1	1
	Motor grade (4.3 m blade)	Haul road maintenance	1	1	1	1
	Water/gravel truck	Haul road maintenance	2	2	2	2
	Track dozer (325 kW)	Dump maintenance	0	0	2	3
	Track dozer (233 kW)	Pit support and construction	3	5	2	2
	Wheel loader (4.5 m^3)	Pit support and construction	1	1	1	1
	Hydraulic excavator (3 m^3)	Utility excavator, rock breaker	1	2	2	1
	Fuel and lube truck	Mobile fuel/lube service	1	2	1	1
	Shuttle bus	Employee transportation	2	2	2	2
	Pickup trucks (1/4 ton)	Staff transportation	8	8	8	8
	Light plants (20 kW)	Pit lighting	9	9	9	9
	Water pumps (150 m^3/h)	Pit sump dewatering	2	2	2	2
	On-highway dump truck	Utility material movement	1	1	1	1
	Soil compactor (117 kW)	Construction support	1	1	1	1

Fleet	Unit	Function	Touquoy Units	Beaver Dam Units	Fifteen Mile Stream Units	Cochrane Hill Units
	Emergency response vehicle	First aid and mine rescue	1	1	1	1
	Side by side ATV	Environmental support	2	2	2	2
	Maintenance trucks	Mobile maintenance crew and tool transport	1	1	1	1
	Mobile crane (36 t capacity)	Mobile maintenance material handling	1	1	1	1
	Float trailer (55 ton capacity)	Equipment transport	1	1	1	1
	Forklift (3 t capacity)	Shop material and tire handling	1	1	1	1
	Mobile steam cleaner	Mobile maintenance	1	1	1	1

17.0 RECOVERY METHODS

Information in this section is based on, and summarized from, Parks et al., 2015 and Staples et al., 2018.

17.1 Touquoy Process Flowsheet

The process design assumes a conventional flowsheet, including crushing, grinding, gravity recovery, CIL, desorption/electrowinning/refining, cyanide destruction and tailings management.

The overall flowsheet is provided in Figure 17-1.

17.2 Plant Design

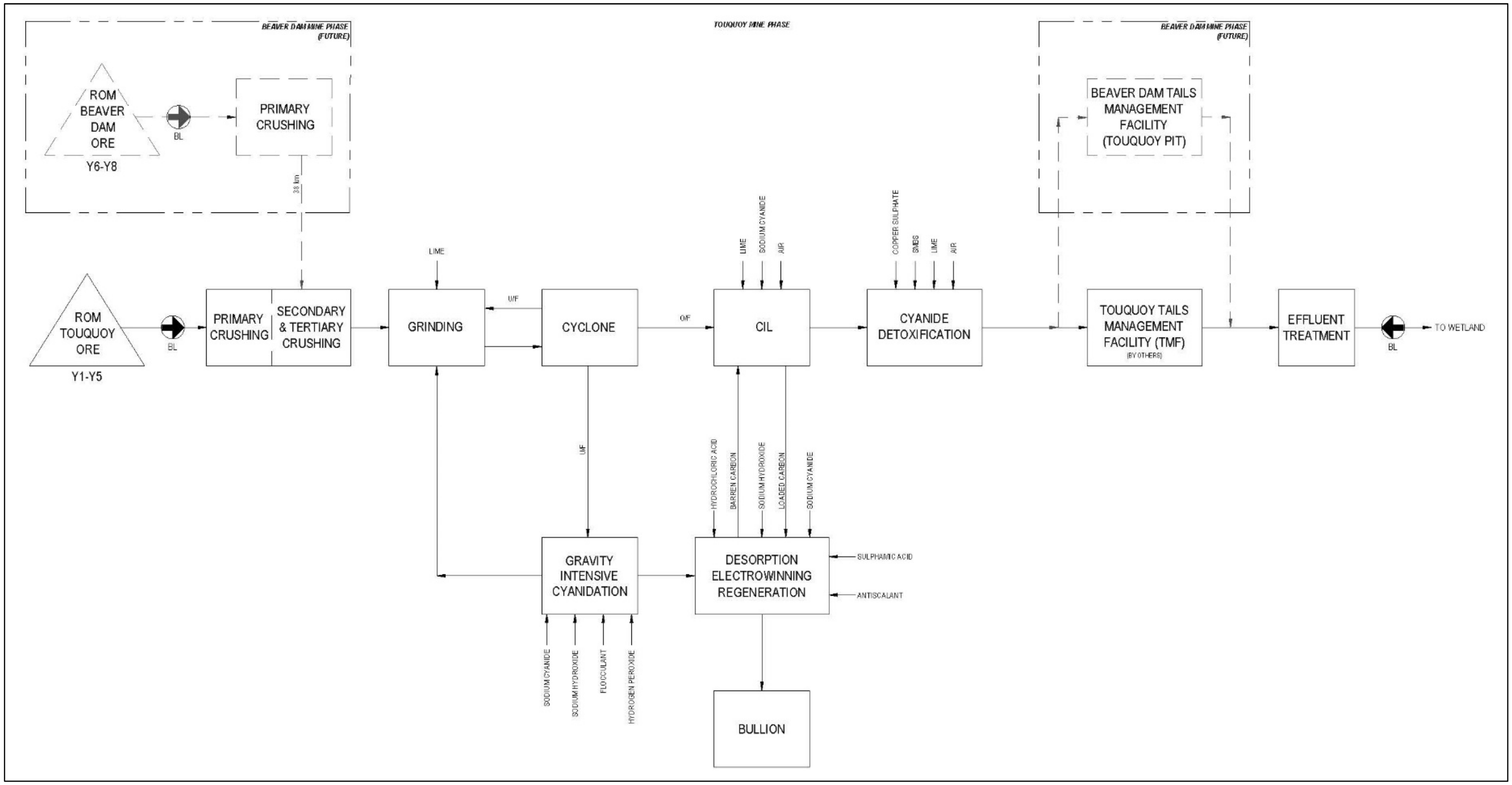
Plant design assumptions are provided in Table 17-1.

The Touquoy process plant is designed for an ore treatment of 2 Mt/a or 250 t/h based on an availability of 8,000 h/a, or 91.3%. However, the crushing section design is set at 60% availability since it operates outdoors and uses modular semi-mobile equipment. It will accept Touquoy ROM ore for the first five years of operation and thereafter ROM ore from the Beaver Dam deposit at the same treatment rate using the same unit operations. Only relatively minor equipment modifications are expected to be needed at Touquoy to treat the Beaver Dam ore.

The process equipment has been sized to treat either of the ore types. The main difference between the ores is that the Beaver Dam ore is harder and has a higher abrasion index. Currently, processing rates for Touquoy ore are in the order of 2.24 Mt/a representing a 12% increase over design which is reflected in the 2019 LOMP. It should also be noted that during detailed design for construction the pre-leach thickener was deemed unnecessary and removed from the final design.

Finally, Touquoy personnel continue to improve plant efficiencies and costs over and above design and have achieved significant reductions in cyanide consumption compared to design whilst maintaining high recoveries. These efficiencies are expected to continue and as such are reflected in the 2019 LOMP cost estimates.

Figure 17-1: Process Flowsheet



Note: Figure prepared by Ausenco, 2019.

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Table 17-1: Design Criteria

Description	**Units**	**Value**
Ore throughput	t/a	2,000,000
Operating schedule		
Crusher availability	%	60
Plant availability	%	91.3
Crusher operating time	h/a	5,256
Plant operating time	h/a	8,000
Throughput, daily - average	t/d	5,479
Plant capacity, hourly	t/h	250
Gold grade – design mill head	g/t	2.6
Crushing (three stage)		
Primary crusher type	single toggle	jaw crusher
Secondary/tertiary crusher	type	cone crusher
Fine ore stockpile residence time - live	h	12
Grinding		
Circuit type		3 stage crushing – ball mill
Bond ball mill work index (80th percentile of Beaver Dam ore)	kWh/t	15.3
Ball mill, dimensions (D x L)	m x m	4.9 x 8.1
Ball mill power	kW	3,300
Feed particle size, F80	mm	10
Product particle size, P80	µm	150
Gravity concentration		
Overall gravity gold recovery	%	50
Hybrid carbon in leach		
Total leach time	h	24
Number of tanks	#	1 leach + 6 adsorption
Size of tanks (H x D)	m x m	12 x 11.5
Cyanide addition	kg/t	0.18
Lime addition	kg/t	0.59
Carbon concentration	g/L	10–15
Desorption and carbon regeneration		
Desorption		
Elution method		Pressure Zadra
Carbon batch size	t	6
Elution CIL strips per week	#	6

Gravity strips per week	#	7
Cyanide destruction		
Method		Air SO_2
Residence time	h	1.5
CN_{WAD} target	mg/L	<1
Sodium metabisulphite addition	kg/t	0.5–0.6

17.2.1 Touquoy

The Touquoy process plant is located east of Moose River, northeast of the Touquoy open pit and northwest of the TMF.

The main plant building houses the grinding, gravity recovery, reagent, elution and refinery sections. The crushing and CIL sections are located outdoors. The three-stage crushing circuit ahead of a single-stage ball mill is based on modular semi-mobile crushing equipment so as to allow the modifications necessary to allow the introduction of Beaver Dam ore.

Crushing

ROM is hauled from the Touquoy pit to the primary crusher and tipped over a static grizzly sloped to bring oversize back to the loading side for removal by a front-end wheel loader (FEL). The FEL supplements the direct-tip feed from the Touquoy ROM stockpiles to maintain a continuous crushing operation. Mine operations retrieve any oversize and either use a mobile rock breaker to reduce the lump size or return oversize to the pit.

The mobile crushing plant produces a fine ore sized to a P80 of 10 mm. The throughput of the crushing plant package is 381 t/h at a crushing plant availability of 60%.

The vibrating grizzly feeder feeds the primary jaw crusher at the front of the mobile crushing circuit. The oversize from the vibrating grizzly enters the single toggle jaw crusher. A tramp magnet removes steel trash from the primary crushed ore.

The fine ore product is conveyed to a fine ore stockpile (12,000 t capacity; live volume of 3,000 t). Two variable-speed reclaim slot belt feeders provide two live pockets and an estimated 25% natural reclaim of the stockpile. The fine ore feed to the mill is conveyed by a 95 m long covered mill feed conveyor from the two fine ore reclaim feeders to the mill feed chute.

The fine ore is processed through one single pinion ball mill in closed circuit with hydrocyclones producing a final product of P80 150 µm. The mill has a nominal solids throughput of 5,479 t/d and can process 250 t/h at 91.3% availability. The overall ball mill circulating load is 250%.

Grinding

The mill is sized to handle both the Touquoy and Beaver Dam ores without any mechanical adjustment required during the transition between mines. The Touquoy ore is expected to operate at a lower ball volume and steel ball consumption than Beaver Dam ore to compensate for the difference in hardness and abrasion characteristics.

Mill slurry discharge overflows onto a rubber-lined trommel screen with trommel oversize discharging to a bunker for regular collection and disposal. The trommel undersize gravitates to the cyclone feed hopper where the slurry is diluted with process water and pumped with a duty/standby cyclone feed pump to the cyclone cluster. A density meter monitors and controls the amount of process water required to produce a target density to the cyclones.

The cyclone underflow splits, with up to 30% feeding the gravity circuit and the remaining underflow stream gravitating to the ball mill. The cyclone produces a fine ground overflow product of P80 150 µm which is sampled, and then gravitates to the vibrating trash screen. Oversize debris are removed and falls to a trash bin at ground level. The minus 0.8 mm trash screen underflow flows by gravity to the CIL circuit.

Gravity and Intensive Cyanidation

A portion of the ball mill circulating load is fed into two 50% duty parallel gravity concentrator trains. The gold concentrate recovered is treated in an intensive batch leach system designed to handle 2.4 t/d of concentrate. The resulting concentrated gold solution is pumped to a dedicated eluate tank at the gold room.

The equipment is arranged to provide a gravity cascade under the cyclones. The gravity circuit splitter box provides the feed slurry to two gravity concentrator trains. Each train consists of a scalping screen, gravity concentrator and gravity area electric chain hoist. The two gravity concentrators in parallel are sized for 188 t/h solids feed rate.

The oversize from the scalping screen gravitates to the ball mill feed chute, while the undersize feeds the concentrator. The tailings from the concentrators is transferred back to the ball mill circuit and the concentrate gravitates to the intensive cyanidation circuit at ground level.

The intensive cyanidation circuit receives the periodic gold concentrate for treatment in an intensive leach reactor. The gold-containing pregnant solution is pumped periodically to a dedicated eluate tank in the gold room.

The tailings are transferred back to the cyclone feed hopper in the grinding circuit.

Carbon-in-Leach

The trash screen underflow enters the pre-leach feedwell after mixing with metered flocculant. The feed box slurry gravitates to the leach tank and optionally can feed directly to CIL Tank 1.

The circuit is a hybrid CIL type and consist of one leach tank and six adsorption tanks in series, each having a live volume of 1,169 m^3. The design allows for a 250 t/h solids feed rate at 50% solids for an average 24-hour residence time. Each tank is interconnected with launders to allow slurry to flow sequentially by gravity to each tank in the train.

Barren carbon enters the adsorption circuit at CIL Tank 6. The carbon advances countercurrent to the main slurry flow during periodic transfers of slurry and carbon using air lift movement from a downstream to upstream tank. Carbon concentrations of 10 to 15 g/L are required in all tanks. Carbon is retained in the upstream tank by an intertank screen. The countercurrent process is repeated until the carbon becomes loaded and reaches CIL Tank 1. Then a recessed impeller pump transfers slurry and carbon to a loaded carbon recovery screen. The loaded carbon is washed with water and released to the acid wash column located inside the main plant, in the desorption area. The slurry returns to CIL Tank 1.

Following elution of the loaded carbon and thermal regeneration, the barren carbon is screened and reported to CIL Tank 6. Fine carbon is discarded to the CIL tailings hopper.

Tailings slurry from CIL Tank 6 flows by gravity to the vibrating carbon safety screen to recover any carbon in the event of damage, wear or other issues with the CIL Tank 6 interstage screen. Recovered carbon is collected in a bin that can be manually transferred for re-use or disposal. Tailings discharge from the safety screen gravitates to the cyanide detox Tank 1 in the cyanide detoxification circuit.

Desorption and Regeneration

Carbon is acid-washed.

The pressure Zadra elution circuit (elution column, strip solution tank, strip solution pump and a strip solution heater package) operates in a closed loop with the electrowinning cells located inside the gold room.

After completion of the elution process barren carbon is transferred from the elution column to the kiln dewatering screen and into the carbon regeneration kiln feed hopper. Regenerated carbon discharges from the kiln to a quench tank and is pumped to the carbon sizing screen. The screen oversize returns to CIL Tank 6, while the quench water and fine carbon reports to the tailings hopper via the carbon safety screen for disposal in the TMF.

Gold Room

Three electrowinning sludging cells are used; one cell is dedicated to the intensive cyanidation circuit and the other two cells to the elution circuit.

The electrowinning cell dedicated to the intensive cyanidation circuit is fed leach solution via a fixed speed centrifugal pump from the gravity leach liquor storage tank. Solution is pumped to the electrowinning cell and then gravitates back into the gravity leach solution storage tank in a closed loop until suitable gold recovery is achieved. The duration of this cycle varies with the quantity of gold recovered by gravity, but is projected to be less than 24 hours.

The two electrowinning cells dedicated to the elution circuit operate in a closed loop with the elution column and associated equipment. Eluate flows directly from the top of the elution column to the electrowinning cells after cooling through heat exchangers. The eluate flows through the electrowinning cells and then gravitates back to the strip solution tank and then is pumped to the elution column in a continuous closed loop. The duration of this cycle is about 16 hours.

Cyanide Detoxification and Tailings Disposal

Slurry passing through the carbon safety screen gravitates to two 300 m^3 cyanide detoxification tanks which are designed on the conventional air/SO_2 process and can operate in series or parallel for operational flexibility. The average slurry residence time at 250 t/h is 1.5 hours.

The detoxified slurry stream gravitates to the tailings hopper from where it is pumped through a single pipeline to the TMF. Supernatant water and run-off from precipitation collected in the TMF is either pumped to the process water tank located next to the pre-leach thickener or to the effluent treatment plant (ETP).

17.2.2 Beaver Dam

A new, simple, satellite primary crushing facility consisting of a grizzly feeder, jaw crusher and primary coarse ore stockpile feed conveyor will be required at Beaver Dam.

The primary jaw crusher module (jaw crusher and grizzly feeder) will be relocated from Touquoy and installed at the Beaver Dam crushing station before Year 6. A coarse ore stockpile feed conveyor will be added, and a new Beaver Dam ROM hopper will be installed at the Beaver Dam crusher station. The main plant will undergo minor retrofits between the Touquoy ROM hopper and secondary crushing section to receive the primary crushed ore.

Primary crushing will occur at Beaver Dam to provide a primary crushed ore stockpile with two days live volume equivalent to 11,000 t capacity. This stockpile inventory will buffer a commercial ore transport road truck fleet hauling the primary crushed ore to the feed point of the main plant. A fleet of 22 trucks each having a nominal payload of 31 t and requiring nine cycles per day/truck will deliver the daily tonnage requirement to meet the Touquoy mill demand.

Prior to Year 6, at the back end of the process plant, the tailings line will be re-routed to the old Touquoy pit once the Touquoy mining operation has shut down. The reclaim water pump and barge, with a rerouted pipeline to the process water tank, will be later relocated from the TMF to the old Touquoy pit when the water accumulation level is adequate in the pit.

17.2.3 Process Materials Requirements

A summary of the estimated reagents, steel media and energy consumption rates for Touquoy and Beaver Dam ores are shown in Table 17-2.

Two (one duty/one standby) rotary screw type compressors will supply high pressure compressed air to the plant. Two oil free centrifugal compressors (one duty/one standby) will supply low pressure air. When the Beaver Dam primary crushing station becomes operational a single duty compressor will provide that area with the necessary air supply.

Energy and water requirements are discussed in Section 18.

17.3 Fifteen Mile Stream

A process facility with a nominal treatment rate of 2.0 Mt/a has been designed to recover and concentrate gold from ore mined at the proposed Fifteen Mile Stream open pit. The plant operates two shifts per day, 365 d/a at an overall plant availability of 92%. The process plant will produce a gold concentrate to be transported and further treated at the Touquoy process plant.

The Fifteen Mile Stream facility was initially designed to incorporate a split circuit, which incorporates coarse particle flotation, to save operating cost while maintaining the similar overall plant recovery. A detailed trade off study between conventional flotation circuit vs split circuit design was conducted in early 2019 and concluded that conventional flotation cells with P_{80} of 150 µm would have a $4.1 M NPV benefit over the LOM over the split circuit with P_{80} of 240 µm. Conventional flotation cell circuit with primary grind size of 150 µm would have an estimated 1.2% total recovery benefit compared to the overall recovery of 240 µm with split circuit design. Based on this trade-off study, the Fifteen Mile Stream facility flotation circuit was changed to conventional flotation configuration with P_{80} of 150 µm as the target primary grind size.

Table 17-2: Reagents and Media

Description	Form	Touquoy	Beaver Dam
		kg/t milled	kg/t milled
Sodium cyanide	solid	0.18	0.54
Lime	solid	0.59	0.63
Hydrochloric acid	liquid	0.01	0.19
Antiscalant	liquid	0.01	0.01
Sodium hydroxide	solid	0.07	0.06
Leach aid	solid	0.5 g/t	0.5 g/t
Flocculant	solid	0.37	0.37
Carbon	solid	0.02	40 g/t
Sodium metabisulphite	solid	0.48	0.60
Copper sulphate	solid	0.13	0.16
Hydrogen peroxide, 50%	liquid	0.01 L/t	0.01 L/t
Smelting fluxes	solid	2 g/t	2 g/t
Grinding media	steel	0.32	0.70
Propane (process use only)	gas/liquid	0.8 L/t	0.8 L/t

An additional trade-off study was completed to asses various comminution circuit options for Fifteen Mile Stream. The study examined the relative merits of a two-stage cone crushing and ball milling (3CB) circuit versus a semi-autogenous grind (SAG) mill in closed circuit with pebble crusher and ball milling (SABC) circuit. Three options were analyzed:

- Option 1: primary jaw crusher followed by SABC;
- Option 2: primary jaw crusher followed by 3CB, to design standards common in the industry;
- Option 3: semi-mobile crushing plant followed by single stage ball milling, similar to the current plant at Touquoy.

Capital and operating costs for the circuit options at a nominal plant capacity were developed. Atlantic Gold made the decision to proceed with a feasibility study based on a SABC circuit as this alternative offered the lowest operating cost accompanied by an intermediate capital cost when compared to three-stage crushing. In addition, the SABC circuit can offer advantages to overcome materials handling issues, as it can provide operational flexibility, higher availability and lower maintenance costs. A similar assessment of comminution options is recommended for Cochrane Hill for the proposed feasibility study.

17.3.1 Mineral Processing

Run of mine ore will be hauled from the open pit to a crushing facility that includes a jaw crusher as the primary stage and cone crushers for secondary and tertiary size reduction.

Crushed ore will be ground by a ball mill in a closed circuit with cyclones. Centrifugal gravity separation units will be installed to obtain GRG from the primary cyclone underflow stream. Gravity separation units will treat 50% of the ball mill circulating load. The overflow from the primary cyclone with P_{80} of 150 μm will report to conventional rougher flotation cells. Rougher flotation concentrate will be subject to one stage cleaning mainly to decrease the amount of concentrate prior to thickening.

Final tailings from the conventional flotation will be pumped to the TMF. Gold concentrate will be thickened and pressure-filtered before being transported by truck to the Touquoy process plant.

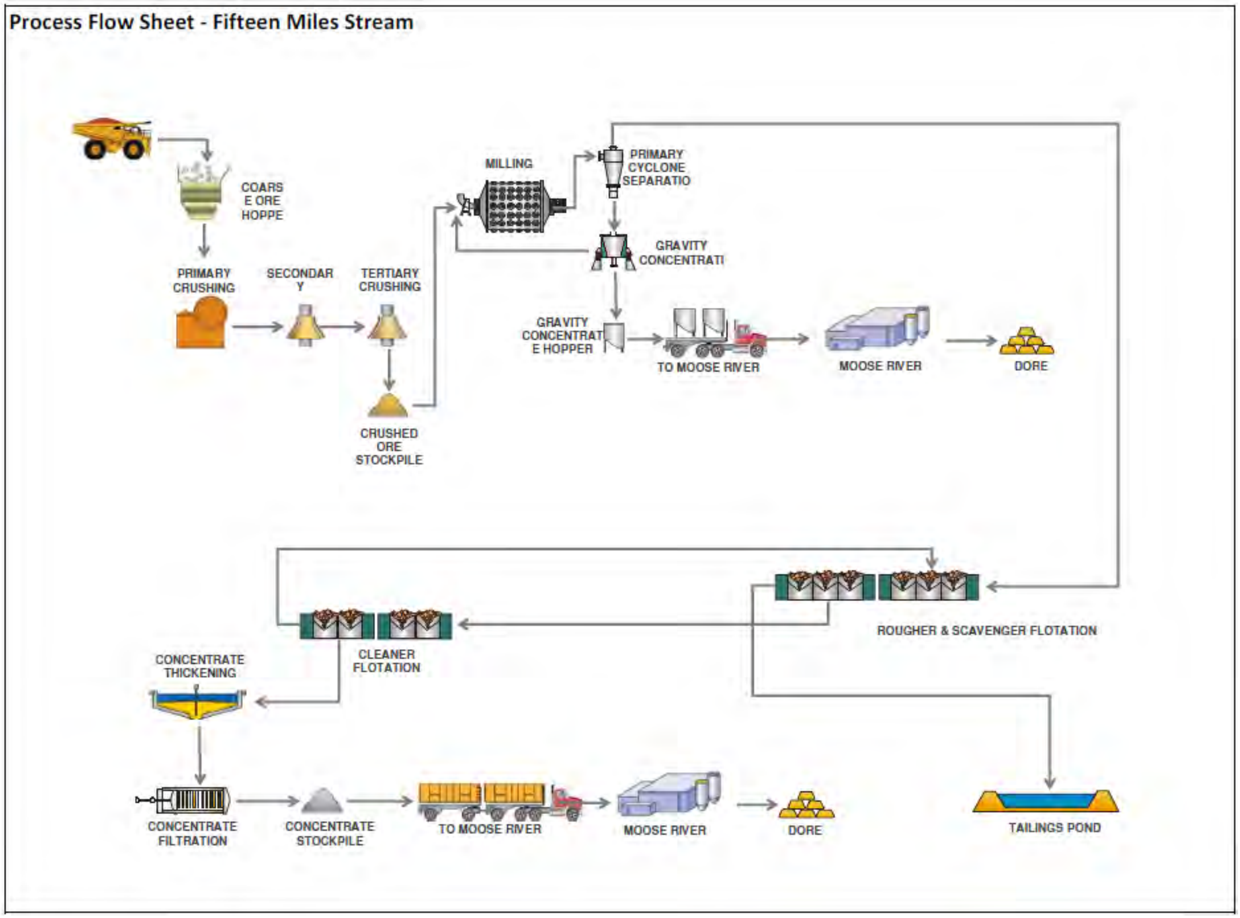
17.3.2 Flowsheet Development

The process flowsheet for Fifteen Mile Stream has been developed on the basis of the 2017 ALS laboratory testwork results. The process plant will consist of the following unit operations:

- Crushing:
  - Primary crushing by jaw crusher;
  - Secondary crushing by cone crusher;
  - Tertiary crushing by cone crusher;
  - Associated conveying, screening and dust suppression systems;
- Grinding and flotation:
  - Grinding by ball mill with a primary cyclone;
  - Gravity concentrator for recovery of GRG;
  - Flotation by conventional flotation;
  - Cleaner flotation;
- Dewatering and concentrate handling:
  - Concentrate dewatering and load out;
  - Tailings disposal to the TMF.

The simplified process flowsheet for Fifteen Mile Stream is shown in Figure 17-2.

Figure 17-2: Fifteen Mile Stream Proposed Process Flowsheet



Note: figure prepared by Ausenco, 2019. Moose River = Touquoy process plant

ATLANTIC GOLD

17.3.3 Major Process Design Criteria

The major process design criteria developed for the Fifteen Mile Stream project are provided in Table 17-3.

17.3.4 Process Plant Description

Crushing and Stockpile

The crushing facility will be a three-stage crushing circuit that will process the ROM ore at an average rate of 381 t/h. The major equipment and facilities at the ROM receiving and crushing areas include:

- ROM surge bin;
- Primary crushing apron feeder;
- Vibrating grizzly feeder;
- Rockbreaker;
- Jaw crusher;
- Secondary cone crusher and single deck screen;
- Tertiary cone crusher and single deck screen;
- Stockpile reclaim apron feeders;
- Stockpile transfer and feed conveyors.

ROM ore will be trucked in from the open pits and dumped directly into the ROM surge bin, or stockpiled on the ROM storage pad from which it can be reclaimed by a FEL for continuous feed to the plant. Any oversized pieces of ore will be broken down by a rock breaker.

ROM ore will be fed from the bin onto the vibrating grizzly feeder and grizzly oversized material will be fed directly into a single toggle jaw crusher. Ore will be crushed and discharged onto the secondary screen feed conveyor, which will also receive the vibrating grizzly undersize material. The secondary screen feed conveyor will be equipped with a magnet and a metal detector to detect and remove tramp metal pieces. Crushed ore and grizzly undersize streams will be combined and transferred to the double deck vibrating secondary screen. Oversize from the secondary screen will be fed to the secondary cone crusher, while secondary screen undersize will report to the fine ore transfer conveyor.

Table 17-3: Major Process Design Criteria, Fifteen Mile Stream

Description	Unit	Value
Yearly processing rate	t/a	2,000,000
Operating days per year	d/a	365
Operation schedule		two shifts/day; 12 hours/shift
Crushing availability	%	60
Grinding/flotation availability	%	92
Crushing		
Nominal processing rate	t/h	381
Crusher feed particle size	mm	< 1,000
Grinding		
Nominal processing rate	t/h	248
Primary grind size, 80% passing	µm	150
Grinding recirculating load	%	300
Abrasion index	g	0.02
Bond ball mill work index	kWh/t	11.3

Secondary crushed ore will be fed into the tertiary screen, and the oversize fraction will be subsequently fed to the tertiary cone crusher. The tertiary screen undersize will bypass directly to the discharge conveyor. Tertiary crushed ore will discharge onto the crusher discharge conveyor and be screened in the tertiary screen.

Following tertiary crushing, fine ore will report to the fine ore transfer conveyor and will be transferred to the fine ore storage area. The fine ore storage will consist of a covered conical crushed ore stockpile with 12 hours live capacity.

Ore from the crushed ore stockpile will be reclaimed by three variable speed fine ore stockpile reclaim apron feeders at a combined nominal rate of 248 t/h. Apron feeders will transfer ore onto a series of transfer conveyors, first the reclaim feeder conveyor, then to the reclaim transfer conveyor and finally to the ball mill feed conveyor. Fine ore from the ball mill feed conveyor will discharge directly into the ball mill. The ball mill feed conveyor will be equipped with a belt scale to provide feed rate data for feed control to the grinding circuit.

Grinding and Classification

A single stage ball mill grinding circuit is proposed for the primary grinding circuit. The primary grinding circuit will consist of a ball mill in a closed circuit with primary classifying cyclones. The circuit will be equipped with two centrifugal gravity concentrators to recover GRG. Approximately 50% of the primary cyclone underflow will be fed to two gravity concentrators simultaneously. The design circulating load for the closed-circuit ball mill is estimated 300% of new feed.

The primary grinding circuit is designed to provide a product size P80 of 150 µm. The major equipment in the primary grinding circuit will include:

- One 4.9 m diameter by 7 m effective grinding length (EGL) ball mill, driven by one 2,700 kW motor;
- One primary cyclone cluster, consisting four 650 mm diameter cyclones (three operating, one standby);

As required, steel balls will be added into the ball mill using a manual kibble system to maintain the mill power draw.

The primary cyclone overflow will be gravity flowed to conventional flotation.

Gravity Concentrate Handling

The gravity concentrate will flow to a gravity concentrator hopper, from which water will be continually decanted as the GRG concentrate accumulates in the hopper. The decant discharge water on/off valve will be programmable-logic controller (PLC) controlled to prevent any accidental discharge of GRG. Once the hopper is full, it will be disconnected and transported to the Touquoy process plant site for further processing. Access to the gravity concentrator hopper storage area will be restricted to authorized personnel only.

Conventional Flotation Circuit

Slurry from the primary cyclone overflow will gravity flow to the conventional flotation circuit while the cyclone underflow will recirculate back to the grinding circuit. The conventional flotation circuit will consist of:

- 12 x 30 m^3 rougher/scavenger flotation tank cells.

Rougher/Scavenger Flotation Tank Cells

Primary cyclone overflow will flow by gravity to the 30 m^3 tank flotation cell feed box. In the rougher flotation cells, potassium amyl xanthate (PAX) collector and methyl isobutyl carbinol (MIBC) frother will be added to enhance the flotation performance.

Concentrates from the twelve conventional 30 m^3 tank cells will be collected and pumped to a cleaner circuit. Rougher tailings will be pumped to the TMF.

Cleaner Flotation

There will be a single-stage cleaner flotation bank consisting of 4 x 5 m^3 tank cells. Tailings from the cleaner flotation circuit will be recycled back to the conventional rougher flotation circuit to minimize the gold losses.

Concentrate Thickening Filtration, Storage, and Loadout

Concentrate thickening, filtration, storage and loadout facilities will consist of:

- One 19 m diameter concentrate thickener;
- One 23 plate 1,500 mm x 1,500 mm vertical plate and frame concentrate filter press;
- Concentrate stockpile.

Concentrate Thickener

Cleaner flotation concentrate will be thickened to approximately 60% solids in a 19 m diameter high-rate thickener. The concentrate will be mixed with diluted flocculant solution at the thickener feed well. Flocculated solids settle towards the thickener discharge cone and will be pumped to the concentrate surge tank, while the supernatant water will overflow to the concentrate thickener overflow tank. Thickener overflow water will be pumped to the process water tank for use as process water in the plant.

Concentrate Filtration and Storage

Thickened concentrate, at approximately 60% solids, will be pumped to concentrate surge tank, and in turn fed to plate and frame pressure filters for dewatering on a batch basis. Filtrate from the pressure filter will flow by gravity to the concentrate thickener overflow tank. Filtered concentrate is expected to be 12% moisture, and will be discharged into a stockpile with a capacity for storage of 3.5 days production at design rates.

Tailings Disposal and Reclaim Water

Flotation tailings from the rougher/scavenger flotation tank cells will be pumped to the TMF for disposal. The supernatant liquid from the tailings pond will be reclaimed by the reclaim water pumps and pumped to the process water tank for use as process water.

17.3.5 Reagents

The reagents will be prepared and stored in a separate, self-contained area within the process plant and delivered by individual metering pumps or centrifugal pumps to the required addition points. All reagents will be prepared using fresh water.

Reagents that will be used in the process are summarized in Table 17-4.

17.3.6 Air Services

Air service requirements are summarized in Table 17-5.

17.3.7 Water Services

Water services are summarized in Table 17-6.

17.3.8 Assay/Metallurgical Laboratory and Quality Control

The existing assay/metallurgical laboratory at the Moose River plant will be upgraded to take extra samples from both Fifteen Mile Stream and Cochrane Hill. Analytical data obtained from routine sampling will be used for process optimization and control, product quality control, and metallurgical accounting. The metallurgical laboratory will perform metallurgical tests for quality control and process flowsheet optimization as required. The laboratory will include equipment such as laboratory crushers, ball mill, sieve screens, laboratory flotation cells, balances, and pH meters.

17.4 Cochrane Hill

A process facility with a nominal treatment rate of 2.0 Mt/a has been designed to recover and concentrate gold from ore mined at the Cochrane Hill open pit. The plant will operate two shifts per day, 365 d/a at an overall plant availability of 92%. The process plant will produce a gold concentrate to be transported and further treated at the Touquoy process plant.

An additional trade-off study should be conducted to asses various comminution circuit options for Cochrane Hill as is already planned for Fifteen Mile Stream.

17.4.1 Mineral Processing

Run of mine ore will be hauled from the open pit to a crushing facility that includes a jaw crusher as the primary stage and cone crushers for secondary and tertiary size reduction.

Table 17-4: Reagents

Reagent	Purpose	Comment
Potassium amyl xanthate (PAX)	Collector	Used as a collector in the flotation circuit and will be supplied in 25 kg bags in the form of pellets. The pellets will be mixed with fresh water to produce a 15% solution strength. The PAX mixing system will be a skid package provided by the vendor. The PAX solution will be distributed to the flotation circuit by three reagent metering pumps. Preparation of the PAX will require a bulk handling system, mixing and holding tanks, and metering pumps.
Methyl isobutyl carbinol (MIBC)	Frother	Used as a frother in the fines rougher/scavenger and cleaner flotation circuit and will be supplied in bulk tote containers in liquid form. MIBC will be pumped directly from the tote by two reagent metering pumps and will be used as 100% solution strength.
Flocculant	Flocculant	Flocculant will be supplied in 25 kg bulk bags as a dry powder. The flocculant will be mixed with fresh water and diluted to 0.50% mix concentration. The flocculant mixing system will be a skid package provided by the vendor. The mixed solution will be supplied to the thickener by two flocculant metering pumps.

Table 17-5: Air Services

Air Type	Comment
Blower air	The flotation blowers will supply air to the rougher/scavenger tank cells and cleaner tank cells. The installed blowers will be multiple-stage, centrifugal type blowers and will be used with a “blow-off” arrangement to adapt to fluctuations in flotation air demand.
Plant and instrument air	Rotary screw air compressors will provide high pressure compressed air operating in lead-lag mode, to meet the demand for plant and instrument air requirements. The pressure filter will use the wet high-pressure air produced from the rotary screw air compressors. There will be a dedicated air receiver to store necessary compressed air required for pressure filter operation. Wet plant air will be stored in the plant air receivers to account for variations in demand prior to being distributed throughout the plant. Instrument air will be dried in the Instrument Air Dryer before distribution throughout the plant.

Table 17-6: Water Services

Type	Comment
Fresh water	Fresh water will be pumped from the Seloam Lake to the fresh and fire water tank to feed the plant. Fresh water in the tank will be used to supply the following services: • Primary crushing circuit dust suppression water. • Reagent preparation water. • Slurry pumps gland seal water. • Cooling water systems. • Make-up water for the process water system Fresh water will be supplied to the plant by two fresh water pumps in a duty–standby configuration.
Potable water	Potable water will be sourced from the fresh water tank and treated in the potable water treatment skid. The treated water will be stored in the potable water storage tank for use by two potable water pumps in a duty–standby configuration.
Gland water	Gland water will be supplied from the fresh water tank and distributed to the plant by two gland seal water pumps in a duty–standby configuration.
Process water	Process water will mainly consist of concentrate thickener overflow water and tailings pond reclaim water. Process water will be stored in the process water storage tank and be distributed by the two process water pumps, in a duty–standby configuration.

Crushed ore will be ground by a ball mill in a closed circuit with cyclones. The primary cyclone overflow, with P_{80} of 350 µm will be forwarded to a secondary cyclone cluster where a fines fraction (less than 150 µm) and coarse fraction (over 150 µm) will be separated. Centrifugal gravity separation units will be installed to obtain GRG from the primary cyclone underflow stream. The fines fraction (-150 µm) reports to conventional flotation cells and the coarse fraction (+150 µm) reports to a HydroFloat™ coarse particle flotation cell to produce gold concentrate.

The coarse gold concentrate produced in the HydroFloat™ cell will be subject to a regrind stage before being combined with the conventional rougher flotation concentrates ahead of a cleaning stage. Final tailings from both the conventional flotation and HydroFloat™ circuits will be pumped to the TMF. Gold concentrate will be thickened and pressure-filtered before being transported by truck to the Touquoy process plant.

17.4.2 Flowsheet Development

The process flowsheet for Cochrane Hill has been developed on the basis of the 2017 ALS laboratory testwork results.

The process plant consists of the following unit operations:

- Crushing:
  - Primary crushing by jaw crusher;
  - Secondary crushing by cone crusher;

  - Tertiary crushing by cone crusher;
  - Associated conveying, screening and dust suppression systems;
- Grinding and flotation:
  - Grinding by ball mill with a primary cyclone;
  - Gravity concentrator for recovery of GRG;
  - Secondary cyclone followed by split circuit flotation;
  - Fines flotation by conventional flotation;
  - Coarse flotation by hydroflotation;
  - Re-grind mill;
  - Cleaner flotation;
- Dewatering and concentrate handling:
  - Concentrate dewatering and load out;
  - Tailings disposal to the TMF.

The simplified process flowsheet proposed for Cochrane Hill is presented in Figure 17-3.

17.4.3 Major Process Design Criteria

The major process design criteria developed for the Cochrane Hill project are outlined in Figure 17-3.

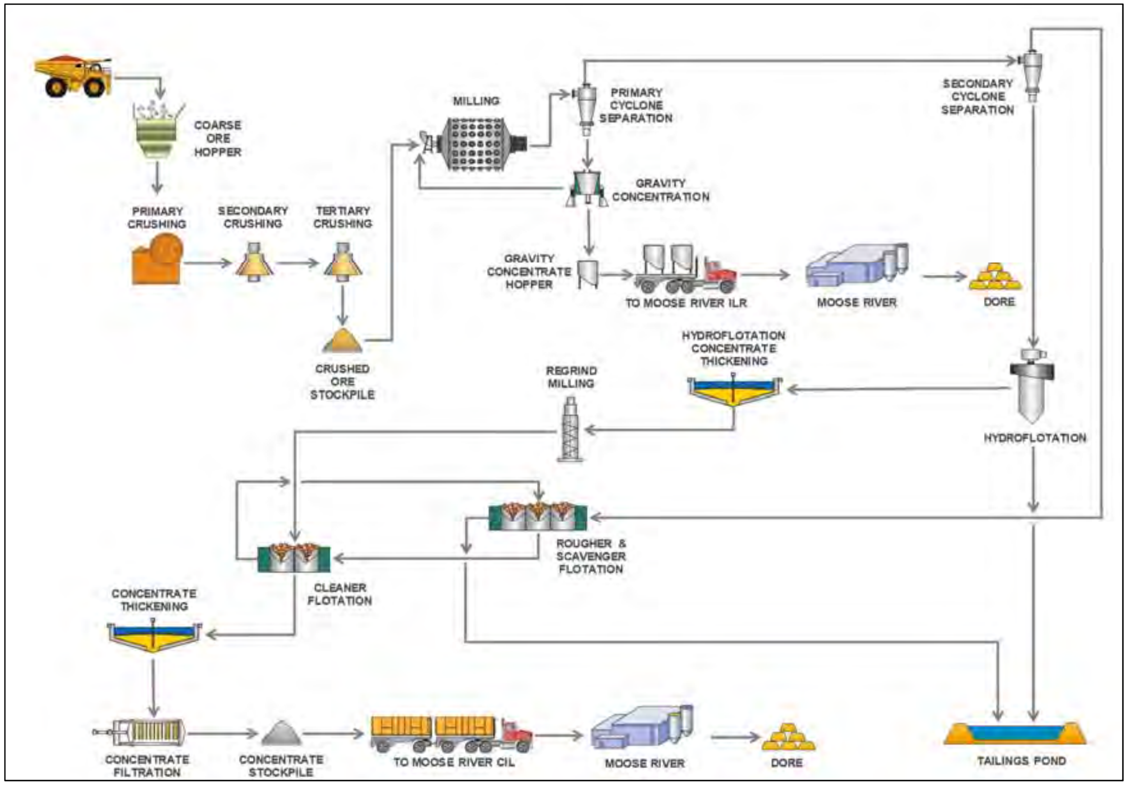
17.4.4 Process Plant Description

Crushing and Stockpile

The crushing facility will be a three-stage crushing circuit that will process the ROM ore at an average rate of 381 t/h. The major equipment and facilities at the ROM receiving and crushing areas will include:

- ROM surge bin;
- Primary crushing apron feeder;
- Vibrating grizzly feeder;
- Rockbreaker;
- Jaw crusher;
- Secondary cone crusher and single deck screen;

Figure 17-3: Process Flowsheet for Cochrane Hill



Note: Figure prepared by Ausenco, 2019.

Table 17-7: Major Process Design Criteria, Cochrane Hill

Description	Unit	Value
Yearly processing rate	t/a	2,000,000
Operating days per year	d/a	365
Operation schedule		two shifts/day; 12 hours/shift
Crushing availability	%	60
Grinding/flotation availability	%	92
Crushing		
Nominal processing rate	t/h	381
Crusher feed particle size	mm	< 1,000
Grinding		
Nominal processing rate	t/h	248
Primary grind size, 80% passing	µm	350
Grinding recirculating load	%	300
Abrasion index	g	0.11
Bond ball mill work index	kWh/t	16.53

- Tertiary cone crusher and single deck screen;
- Stockpile reclaim apron feeders;
- Stockpile transfer and feed conveyors.

ROM ore will be fed from the bin onto the vibrating grizzly feeder and grizzly oversized material will be fed directly into a single toggle jaw crusher. Ore will be crushed and discharged onto the secondary screen feed conveyor, which will also receive the vibrating grizzly undersize material. The secondary screen feed conveyor will be equipped with a magnet and a metal detector to detect and remove tramp metal pieces.

Crushed ore and grizzly undersize streams will be combined and transferred to the double deck vibrating secondary screen. Oversize from the secondary screen will be fed to the secondary cone crusher, while secondary screen undersize will report to the fine ore transfer conveyor.

Secondary crushed ore will be fed into the tertiary screen, and the oversize fraction will be subsequently fed to the tertiary cone crusher. The tertiary screen undersize will bypass directly to the discharge conveyor. Tertiary crushed ore will discharge onto the crusher discharge conveyor and screened in the tertiary screen.

Following tertiary crushing, fine ore will report to the fine ore transfer conveyor and will be transferred to the fine ore storage area. The fine ore storage will consist of a covered conical crushed ore stockpile with 12 hours live capacity.

Ore from the crushed ore stockpile will be reclaimed by three variable speed fine ore stockpile reclaim apron feeders at a combined nominal rate of 248 t/h. Apron feeders will transfer ore onto a series of transfer conveyors, first the reclaim feeder conveyor, then to the reclaim transfer conveyor and finally to the ball mill feed conveyor. Fine ore from the ball mill feed conveyor will discharge directly into the ball mill. The ball mill feed conveyor will be equipped with a belt scale to provide feed rate data for feed control to the grinding circuit.

Grinding and Classification

A single stage ball mill grinding circuit is proposed for the primary grinding circuit. The primary grinding circuit will consist of a ball mill in a closed circuit with primary classifying cyclones. The circuit will be equipped with two centrifugal gravity concentrators to recover GRG. Approximately, 50% of the primary cyclone U/F will be fed to two gravity concentrators simultaneously. The design circulating load for the closed-circuit ball mill is 300% of new feed.

The primary grinding circuit is designed to provide a product size of P80 of 350 μm. The major equipment in the primary grinding circuit will include:

- One 4.9 m diameter by 7 m EGL ball mill, driven by one 2,700 kW motor;
- One cyclone cluster, consisting of three 838 mm diameter cyclones (two operating, one standby);
- One secondary cyclone cluster, consisting of five 510 mm diameter cyclones (four operating, one standby).

As required, steel balls will be added into the ball mill using a manual kibble system to maintain the mill power draw.

The primary cyclone overflow will be pumped to the secondary cyclones where fines (less than 150 μm) will be separated from the coarse (>150 μm) material; the fine and coarse fractions are forwarded to conventional flotation and hydroflotation respectively.

Gravity Concentrate Handling

The gravity concentrate will flow to a gravity concentrator hopper from which water will be continually decanted as the GRG concentrate accumulates in the hopper. The decant discharge water on/off valve will be PLC-controlled to prevent any accidental discharge of GRG. Once the hopper is full, it will be disconnected and transported to the Moose River site for further processing. Access to the gravity concentrator hopper storage area will be restricted to authorized personnel only.

Split Circuit Flotation

Slurry from the secondary cyclone overflow will gravity flow to the conventional flotation circuit while the cyclone underflow will gravity flow to the hydroflotation circuit. The split flotation circuit will consist of:

- 6 x 30 m^3 rougher/scavenger flotation tank cells;
- 2.8 m diameter hydroflotation cell;
- 125 kW HIGmill® as a concentrate regrind mill.

Rougher/Scavenger Flotation Tank Cells

Secondary cyclone overflow will flow by gravity to the 30 m^3 tank flotation cell feed box. In the rougher flotation cells, PAX collector and MIBC frother will be added to enhance the flotation performance.

Concentrates from the six conventional 30 m^3 tank cells will be collected and pumped to a cleaner circuit, where it will be combined with re-ground hydroflotation concentrate prior to feeding to the cleaner flotation. Rougher/scavenger tailings will be pumped to the TMF.

HydroFloat™ Cell

Secondary cyclone underflow will flow to the HydroFloatTM feed inlet, where PAX collector and W34 frother will be added to enhance the flotation performance.

Hydroflotation concentrate will be thickened in a 12 m diameter high rate thickener to increase solids concentration prior to feeding to the regrind circuit. Once reground, hydroflotation concentrate will be combined with concentrate produced in the convention rougher/scavenger cells and fed to a cleaner circuit. The hydroflotation tailings will be combined with the rougher/scavenger tailings and pumped to the TMF.

Regrind and Cleaner Flotation

Concentrate from coarse particle flotation will flow to the concentrate thickener, where it will be thickened to 50% solids. Thickened concentrate will be reground to a P80 of 80 µm in a 125 kW HIGmill®.

There will be a single-stage cleaner flotation bank consisting of 6 x 5 m^3 tank cells. Tailings from the cleaner flotation circuit will be treated in the conventional rougher/scavenger flotation cells to minimize the gold losses.

Concentrate Thickening, Filtration, Storage, and Loadout

Concentrate thickening, filtration, storage and loadout facilities will consist of:

- One 12 m diameter concentrate thickener;
- One 20 plate 1,500 mm x 1,500 mm vertical plate frame concentrate filter press;
- Concentrate stockpile.

Concentrate Thickener

Cleaner flotation concentrate will be thickened to approximately 60% solids in a 12 m diameter high-rate thickener. The concentrate will be mixed with diluted flocculant solution at the thickener feed well. Flocculated solids settle towards the thickener discharge cone and will be pumped to the concentrate surge tank, while the supernatant water will overflow to the concentrate thickener overflow tank. Thickener overflow water will be pumped to the process water tank for use as process water in the plant.

Concentrate Filtration and Storage

Thickened concentrate, at approximately 60% solids will be pumped to concentrate surge tank, and in turn fed to plate and frame pressure filters for dewatering on a batch basis. Filtrate from the pressure filter will flow by gravity to the concentrate thickener overflow tank. Filtered concentrate is expected to be 12% moisture and will be discharged into a stockpile with a capacity for storage of 3.5 days production at design rates.

Tailings Disposal and Reclaim Water

Combined flotation tailings (both from the rougher/scavenger flotation tank cells and the HydroFloat™ cell will be pumped to the TMF for disposal. The supernatant liquid from the tailings pond will be reclaimed by the reclaim water pumps and pumped to the process water tank for use as process water.

17.4.5 Reagents

The reagents will be prepared and stored in a separate, self-contained area within the process plant and delivered by individual metering pumps or centrifugal pumps to the required addition points. All reagents will be prepared using fresh water.

Reagents that will be used in the process are summarized in Table 17-8.

Table 17-8: Reagents

Reagent	Purpose	Comment
Potassium amyl xanthate (PAX)	Collector	Used as a collector in the flotation circuit and will be supplied in 25 kg bags in the form of pellets. The pellets will be mixed with fresh water to produce a 15% solution strength. The PAX mixing system will be a skid package provided by the vendor. The PAX solution will be distributed to the flotation circuit by three reagent metering pumps. Preparation of the PAX will require a bulk handling system, mixing and holding tanks, and metering pumps.
Methyl isobutyl carbinol (MIBC)	Frother	Used as a frother in the fines rougher/scavenger and cleaner flotation circuit and will be supplied in bulk tote containers in liquid form. MIBC will be pumped directly from the tote by two reagent metering pumps and will be used as 100% solution strength.
W34	Frother	Used as a frother in the flotation circuit and will be supplied in bulk tote containers in liquid form. W34 will be pumped directly from the tote by two reagent metering pumps (one duty and one standby) and will be used as 100% solution strength.
Flocculant	Flocculant	Flocculant will be supplied in 25 kg bulk bags as a dry powder. The flocculant will be mixed with fresh water and diluted to 0.50% mix concentration. The flocculant mixing system will be a skid package provided by the vendor. The mixed solution will be supplied to the thickener by two flocculant metering pumps.

17.4.6 Air Services

Air service requirements are summarized in Table 17-9.

17.4.7 Water Services

Water services are summarized in Table 17-10.

17.4.8 Assay/Metallurgical Laboratory and Quality Control

The existing assay/metallurgical laboratory at the Moose River Plant will be upgraded to take extra samples from both Fifteen Mile Stream and Cochrane Hill. Analytical data obtained from routine sampling will be used for process optimization and control, product quality control, and metallurgical accounting.

The metallurgical laboratory will perform metallurgical tests for quality control and process flowsheet optimization as required. The laboratory will include equipment such as laboratory crushers, ball mill, sieve screens, laboratory flotation cells, balances, and pH meters.

17.5 Upgrades to Touquoy Process Plant Leach Circuit

Gold concentrates will be transported from the Fifteen Mile Stream and Cochrane Hill plants to the existing Moose River plant. Once Touquoy mineralization is exhausted, the process plant at Touquoy will require modifications to accept concentrate only.

Table 17-9: Air Services

Air Type	Comment
Blower air	The flotation blowers will supply air to the rougher/scavenger tank cells, hydroflotation and cleaner tank cells. The installed blowers will be multiple-stage, centrifugal type blowers and will be used with a "blow-off" arrangement to adapt to fluctuations in flotation air demand.
Plant and instrument air	Rotary screw air compressors will provide high pressure compressed air operating in lead-lag mode, to meet the demand for plant and instrument air requirements. The pressure filter will use the wet high-pressure air produced from the rotary screw air compressors. There will be a dedicated air receiver to store necessary compressed air required for pressure filter operation. Wet plant air will be stored in the plant air receivers to account for variations in demand prior to being distributed throughout the plant. Instrument air will be dried in the Instrument Air Dryer before distribution throughout the plant.

Table 17-10: Water Services

Type	Comment
Fresh water	Fresh water will be pumped from the Archibald Lake to the fresh and fire water tank to feed the plant. Fresh water in the tank will be used to supply the following services: • Primary crushing circuit dust suppression water. • Reagent preparation water. • Slurry pumps gland seal water. • Cooling water systems. • Make-up water for the process water system Fresh water will be supplied to the plant by two fresh water pumps in a duty–standby configuration.
Potable water	Potable water will be sourced from the fresh water tank and treated in the potable water treatment skid. The treated water will be stored in the potable water storage tank for use by two potable water pumps in a duty–standby configuration.
Gland water	Gland water will be supplied from the fresh water tank and distributed to the plant by two gland seal water pumps in a duty–standby configuration.
Process water	Process water will mainly consist of concentrate thickener overflow water and tailings pond reclaim water. Process water will be stored in the process water storage tank and be distributed by the two process water pumps, in a duty–standby configuration.

17.5.1 Process Design Basis for Gold Concentrates

The flotation and gravity concentrates from the Fifteen Mile Stream and Cochrane Hill mills will be processed at the existing Touquoy gold leaching plant. A summary of the two product streams from each of the mills is provided in Table 17-11 for Fifteen Mile Stream and Table 17-12 for Cochrane Hill.

Table 17-11: Process Throughput Parameters, Fifteen Mile Stream

Description	Units	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Float concentrate throughput	t/h	5.92	9.11	9.11	9.11	9.11	9.11	9.11	9.11	6.67
Float concentrate grade	g/t	10.0	10.1	9.8	9.5	8.2	7.7	6.9	4.7	4.4
Gravity concentrate throughput	kg/day	3,562	5,480	5,479	5,479	5,479	5,479	5,479	5,480	4,011
Gravity concentrate grade	g/t	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265	1,265

Table 17-12: Process Throughput Parameters, Cochrane Hill

Description	Units	Yr 3 2020	Yr 4 2021	Yr 5 2022	Yr 6 2023	Yr 7 2024	Yr 8 2025	Yr 9 2026	Yr 10 2027
Float concentrate throughput	t/h	—	—	5.19	6.14	6.12	6.16	4.83	2.23
Float concentrate grade	g/t	—	—	21.2	23.3	21.7	21.9	17.1	6.99
Gravity concentrate throughput	kg/day	—	—	904	1,169	1,090	1,106	866	255
Gravity concentrate grade	g/t	—	—	3,200	3,200	3,200	3,200	3,200	3,200

The feed parameters in these tables were used to determine the necessary modifications and additions that are proposed for the Moose River gold leaching plant.

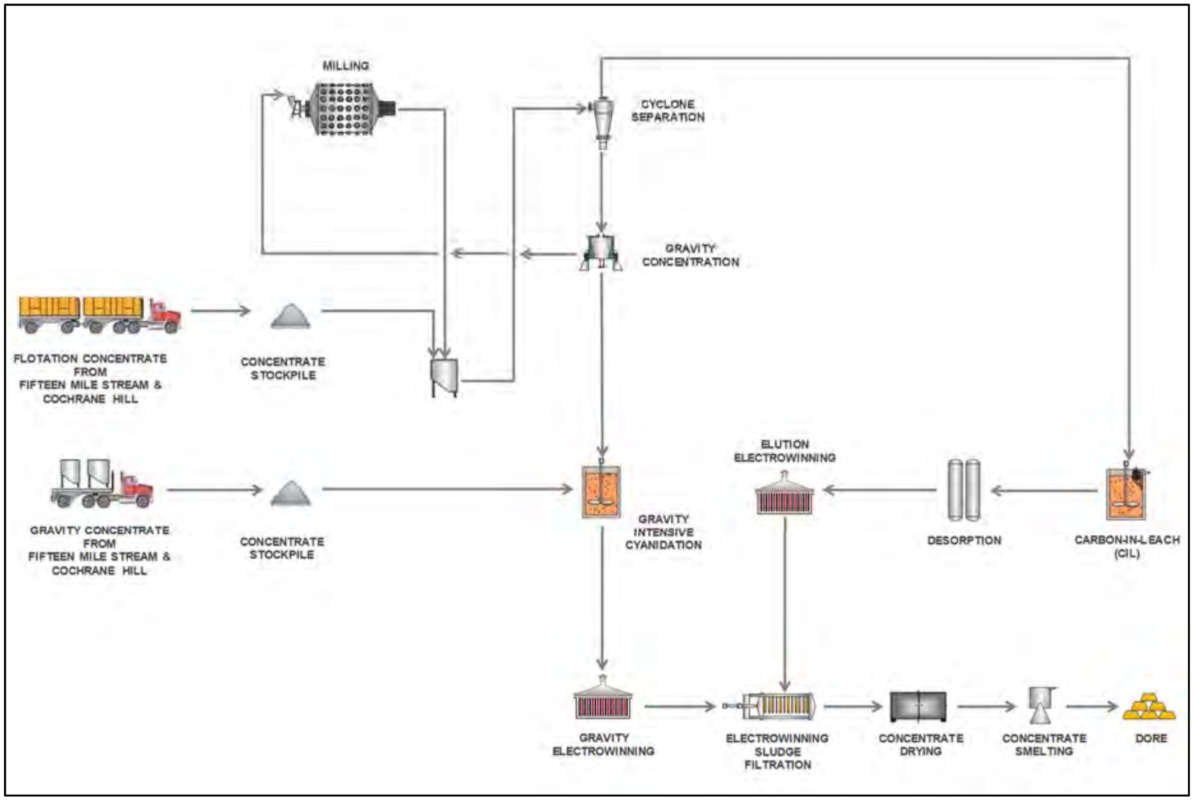
17.5.2 Proposed Process Flowsheet

The process flowsheet is developed based on the 2017 ALS laboratory testwork results. The simplified process flowsheet is shown in Figure 17-4.

17.5.3 Analysis of Existing Touquoy Process Plant

Following a review of the testwork discussed in Section 13, a mass balance validation calculation was developed to simulate the influence of Fifteen Mile Stream and Cochrane Hill flotation and gravity concentrate streams on the downstream Touquoy process plant. The observed effect to the Touquoy plant circuits are discussed in each of the following sub-sections.

Figure 17-4: Flowsheet, Touquoy Process Plant



Note: Figure prepared by Ausenco, 2018.

Crushing

Given the Fifteen Mile Stream and Cochrane Hill concentrates are a product from an upstream mill, there is no need for additional crushing of these streams, and therefore no changes are required.

Grinding

The projected particle size of both the Fifteen Mile Stream and Cochrane Hill flotation concentrate stream will be around100 µm, which is finer than the target grind size for the existing grinding circuit at Touquoy, and is therefore no additional grinding load is expected on the Touquoy ball mill circuit.

The coarse particle flotation concentrate component of the Cochrane Hill concentrates when the HydroFloat™ circuit is operating, the regrind mill is expected to be installed at Cochrane Hill and decrease the concentrate particle size down to around 100 µm and thus there will be no influence at Touquoy.

Gravity Concentration

The Fifteen Mile Stream and Cochrane Hill gravity concentrates will be recovered and transported in skid-mounted concentrate hoppers to the existing Touquoy process plant. As outlined in Section 17, the projected mass throughput from the additional Fifteen Mile Stream and Cochrane Hill gravity concentrates will exceed 4,000 kg/d, which surpasses the existing gravity concentrate throughput from Touquoy and Beaver Dam facilities by five times. Furthermore, once the gravity concentrate gold is leached into pregnant solution, the projected gold required to be recovered in the existing intensive leach electrowinning cell will be 4.1 times greater than the current duty.

Given the increase in mass throughput, the existing intensive leach reactor and downstream electrowinning cell has been identified as a bottleneck, and therefore a new intensive leach reactor and electrowinning cell will be required.

Leaching

The additional solids throughput from the combined Fifteen Mile Stream and Cochrane Hill concentrates will be around 18 t/h at its peak. This represents an overall increase to the Touquoy process plant of 7% on a dry solids mass basis.

In terms of gold loading capacities, the existing Touquoy CIL circuit was designed for a 1,300 g/t Au carbon loading capacity, which when transposed over the proposed feed criteria, results in only one operating year (2023 or Yr 6), whereby the carbon loading will be required to be in excess of this at 1,530 g/t Au. Therefore, it is expected that the nominal increase in carbon loading can be achieved with supplementary testwork and site-based trials, increasing carbon profiles, and adjusting carbon movement rates.

When the additional volumetric flow is transposed over the existing Touquoy plant equipment, it can be projected that the trash screens will experience minimal surging in the peak throughput years, and the leach circuit retention time will only decrease to 22 h from 24 h. The decrease in the leaching retention time would typically be a note of concern for a gold leaching plant; however, as indicated in Section 13, the bottle roll tests completed on the flotation concentrates indicate that the bulk of the gold extraction occurs within the first eight hours, and there is no change in gold extraction with residence times beyond about 20 hours, and therefore the only additional validation that is required is of the existing treatment of the Touquoy and Beaver Dam ores, to ensure that the kinetic performance is similar to that of Fifteen Mile Stream and Cochrane Hill. Overall it is expected that no changes are required to the leaching circuit.

Elution

Due to the additional gold throughput expected to be recovered onto the activated carbon in the leach circuit, additional acid wash and elution cycles are expected to be required. The additional gold throughput from the Fifteen Mile Stream and Cochrane Hill concentrates will increase the required elution frequency from 0.5 cycles/day to the 1.2 cycles/day at the peaks, based on an assumed gold loading of 1,300 g/t Au of carbon.

It is likely that the gold loadings on the carbon could be further increased with longer loading times, and if required, acid wash cycles could be operated in parallel with elution cycles in order to reduce the overall elution cycle batch times by ~25%. Overall, it is expected that no changes are required to the elution circuit.

Gold Room

As the gold room operates on a batch basis, the increase in gold throughput from approximately 90 koz/a to nominally 200 koz/a, peaking at 254 koz/a in 2023 (or Yr 6); this will likely result in more frequent sludge presses, drying batch, and smelting activities. Currently, the existing Touquoy gold room is scheduled to operate for only five days per week, and for only eight hours per shift, therefore there is additional process capacity within the circuit.

In order to ensure that the heavy metals recovered in the Fifteen Mile Stream and Cochrane Hill concentrates were not deleterious, additional analyses were performed on the concentrates reviewing copper, lead, arsenic and mercury. Upon reviewing the analysis, all levels measured in both leached liquor and adsorbed onto the carbon were observed to be very low, and therefore are not expected to introduce any ventilation issues downstream in the existing Touquoy process plant.

Detoxification and Tailings

Given the additional mass throughput expected to be processed by the leaching circuit, additional volumetric flow will be observed at the carbon safety screens, detoxification circuit and tailings pumps. When the additional volumetric flow is transposed over the existing Touquoy plant equipment, it can be projected that the carbon safety screens may experience surging in the peak throughput years, and the detoxification circuit retention time will decrease to 1.8 to 1.7 hours.

In regards to the reduction in detoxification retention time, the projected reaction time of 1.5 hours still satisfies the minimum retention time in the Touquoy process design criteria of 1.5 hours, therefore it is expected that no changes are required to the detoxification circuit.

Lastly, the increase in volumetric throughput observed at the tailings pumpset still falls within the design range that was allowed for as a maximum throughput case during the detailed design of the Touquoy plant, therefore it is expected that no changes are required.

Reagents

Because of the increase in solids throughput, and the increase in frequency of both elution cycles and intensive leach cycles, the available capacity of both the cyanide and lime reagents circuits was reviewed. In total, it is projected that the cyanide consumption rate will approximately double from current consumption rates during the peak years from 3.2 t/d to 4.4 t/d. This projected increase on dry consumption rate will in turn double the required output from the cyanide pumps, which are rated up to 1.51 m^3/h, whereas the maximum consumption flowrate will be 0.91 m^3/h, therefore it is expected that no changes are required.

Similarly, for the lime reagent circuit sizing, the increase in solids throughput as mentioned above directly impacts the lime consumption to the leach, detoxification and treatment plant circuits. In total, it is projected that the lime consumption rate will increase by 13% from current consumption rates during the peak years from 4.2 t/d to 4.8 t/d. This projected increase on dry consumption rate will in turn increase the required output from the lime distribution pumps; however, overall the lime reagent system is rated to 8.0 t/d as indicated in the Touquoy process design criteria, therefore it is expected that no changes are required.

Equipment Sizing Specifications of Required Modifications

The following new and modified equipment skids will be installed as part of the Moose River plant modifications:

- Float concentrate repulp hopper and feed (new);

- Float concentrate repulp trash screen and pump box (new);
- Float concentrate stockpile shed (new);
- Intensive leach reactor (new) –CS4000 or equivalent;
- Pregnant tank with immersion heater (new);
- Electrowinning cell with sludge hopper (new) – 75 ft^3;
- Gold room building enclosure with ventilation ducting (new).

17.5.4 Process Description of Required Modifications

Flotation Concentrate Feed/Grinding

No mechanical changes are expected to the existing Moose River process plant grinding circuit. In order to introduce the Fifteen Mile Stream and Cochrane Hill concentrates to the Touquoy process plant grinding circuit, a new concentrate stockpile shed will be installed allowing for 3.5 days storage of concentrate at the Touquoy plant. Reclamation of the Fifteen Mile Stream and Cochrane Hill concentrate will be by front-end loader, which will discharge the concentrate into a reclaim hopper above a variable-speed belt feeder. The feeder head chute will discharge into a conical repulp hopper, which will combine adequate process water for slurrying, and pumping the feed slurry to the existing cyclone feed hopper ahead of the classifying cyclones.

Gravity Concentration Feed

No mechanical changes are expected to the existing Touquoy process plant gravity circuit. Given the increase in gravity gold concentrate, it is proposed to install a new parallel intensive leach reactor and electrowinning circuit to increase the capacity for gravity gold recovery. Introduction of the Fifteen Mile Stream and Cochrane Hill gravity gold concentrates will be via a skid-mounted concentrate hopper (to be supplied by FLS Knelson), which will be positioned adjacent to the new intensive leach reactor circuit (to be supplied by Consep).

The intensive leach reactor skids will combine the gravity concentrate with cyanide, caustic soda and leach-aid to extract the gold from the concentrate, and then the pregnant solution will be bled off towards a heated pregnant solution tank. Upon completing a gravity gold intensive leach cycle, the pregnant solution will be circulated through a new electrowinning cell (to be supplied by FLS Summit Valley) which will plate the extracted gold onto the electrowinning cathodes.

Periodically, the electrowinning sludge will be high-pressure washed into a sludge hopper which will transfer the sludge to the existing sludge press feed hopper for dewatering ahead of smelting. The barren solution from the electrowinning cell will be pumped to the leaching circuit.

17.6 Upgrades to Touquoy Process Plant Leach

When both the Touquoy and Beaver Dam mineralization is mined out, Fifteen Mile Stream and Cochrane Hill gold concentrates are expected to be the only feed to the Moose River plant.

Both crushing and grinding circuits including the gravity concentration circuit up to primary cyclones are not required since both Fifteen Mile Stream and Cochrane Hill gold concentrates can be fed directly to either intensive cyanide leach or CIL circuits.

17.6.1 Leaching

No changes are required to both intensive leach reactor and electrowinning cell. Much smaller carbon adsorption tanks are required to handle the significantly reduced volumetric flow of Fifteen Mile Stream and Cochrane Hill flotation concentrates. Preliminary sizing suggests that 10 x 30 m^3 pumpcell circuit is required replacing the current seven 1,329 m^3 tanks. Adsorpion of gold still requires six stages of carbon movement to capture the gold, just on a smaller scale.

17.6.2 Other Changes

No changes are required for the elution, gold room, detoxification, and reagent plant.

Smaller tailings pumps and pipes are required to handle much smaller volume of tailings. As an alternative, tailings can be diluted with water to end up with the similar tailings volumetric flow rate as the current operating tailings. With diluted tailings, existing tailings pumps and pipes can be used.

17.6.3 Trade-off Study

An additional trade-off study was completed to asses various comminution circuit options for Fifteen Mile Stream. The study examined the relative merits of a two-stage cone crushing and ball milling (3CB) circuit versus a semi-autogenous grind (SAG) mill in closed circuit with pebble crusher and ball milling (SABC) circuit. Three options were analyzed:

- Option 1: primary jaw crusher followed by SABC;
- Option 2: primary jaw crusher followed by 3CB, to design standards common in the industry;
- Option 3: semi-mobile crushing plant followed by single stage ball milling, similar to the current plant at Touquoy.

Capital and operating costs for the circuit options at a nominal plant capacity were developed. Atlantic Gold made the decision to proceed with a feasibility study based on a SABC circuit as this alternative offered the lowest operating cost accompanied by an intermediate capital cost when compared to three-stage crushing. In addition, the SABC circuit can offer advantages to overcome materials handling issues, as it can provide operational flexibility, higher availability and lower maintenance costs.

A similar assessment of comminution options is also recommended for Cochrane Hill for the feasibility study.

18.0 PROJECT INFRASTRUCTURE

18.1 Introduction

An infrastructure layout plan for Touquoy is provided as Figure 16-19 and for Beaver Dam, in Figure 16-20.

Figure 16-21 includes a proposed layout for Fifteen Mile Stream.

The planned infrastructure layout for Cochrane Hill is included as Figure 16-22.

18.2 Road and Logistics

18.2.1 Touquoy

The Touquoy property can be accessed via 110 km of sealed road from Halifax to Moose River. The administration area is accessed via a 1.3 km gravel access road from Mooseland Road. The site itself is intersected by the Mooseland Road, a 35 km mostly gravel road that provides public access between Tangier–Sheet Harbour on Provincial Highway 7 and Middle Musquodoboit. A road crossing has been constructed on this road to allow off-highway vehicles to cross the road and gain access to the plant site and WRSF from the open pit.

Major onsite roads at Touquoy include the ore haulage and waste haulage roads. Both these roads cross the Mooseland Road in order to provide access to the plant site and WRSF. Secondary roads include a powerline access track, a track along the decant line and tailings line, and a track to access the ETP.

18.2.2 Beaver Dam

Access to the Beaver Dam administration area will be via the 7.5 km Beaver Dam road from Provincial Highway 224 in combination with the upgraded 30 km corridor used for ore haulage from Year 6.

Ore will be transported from the Beaver Dam site to the Touquoy mine site by semi-trailer trucks using a 9-axle B-train configuration carrying a 50 t payload. The trucks will travel a total distance of 30 km between the two sites, over four, either upgraded or new sections of road.

Access to the Beaver Dam mine site will be provided by the existing Beaver Dam Mines Road including a new section to be implemented to the southwest of the Provincial Highway 224 crossing. From Provincial Highway 224, the new section will continue westward for approximately 4.5 km and connect to an existing forestry road, which will be upgraded to accommodate additional truck traffic. Ultimately the new section will connect to Mooseland Road, which continues north for 11 km to connect with the

Touquoy access. As much as possible, existing road sections will be improved to accommodate the semi-trailer truck traffic, including adjusting the gradients and road bends for the required truck sizes and design speeds. The total distance between the Beaver Dam and Touquoy sites along the designed route will be approximately 29 km and the route will be designed to accommodate a maximum speed of 70 km/h.

18.2.3 Fifteen Mile Stream

A well-maintained bituminized road (Provincial Highway 374), which connects several large towns in Pictou County (Stellarton, New Glasgow) with the coastal community of Sheet Harbour, will provide access to the site. The administration office and plant site will be accessed via a 5 km mine access road. This road will use the existing Seloam Lake Road for approximately 1 km at which point a dedicated 4 km mine access road will be constructed. The road will allow for two-way traffic, one lane in each direction and will not be paved.

In addition to the mine access road, three major ex-pit haul roads to haul ore and waste material will be constructed using the mine fleet during the pre-production period. The ore haul road will be 1.5 km long, and connect the open pit to the ROM stockpile pad. The waste haul road will consist of two roads, one connecting the open pit with the waste rock storage facility (0.4 km), and the other connecting the open pit with the TMF (1.1 km).

18.2.4 Cochrane Hill

A well-maintained bituminized road (Provincial Highway 7) linking the village of Sherbrooke and the town of Antigonish provides access to the site. A 2 km site access road will be constructed to link the site facilities to Provincial Highway 7.

The new access road will allow for two-way traffic, one lane in each direction and will not be paved.

To allow development of the proposed open pit, and to prevent the need to shut down the public highway during blasting operations, a 2.9 km section of Provincial Highway 7 will be relocated approximately 300 m to the west. The diversion will be constructed outside of a 500 m diameter rock blasting disturbance zone and consist of single lane, two-way traffic, similar to the existing road section. This relocated section of road will meet the Nova Scotia Transportation and Infrastructure Renewal (NSTIR) Highway Design Guidelines for a Minor F Collector route. The mine site will use a 1 km portion of the existing Provincial Highway 7 as the access road to the south of the site.

In addition to the mine access road, three major ex-pit haul roads to haul ore and waste material will be constructed using the mine fleet during the pre-production period. The ore haul road will be 1.5 km long, and connect the open pit to the ROM stockpile pad. The waste haul road will consist of two roads, one connecting the open pit with the waste rock storage facility (0.4 km), and the other connecting the open pit with the TMF (1.1 km).

18.3 Built Infrastructure

18.3.1 Touquoy

Built infrastructure supporting operations includes administration offices, control room complex, mill maintenance office, process plant building, reagent storage, laboratory, workshop and warehouse and the main plant motor control centre room. Other infrastructure aspects in place include on-site communications, potable water, fire protection, security, sewage and waste, fuel and the raw water supply.

18.3.2 Beaver Dam

As ore will be transported to Touquoy for processing, building infrastructure at Beaver Dam will be limited. Building infrastructure will consist of a small workshop and warehouse facility. Other infrastructure aspects that will need to be provided in support of mining operations include on-site communications, potable water, fire protection, security, sewage and waste, fuel and the raw water supply.

18.3.3 Fifteen Mile Stream

The building infrastructure required for Fifteen Mile Stream is outlined in Table 18-1.

18.3.4 Cochrane Hill

The building infrastructure required for Cochrane Hill is outlined in Table 18-2.

18.4 Water Management

Information on water management is provided in Section 20.

18.5 Stockpiles

Information on stockpiles is provided in Section 16.5 and Section 20.

18.6 Waste Rock Storage Facilities

Information on WRSFs is provided in Section 16.6 and Section 20.

18.7 Tailings Management Facilities

Information on the TMFs is provided in Section 20.

Table 18-1: Infrastructure Requirements, Fifteen Mile Stream

Item	Description
Administration	The administration building footprint will be approximately 402 m^2 and will house managers, administration, finance and a proportion of mining and processing personnel. The building will include offices, meeting and training rooms, kitchen, toilets, mine dry and first aid facilities
Gatehouse	The guardhouse will be located on the site access road where security staff can control entry to the mine and process plant areas. The building will be constructed as a single-storey, wood-frame building
Mining office and change room	Mining office and change room facilities for the workforce were assumed to be constructed in the mine facility area and will be approximately 400 m^2 in area. These facilities will have clean and dirty areas and will be complete with showers, basins, toilets, lockers and overhead laundry baskets. The building will be constructed as a single-storey, wood-frame building
Truck workshop and warehouse	The pre-engineered truck workshop and warehouse building will have an area of 720 m^2 and will be positioned adjacent to the mine office at Fifteen Mile Stream. This area will be divided into two sections; one section will be used for warehousing spare parts and the other section will be a maintenance workshop. Lifting and handling activities will be fulfilled by an overhead crane.
Plant office and change room	The plant office and change room facilities for the process plant were assumed to be constructed in the process plant area and will be approximately 260 m^2 in area. These facilities will have clean and dirty areas and will be complete with showers, basins, toilets, lockers and overhead laundry baskets. The building will be constructed as a single-storey, wood-frame building
Plant workshop	The plant workshop will be used to perform maintenance on process equipment and equipment spares. The pre-engineered plant workshop building will have an approximate area of 300 m^2.
Fine ore stockpile	The fine ore stockpile will be used to keep the ore dry and heated to prevent freezing during the winter. The pre-engineered building will be approximately 2,080 m^2 in area.
Filtration, storage and loadout	The filtration, storage and loadout building will house process equipment and provide a covered area for loading the concentrate on to the trucks. This building will be separated from the process plant building to minimize the building volume that requires process ventilation equipment. The pre-engineered building will have an approximate area of 650 m^2.
Process plant	The pre-engineered process plant building will be approximately 1,490 m^2 in area (24 m wide x 62 m long) and will house milling, gravity, flotation and reagent equipment. The building will be divided into two sections. The first section will contain the mill; the second section will contain the gravity, flotation and reagent system equipment. Both sections will be serviced by overhead cranes. The building will be heated using electrical space heaters.
Ball mill luberoom	The ball mill luberoom will be located outside the process plant building, adjacent to the ball mill section. The pre-cast concrete building will have an approximate area of 80 m^2.
Plant switchroom	The plant switchroom will be located just outside the process plant area and will house the control equipment for the switch yard. The pre-cast concrete building will be approximately 160 m^2 in area.

Compressed air supply	High-pressure compressed air for plant-air duty will be provided by duty and standby screw compressors and a duty plant air receiver. There will be three high-pressure air uses; instrument air, plant air and concentrate filter air. The instrument air will be dried and then stored in a dedicated air receiver. The plant air will be fed straight from the plant air receiver. The concentrate filter air will be stored in a dedicated air receiver. Low-pressure air for flotation-cell air requirements will be provided by duty and standby multistage centrifugal blowers.
On-site communications	On-site communications will consist of inter-connected mobile and fixed systems, including landline telephone network, radios and internet. It is assumed that a network connection can be made at Provincial Highway 7.
Potable water	Potable water is produced by a package water treatment plant and is stored in a tank for reticulation to all consumers
Fire protection	Fire protection will consist of fire hydrants, fire hose-reel cabinets and fire extinguishers placed strategically around the facilities in accordance with the relevant regulations. Fire-fighting water will be supplied from a dedicated outlet in the fire water tank. The fire water tank will be fed directly from the fresh water pond. An electric fire-water pump with a diesel-powered back-up pump will be provided. A fire-water jockey pump will maintain pressure in the fire ring-main at all times when the fire-water system is on stand-by. Various types of fire extinguishers will be provided in areas where water is undesirable as a means of fire control; these include motor control centres (MCCs) and control rooms. Foam fire extinguisher units will be installed at hydrant points servicing fuel storage and flammable reagent areas. A fire alarm control panel for surface facilities will be provided in the main control room, cabled to fire detectors in the following areas: • Process plant MCC rooms; • Main control room; • Workshop store and offices; • Laboratory. In each area, a combination of heat and smoke detectors will be provided with break-glass units mounted externally to the buildings. Within the process plant MCC rooms, very early smoke detection apparatus (VESDA) will be installed for early smoke detection and alarm initiation. Multiple detectors will be marshalled in a locally-mounted annunciator junction box. Each area will report as one zone on the fire alarm control panel. Alarm bells will be provided for local alarm at each area.
Security	Everyone entering the processing plant and mine facilities areas will be required to pass the continuously-manned gatehouse. The gatehouse will be located along the only access road, outside of the blast radius.
Sewage and waste	Sewage from the plant site buildings will flow by gravity via a pipe network buried below the frost line to septic tanks with leach drains. Depending on the type of chemical waste from the laboratory it will either be recycled to the plant or stored for off-site disposal. Office and domestic waste are collected and disposed of off-site in accordance with the applicable regulations.

Fuel	Propane will be delivered to site as a compressed gas–liquid and stored in a pair of supplier-managed on-site tanks. Diesel will be delivered to site in tanker trucks and will be available for use by vehicles using onsite storage tanks and a bowser arrangement for distribution.
Raw water supply	Raw water will be drawn from a location at Seloam Lake, approximately 2 km north-east of the process plant. The water will be recovered by submersible pumps mounted within a decant structure. The bulk of the plant water demand will be drawn as a recirculating flow from the TMF pond. The raw water supply building will be located at the fresh water source and house the pumping equipment. The pre-engineered building will have an area of 36 m^2.

Table 18-2: Infrastructure Requirements Cochrane Hill

Item	Description
Administration	The administration building footprint will be approximately 402 m^2 and will house managers, administration, finance and a proportion of mining and processing personnel. The building will include offices, meeting and training rooms, kitchen, toilets, mine dry and first aid facilities
Gatehouse	The guardhouse will be located on the site access road where security staff can control entry to the mine and process plant areas. The building will be constructed as a single-storey, wood-frame building
Mining office and change room	The mining office and change room facilities for the were assumed to be constructed in the mine facility area and will be approximately 400 m^2. These facilities will have clean and dirty areas and will be complete with showers, basins, toilets, lockers and overhead laundry baskets. The building will be constructed as a single-storey wood-frame building.
Truck workshop and warehouse	The truck workshop and warehouse will be 720 m^2 in area and will be positioned adjacent to the mine office at Cochrane Hill. This area will be divided into two sections. One section will be used for warehousing spare parts and the other will be a maintenance workshop. Lifting and handling activities will be fulfilled by an overhead crane. This building will be a pre-engineered building
Plant office and change room	The plant office and change room facilities for the process plant were assumed to be constructed in the process plant area and will be approximately 260 m^2 in area. These facilities will have clean and dirty areas and will be complete with showers, basins, toilets, lockers and overhead laundry baskets. The building will be constructed as a single-storey, wood-frame building.
Plant workshop	The plant workshop will be used to perform maintenance on process equipment and equipment spares. The pre-engineered plant workshop building will have an area of approximately 300 m^2.
Fine ore stockpile	The fine ore stockpile will be used to keep the ore dry and heated to prevent freezing during the winter. The pre-engineered building will be approximately 2,080 m^2 in area.
Filtration, storage and loadout	The filtration, storage and loadout building will house process equipment and provide a covered area for loading concentrate on to the trucks. This building will be separated from the process plant building to minimize the building volume that requires process ventilation equipment. The pre-engineered building will have an area of approximately 650 m^2.

Process plant	The pre-engineered process plant building will be approximately 1,490 m^2 in area (24 m wide x 62 m long) and will house milling, gravity, flotation and reagent equipment. The building will be divided into two sections. The first section will contain the mill; the second section will contain the gravity, flotation and reagent system equipment. Both sections will be serviced by overhead cranes. The building will be heated using electrical space heaters.
Ball mill luberoom	The ball mill luberoom will be located outside the process plant building, adjacent to the ball mill section. The pre-cast concrete building will be approximately 80 m^2 in area.
Plant switchroom	The plant switchroom will be located just outside the process plant area and will house the control equipment for the switch yard. The pre-cast concrete building will have an area of approximately 160 m^2.
On-site communications	On-site communications will consist of inter-connected mobile and fixed systems, including landline telephone network, radios and internet. It is assumed that a network connection can be made at Provincial Highway 7.
Potable water	Potable water will be produced by a package water treatment plant and is stored in a tank for reticulation to all consumers
Fire protection	Fire protection will consist of fire hydrants, fire hose-reel cabinets and fire extinguishers placed strategically around the facilities in accordance with the relevant regulations. Fire-fighting water will be supplied from a dedicated outlet in the fire water tank. The fire water tank will be fed directly from the fresh water pond. An electric fire-water pump with a diesel-powered back-up pump will be provided. A fire-water jockey pump will maintain pressure in the fire ring-main at all times when the fire-water system is on stand-by. Various types of fire extinguishers will be provided in areas where water is undesirable as a means of fire control; these include MCCs and control rooms. Foam fire extinguisher units will be installed at hydrant points servicing fuel storage and flammable reagent areas. A main fire alarm indicator panel (MIFB) for surface facilities will be provided in the main control room, cabled to fire detectors in the following areas: • Process plant MCC rooms; • Main control room; • Workshop store and offices; • Laboratory. In each area, a combination of heat and smoke detectors will be provided with break-glass units mounted externally to the buildings. Within the process plant MCC rooms, very early smoke detection alarms (VESDAs) will be installed for early smoke detection and alarm initiation. Multiple detectors will be marshalled in a locally-mounted annunciator junction box. Each area will report as one zone on the MIFB. Alarm bells will be provided for local alarm at each area.
Security	Everyone entering the processing plant and mine facilities areas will be required to pass the continuously-manned gatehouse. The gatehouse will be located along the only access road, outside of the blast radius.
Sewage and waste	Sewage from the plant site buildings will flow by gravity via a pipe network buried below the frost line to septic tanks with leach drains. Depending on the type of chemical waste from the laboratory it will either be recycled to the plant or stored for off-site disposal. Office and

	domestic waste is collected and disposed of off-site in accordance with the applicable regulations.
Fuel	Propane will be delivered to site as a compressed gas–liquid and stored in a pair of supplier-managed on-site tanks. Diesel will be delivered to site in tanker trucks and will be available for use by vehicles using onsite storage tanks and a bowser arrangement for distribution.
Raw water supply	Raw water is drawn from a location at Archibald Lake, approximately 4 km north-west of the process plant. The water is recovered by submersible pumps mounted within a decant structure. The bulk of the plant water demand is drawn as a recirculating flow from the TMF pond. The building will be located at the fresh water source and house the pumping equipment. The pre-engineered building will be 36 m^2 in area.

18.8 Power and Electrical

18.8.1 Touquoy

At Touquoy, the power supply comes from a connection to the Provincial distribution grid. A new 25 kV overhead line was installed from a connection at the Caribou Mines site, about 15 km away. Part of this line uses poles carrying an existing single-phase line. Power factor correction is applied at point of entry to the plant to ensure that the power factor remains above 0.90. Plant power distribution from the main substation is via overhead power lines and buried conduits where required. A 545 kW black-start diesel generator provides emergency power.

18.8.2 Beaver Dam

The power demand at Beaver Dam is insufficient to justify providing permanent grid supply. Therefore two (duty/standby) self-contained, skid-mounted 500 kW diesel powered generators will provide the required 600 V electrical power for Beaver Dam surface consumers.

18.8.3 Fifteen Mile Stream

Nova Scotia Power Interconnection

The proposed Fifteen Mile Stream site is located approximately 20 km to the south of Trafalgar along Provincial Highway 374. The closest point of supply for the Fifteen Mile Stream site is approximately 20 km south of the Trafalgar power station and due west of the site. The site will be connected to the power grid by a 1 km overhead power line connected to the 69 kV line that runs adjacent to the planned mine site. This connection assumes a direct line between the 69 kV line with a step-down transformer from 69 kV to 25 kV, to the site and service the mine requirements.

Power Distribution

The 69 kV overhead line incoming feed will be stepped down to 25 kV at the point of interconnection with the Provincial grid.

The 25 kV line will be tapped to supply the gatehouse and mine office, truck workshop, warehouse, mining office and change room buildings. The 25 kV will be stepped down to each of these buildings through a bank of pole top transformers.

The main 25 kV overhead line will continue to the substation. The plant power distribution from the main substation will be via overhead power lines and buried conduits wherever required. The distribution voltage to the local electrical rooms will be 4.16 kV.

A 500 kW black-start diesel generator will provide emergency power. In the event of a total power black-out the generator will be started by an operator. The emergency generator will only supply back-up power to select equipment in the process plant area.

The total connected load will be approximately 5.7 MW with an operating load of 4 MW.

Electrical Rooms

There will be four electrical rooms, one at the 25kV substation, one at the process plant area, one at the crushing plant area and one at the TMF area. The electrical rooms will be pre-fabricated and loaded with electrical equipment prior to delivery to site.

Lighting

Three-metre high pole-mounted high intensity discharge type weatherproof lights will be utilized for plant and conveyor lighting, while 8 m pole-mounted floodlights will be utilized for ROM, crushing and plant area lighting. High bay and low bay lighting will be used for process plant building operating floors. Energy efficient light-emitting diode (LED)-type lighting fixtures will be applied where suitable. Emergency lighting will be also installed throughout the plant, in stairways and exits to provide sufficient light to allow safe egress of personnel from the buildings.

18.8.4 Cochrane Hill

Nova Scotia Power Interconnection

The proposed Cochrane Hill site is located near the intersection of the Provincial Highway 7 and Provincial Highway 348, near Melrose. The closest point of power supply for the Cochrane Hill site is the 25 kV circuit 57C-426 located at the Salmon River Substation. To connect the site to the substation it is necessary to upgrade a 4 km section of overhead single-phase line, and to build an additional 9 km of overhead three phase line to supply the site with 25 kV power.

Site Distribution

At Cochrane Hill, the power supply will come from a connection to the existing Nova Scotia Power 25 kV line distribution grid. A new 25 kV overhead line will be required from a connection point located at the intersection of Provincial Highway 7 and the access road to the Cochrane Hill facility. Power factor correction will be applied at the plant site 25 kV substation to ensure that the power factor remains above 0.90 or better at point of entry.

An interconnection application needs to be made with Nova Scotia Power Inc. to confirm the power demand can be supplied by the referenced existing 25 kV line on Provincial Highway 7.

The total connected load will be approximately 5.5 MW with an operating load of 4.2 MW.

Power Distribution

The 25 kV overhead line incoming feed will be tapped to supply the gatehouse and mine office, truck workshop, warehouse, mining office and change room buildings. The 25 kV will be stepped down to each of these buildings through a bank of pole top transformers.

The main 25 kV overhead line will continue to the substation. The plant power distribution from the main substation will be via overhead power lines and buried conduits wherever required. The distribution voltage to the local electrical rooms will be 4.16 kV.

A 500 kW black-start diesel generator will provide emergency power. In the event of a total power black-out the generator will be started by an operator. The emergency generator will only supply back-up power to select equipment in the process plant area.

Electrical Rooms

There will be four electrical rooms. There will be one at the 25 kV substation, one at the process plant area, one at the crushing plant area and one at the TMF area. The electrical rooms will be pre-fabricated and loaded with electrical equipment prior to delivery to site.

Lighting

Three-metre high pole-mounted high-intensity discharge type weatherproof lights will be utilized for plant and conveyor lighting, while 8 m pole-mounted floodlights will be utilized for ROM, crushing and plant area lighting. High bay and low bay lighting will be used for process plant building operating floors. Energy efficient LED-type lighting fixtures will be applied where suitable. Emergency lighting will be also installed throughout the plant, in stairways and exits to provide sufficient light to allow safe egress of personnel from the buildings.

18.9 Concentrate Transport

18.9.1 Fifteen Mile Stream

Gold concentrates produced at Fifteen Mile Stream include a gravity concentrate and a floatation concentrate. The gravity concentrate represents a small portion of the total gold concentrate produced and will be stored and transported in specialized hoppers. The hoppers will be transported on the back of a flatbed once a hopper has been filled, in the order of one hopper every two days. The majority of concentrate to be hauled will be floatation concentrate. Up to 105,000 t of flotation concentrate will be hauled on an annual basis in purpose-built side-dump haul trucks. The trucks will be loaded inside the concentrate loadout area by FEL. The concentrate will be covered to prevent any losses and the trucks weighed prior to leaving to ensure appropriate loading.

Concentrates from Fifteen Mile Stream will be transported to the Touquoy process plant along a combination of existing public and private roads. The proposed route follows Provincial Highway 374 south to Provincial Highway 7, east along Provincial Highway 7 through Sheet Harbour to Provincial Highway 224 and then northwest along Provincial Highway 224, connecting with the existing Moose River Cross Road to Mooseland Road.

The 52 km section of public highway (i.e. 17 km of Provincial Highway 374, 4 km of Provincial Highway 7 and 31 km of Provincial Highway 224) that forms a large part of the link consists of dual-lane sealed roads built to support heavy truck traffic. The Moose River Cross Road (12.7 km) is a private logging road of variable condition, while Mooseland Road (11.9 km) is a Provincially-owned road that has sealed and unsealed sections.

On-highway trucks will be used to transport flotation concentrate. The trucks will complete approximately 6–8 return trips per day at the design production rate.

18.9.2 Cochrane Hill

Gold concentrates produced at Cochrane Hill will include a gravity concentrate and a floatation concentrate. The gravity concentrate represents a small portion of the gold concentrate produced, and will be stored and transported in specialized hoppers. As with Fifteen Mile Stream, hoppers will be transported on the back of a flatbed once a hopper has been filled, in the order of one hopper every two days. The majority of concentrate to be hauled will be floatation concentrate. Up to 56,000 t flotation concentrate will be hauled on an annual basis in purpose-built side dump haul trucks. The trucks will be loaded inside the concentrate loadout area by FEL. The concentrate will be covered to prevent any losses and the trucks weighed prior to leaving to ensure appropriate loading.

Concentrates from Cochrane Hill will be transported to the Touquoy process plant along a combination of existing public roads and private road. The proposed route follows Provincial Highway 7 south and then west to Provincial Highway 224 and then northwest along Provincial Highway 224, connecting with the existing Moose River Cross Road to Mooseland Road.

On-highway trucks will be used to transport flotation concentrate. The trucks will complete approximately 6–8 return trips per day at the design production rate.

19.0 MARKET STUDIES AND CONTRACTS

19.1 Market Studies

There are many markets in the world where gold is bought and sold, and it is not difficult to obtain a market price at any particular time. The gold market is very liquid with a large number of well-informed potential buyers and sellers active at any given time.

A contract was entered into for the transportation, security, insurance, and refining of doré gold bars from Touquoy, and doré is currently shipped to a customer for refining.

It is expected that doré produced from Beaver Dam, Fifteen Mile Stream and Cochrane Hill would be subject to similar contracts to that in place for Touquoy.

19.2 Commodity Price Projections

The financial analysis that supports Mineral Reserves uses a gold price of US$1,300 and an exchange rate of C$1 = US$0.75.

19.3 Contracts

In order to mitigate gold price risk, Atlantic Gold entered into margin-free gold forward sales contracts. The ounces associated with these forward gold sales contracts are delivered during production.

There are major contracts currently in place to support the Touquoy Mine operations, in addition to the refining contract. These contracts cover items such as bulk reagents, operational and technical services, process equipment maintenance support, earthworks projects, transportation and logistics, and administrative services.

Atlantic Gold may enter into additional operational contracts including, but not limited to, equipment maintenance and ore haulage between Touquoy and Beaver Dam, Fifteen Mile Stream and Cochrane Hill, depending upon operational requirements. These will be reviewed on a continual basis as the project moves forward. Contracts would be negotiated and renewed as needed. Contract terms would be in line with industry norms, and typical of similar contracts in Nova Scotia that Atlantic Gold is familiar with.

19.4 Comments on Section 19

The QP has reviewed the information provided by Atlantic Gold on marketing, contracts, and metal price projections, and note that the information provided is consistent with the source documents used, and that the information is consistent with what is publicly available on industry norms. The information can be used in mine planning and financial analyses in the context of this Report.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Permitting Status Summary

20.1.1 Touquoy

An Environmental Assessment Registration Document (EARD) was submitted to Nova Scotia Environment (NSE) in March 2007 for the Touquoy gold project, or what is now effectively known as the Touquoy Mine portion of the Moose River Consolidated Gold Operation. Subsequently an Environmental Focus Report was requested by the Minister of Environment and this was submitted in November 2007. Ministerial Environmental Approval for the then Touquoy gold project was granted in February 2008.

The three critical permits required to proceed to mine development, operation and reclamation are the Environmental Assessment Registration and Industrial Approval authorized pursuant to the Nova Scotia *Environment Act*, and the Mineral Lease mandated under the Nova Scotia *Mineral Resources Act*. Nova Scotia Environment (NSE) gave approval of the Environmental Assessment Registration for the Touquoy Mine on February 1, 2008, and granted an Industrial Approval to construct, operate and reclaim on March 24, 2014. Nova Scotia Department of Natural Resources (NSDNR; now NS Energy & Mines or NSEM) granted a Mineral Lease on August 1, 2011.

Other subsidiary and specific permits, including, but not limited to, wetland alteration, water withdrawal approval, public road reclamation and re-alignment, have been sought as required, and granted to allow the mine to proceed to production.

Atlantic Gold has obtained additional approvals through the applicable provincial regulatory processes, including an amended Industrial Approval. The Touquoy Gold Mine has been commissioned and reached commercial operation on March 1, 2018, as per its approvals.

20.1.2 Beaver Dam

The Beaver Dam Environmental Impact Statement (EIS) was submitted to the Canadian Environmental Assessment Agency (CEAA) and NSE on June 12, 2017. CEAA and NSE issued Information Requests (Round 1) in August 2017. A revised EIS was submitted by Atlantic Gold on February 28, 2019, and accepted by CEAA, meeting concordance with the Round 1 Information Requests.

The Beaver Dam, Cochrane Hill, and Fifteen Mile Stream properties are all subject to the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), based on a trigger of 600 t/d or more of production, and a Class 1 Environmental Assessment under the Nova Scotia *Environment Act*, to be conducted concurrently.

The environmental assessment review process concludes once the Environmental Assessment (EA) Report is issued by CEAA, and the Federal Minister of Environment issues a favorable EA decision statement based on this report that will include enforceable conditions. A simultaneous EA approval provided by the Province will then allow Atlantic Gold to apply for a Provincial Industrial Approval and Mineral Lease from NSE and NSDEM, respectively, which will allow it to construct, operate and reclaim the project.

Under the *Canadian Environmental Assessment Act* (1992) and its pursuant regulations, there were no triggers for a federal environmental assessment (EA) when the Touquoy Gold Project was reviewed in 2007. However, the Beaver Dam Mine Project requires federal EA approval, and associated changes to the Touquoy Gold Project at the Touquoy Mine as a result of the Beaver Dam Mine Project are being assessed through this federal EA process. They include:

- An increase in the duration of ore processing (approximately four additional years);
- Minor adjustments with the ore processing facility;
- Disposal of tailings from processing of Beaver Dam ore in the exhausted Touquoy open pit.

Due to the timing of the Beaver Dam ore being processed at the Touquoy site, the Beaver Dam tailings will not be stored in the Touquoy TMF, but instead will be permanently stored in the exhausted pit after the Touquoy gold deposit has been mined out. This allows the Touquoy Gold Project footprint to be maintained as currently permitted and no tailings management will be required at the Beaver Dam mine site. All other aspects of the Touquoy Gold Project will remain as assessed and approved through the Nova Scotia EA process in 2008.

Following the production period for the Beaver Dam Mine Project, reclamation would occur at the Beaver Dam mine site and at facilities associated with ore processing and tailings management at the Touquoy Mine due to processing Beaver Dam ore. Changes to the current reclamation plan for the Touquoy Gold Project, as a result of the Beaver Dam Mine Project, would require approval by the Province of Nova Scotia.

Following approval of the Beaver Dam Mine Project EA by CEAA and NSE, an additional three months' work is required to prepare and submit support documents for the Industrial Approval and other approvals such as water withdrawal for pit dewatering, and wetland and watercourse alterations. Preparation of some aspects of the Industrial Approval support documents will be undertaken concurrent with the EA review.

20.1.3 Fifteen Mile Stream and Cochrane Hill

Cochrane Hill and Fifteen Mile Stream were formally introduced before the One Window Committee, a joint committee of the NSE and the NSDNR (now NSLF and NSEM) in July 2017. Through the One Window Committee process, the projects were discussed with various Provincial and Federal regulatory agencies, each of which have the opportunity to identify potential legislated triggers for their review and possible "go-forward" involvement.

Baseline environmental studies in respect of the Fifteen Mile Stream Egerton–MacLean deposit commenced in June 2017 and were completed in October 2018 (16 months of seasonally-relevant data). Results will be incorporated into an environmental impact statement (EIS) to be submitted to Provincial and Federal regulators in Q2 2019, and to the public, for registration. Further baseline environmental studies will be targeted in future to support the development of the Plenty and Hudson deposits, which will be permitted and developed subsequent to the approval of the Egerton–MacLean deposit.

Baseline environmental studies in respect of the Cochrane Hill deposit commenced in 2015, re-initiated in June 2017, and were completed in fall 2018 (13 months of seasonally-relevant data). Results will be incorporated into an EIS to be submitted to Provincial and Federal regulators in Q3 of 2019, and to the public, for registration.

Studies completed in support of the Fifteen Mile Stream EIS are summarized in Table 20-1, and in Table 20-2 for the Cochrane Hill EIS.

The environmental assessment review process is completed when the environmental assessment decision statement with enforceable conditions is issued by the Minister. Once approval is received, then an Industrial Approval to Operate and grant of a Mineral Lease will be sought from NSE and NSDEM respectively.

20.2 Environmental Considerations/Monitoring Programs

20.2.1 Touquoy

Emissions from the Touquoy mine site activities during operations are currently monitored, reported, and treated in accordance with Provincial and Federal regulations and permit requirements.

The environmental assessment concluded a finding of no significant adverse effects on the environment arising from proposed project activities or accidental events. Potential adverse effects on valued environmental and socio-economic components are expected to be short-term and/or highly localised and can be effectively mitigated through the application of technically feasible mitigation and standard mining health, safety and environmental protection practices and procedures.

Table 20-1: Completed Studies in Support of Fifteen Mile Stream EIS

Breeding bird surveys	Fish surveys
Common nighthawk surveys	Assessment of potential watercourse re-routing options
Nocturnal owl surveys	Mainland moose surveys
Bird spring and fall migration surveys	Surface water assessments (quality and quantity) and surface water modelling
Winter wildlife and bird surveys	Surface to groundwater: temperature and drive point piezometers
Rare plant surveys	Groundwater monitoring program and 3D hydrological modelling
Butterfly surveys	Air dispersion modeling
Lichen surveys	Noise modeling to nearest receptors from the proposed mining operation
Bat hibernacula work (within study area) – evaluation of abandoned mine openings	Ambient noise and air baseline data collection, including total suspended particulates (TSP) and TM10
Wetland field delineation and functional assessment evaluations	Archaeological Phase I and II surveys
Identification of watercourses and likely fish habitat	Mi'kmaq ecological knowledge study (MEKS)

Table 20-2: Completed Studies in Support of Cochrane Hill EIS

Breeding bird surveys	Rare plant assessments
Common nighthawk surveys	Wetland field delineation and functional assessment evaluation
Nocturnal owl surveys	Identification of watercourses and likely fish habitat
Bird spring and fall migration surveys	Fish surveys
Winter wildlife and bird surveys	Surface water assessments (quality and quantity) and surface water modelling
Habitat surveys	Surface to groundwater: temperature and drive point piezometers
Wood turtle surveys	Groundwater monitoring program and 3D hydrological modelling
Winter moose surveys and spring moose survey	Ambient noise and air baseline data collection
Archaeological Phase I and II studies	Noise modeling to nearest receptors from the proposed mining operation
Bat hibernacula work (within study area) – evaluation of abandoned mine openings	Air dispersion modeling
Lichen surveys	Follow up archeological surveys
Butterfly surveys	MEKS

In the case of an open pit mining operation, potential effects of the environment on the Project include meteorological or climatic conditions, specifically precipitation. Major precipitation and runoff events may cause temporary delays in mine operation and rehabilitation activities.

20.2.2 Beaver Dam

Emissions from the Beaver Dam mine site activities during construction and operations will be monitored, reported, and treated in accordance with Provincial and Federal regulations and permit requirements.

As with Touquoy, potential effects of the environment on the project include meteorological or climatic conditions, specifically precipitation. Major precipitation and runoff events may cause temporary delays in mine construction, operation and rehabilitation activities.

20.2.3 Fifteen Mile Stream and Cochrane Hill

Emissions from the Fifteen Mile Stream and Cochrane Hill mine site activities during construction and operations will be monitored, reported, and treated in accordance with Provincial and Federal regulations and permit requirements.

As with the Touquoy Mine, potential effects of the environment include meteorological or climatic conditions, specifically precipitation. Major precipitation and runoff events may cause temporary delays in mine construction, operation and rehabilitation activities.

20.3 Water Management

20.3.1 Touquoy

Water Supply

Sources of water include mine dewatering operations, raw water from Scraggy Lake, precipitation including run-off and snowmelt and return water from the TMF. Raw water is drawn from a location at Scraggy Lake, approximately 2.6 km east of the process plant. The bulk of the plant water demand is drawn as a recirculating flow from the TMF pond. This is supplemented by plant site run-off which is collected in a pond at the south end of the plant site. Potable water is produced by a package water treatment plant or supplied from off-site sources.

Surface Water

Runoff from each of the active mine areas is directed into the tailings pond, primarily as a source of process water. Active mine areas include the open pit area, the mill site, the waste rock storage area and the TMF. Mine water from the open pit is pumped to the tailings pond.

Monitoring consists of surface water and groundwater stations throughout the site as prescribed by Conditions of Industrial Approval issued by NSE.

The surface water program determined baseline conditions prior to the start of mining development and provide long-term surveillance of surface water chemistry throughout the life of the operation. An annual monitoring report is provided to NSE. In addition, NSE receives copies of all surface water monitoring data reported to Environment and Climate Change Canada to satisfy requirements under the Metal and Diamond Mining Effluent Regulations (MDMER). The Erosion and Sediment Control Plan is adapted as needed to account for changes in site conditions, or considerations for what constitutes best practices in the view of both the proponent and the regulator.

The Environmental Assessment Approval requires the proponent to post a bond or carry insurance to ensure that, in the event of an incident affecting surface water quality the costs of clean-up and rehabilitation can be covered. This provision was in place prior to commencement of construction.

Groundwater Monitoring

The ongoing groundwater monitoring program provides long-term surveillance of water levels and water chemistry throughout the lifetime of the operation. Monitoring wells were first installed in March 2016. Groundwater quality monitoring began July 2016 and is currently ongoing. Each groundwater monitoring well nest has a shallow well in the upper fractured rock zone, and a deeper well in the less fractured bedrock aquifer. Selected wells are instrumented with water level data loggers to provide a continuous record of groundwater levels with data down-loaded at frequencies specified by the Conditions of Industrial Approval. The water level monitoring, and groundwater analytical testing at frequencies specified by the Conditions of Industrial Approval, detect changes in bedrock hydrogeochemical conditions.

The potential for groundwater contamination from the TMF is considered to be low. The groundwater table in the area is near surface which will inhibit inflow by maintaining a low flow gradient. In addition, the permeability of the tailings is quite low. Seepage volumes through the tailings dams are expected to be low, and any shallow seepage which does occur will be captured in collection ditches on the perimeter of the dam and pumped back into the pond. For this reason, the impact of seepage on groundwater quality is expected to be negligible and to date, the monitoring data support this prediction.

Groundwater Modelling Simulations

Prior to the development of the Touquoy pit and construction of the TMF, a conceptual model was developed for groundwater flow, and subsequently, a three-dimensional numerical base case model for the simulation of existing conditions was constructed. The base case model was used to construct a series of predictive simulations.

The first simulation was performed to evaluate the hydraulic influence of the dewatered pit on the larger-scale flow regime and to quantify groundwater inflow. Groundwater inflow to the open pit was predicted to be 517 m^3/day, which, based on current flow monitoring information, is reasonably accurate. Groundwater drawdowns greater than 1 m are predicted but are limited to an area close to the pit. The predicted groundwater drawdown beneath Moose River was between 0.5 m to 1 m. However, this is not anticipated to result in substantive changes to the water level in Moose River. Predicted decreases to baseflow in Moose River and a nearby tributary to Scraggy Lake were relatively small compared to the average flow in these water bodies. These predictions have been recently validated by groundwater and surface water monitoring results.

The second simulation was performed to evaluate potential changes to water quality in the receiving environment due to the disposal of tailings into the open pit. The simulated pit was filled with tailings to an elevation within the competent fractured bedrock. Two pit flooding scenarios were considered. Results from the transport simulations show that allowing the pit stage to reach ground surface results in groundwater drawdown to the west at Moose River on the order of 0.1 m to 0.5 m and base-flow reduction. The transport simulation predicts that solute will migrate quickly westward from the pit to Moose River with active groundwater flow via the more permeable glacial till and weathered bedrock. The relative concentration at Moose River is approximately 0.5 of the source concentration of 1.0 in less than 1.5 years. Detectable changes to water quality in Moose River are possible in this case.

Simulations conducted maintaining the pit as the local hydraulic low show similar groundwater drawdown and changes to river baseflow as the fully-dewatered pit scenario. However, the hydraulic containment of pit water limits the transport mechanism of solute away from the pit. Relative concentrations in Moose River are predicted to be less than 1×10^{-9} of the source concentration of 1.0 for more than 15 years, increasing to approximately 1×10^{-6} of the source concentration of 1.0 after approximately 150 years. Potential changes to water quality in Moose River are not anticipated in this case.

The results show that hydraulic containment could be used to mitigate the potential release of contaminants from the open pit. However, the potential risk associated with solute migration depends on the source concentrations, fate and transport mechanisms, and the regulatory water quality guidelines for individual contaminants in the receiving freshwater environment.

The presence of preferential pathways, such as fractures and faults, not observed or characterized in previous field efforts could have implications for managing inflows and the migration of solutes from the pit into the receiving environment. This has been considered in the development of management, mitigation and contingency plans.

The groundwater modelling of the Touquoy Pit based on updated pit tailings disposal scenarios, as well as the most recent hydrogeologic and hydrogeochemical data base has been completed. The CEAA and NSE requested that the modelling be completed following their review of the EIS prepared for Beaver Dam. This modelling has determined that treatment for arsenic is predicted to be required for discharge during post-closure when the pit fills with water and an overland drainage channel is established with the Moose River. This prediction is based on source terms that have been developed based on very conservative assumptions. On-going source term refinement is underway and modelling updates will be completed to confirm conclusions relating to the need for water treatment during post-closure.

20.3.2 Beaver Dam

Surface Water and Groundwater

Surface water monitoring stations were established at seven locations in 2014 and are sampled monthly with the program continuing until September 2015. Additional surface water sampling was completed at nine locations in 2018 and sampling continues in 2019. Water chemistry analyses for a select group of parameters, as well as surface flow and water level data have been collected and evaluated. Water quality chemistry shows exceedances in the CCME Canadian Water Quality Guidelines for Protection of Aquatic Life (CCME WQG-PAL) guidelines for aluminium, arsenic and iron in baseline samples.

A groundwater monitoring network was established during 2018 that involved a total of 49 nested monitoring wells. Hydrogeologic testing and sampling / chemical analyses were conducted on each well to establish groundwater baseline conditions for the site and to support groundwater modeling efforts.

Surface water runoff will be directed to settling ponds where water will be treated prior to release to the environment and/or used for dust suppression at the site.

A settling pond system exists at the site that was used, and successfully met regulatory requirements, for site runoff treatment during advanced exploration and development of a mine portal in the late 1980s. This pond is located within the footprint of the future open pit. Preliminary design has been completed for a revised settling pond system for the waste rock and overburden stockpiles surface water collection and management.

Settling ponds will be reclaimed following the cessation of mining and rehabilitation. Site monitoring will consist of a network of surface water and groundwater stations throughout the site in consultation with NSE and in accordance with future permits.

The current surface water and groundwater monitoring programs are ongoing and will determine baseline conditions prior to the start of mining development and provide long-term surveillance of water chemistry and other parameters throughout the lifetime of the operation. “Background” conditions will be monitored outside of the influence of the settling pond facility and open pit that will be monitored on the same frequency as the other monitoring stations.

An Erosion and Sediment Control Plan will be adapted as development proceeds to account for changes in site conditions, changes in the development schedule or considerations for what constitutes best practices in the view of both the proponent and the regulator. Nova Scotia has required proponents to post a bond or carry insurance to ensure that, in the event of an incident affecting surface water quality, the costs of clean-up and rehabilitation are accounted for. Provisions for the bond are included in the project costs.

Annual reports will be issued to NSE and Environment and Climate Change Canada (ECCC) to satisfy MDMER and NSE regulations and permit conditions. These programs and requirements are well understood by Atlantic Gold, and there are available resources in Nova Scotia to support the sampling, analytical testing and data interpretation needs of the regulators.

Groundwater Modelling

A three-dimensional groundwater model was developed to evaluate interactions between the groundwater flow and surface water flow regimes in terms of flow quantity at and surrounding Beaver Dam while mining operations occur and following reclamation. The groundwater flow model also will be used as a predictive tool to aid in evaluating/designing measures to mitigate potential reductions in groundwater/surface water flows caused by mining operations. The groundwater flow model was identified as required additional information by the CEAA and NSE following their review of the EIS prepared for Beaver Dam which was submitted in June 2017. To aid in the development of the model, a series of shallow and deep groundwater monitoring wells were installed at or near the mine site. Hydrogeological testing and groundwater elevation data were collected. Surface water stations have been established to measure elevations and flow in adjacent and nearby water bodies.

Modelling predictions conclude that water treatment may be required during operations and post closure at the Beaver Dam Mine site prior to discharge to the Killag River, in order to meet MDMER requirements and appropriate regulatory criteria in the receiving environment. Groundwater seepage is predicted from mine infrastructure towards Crusher and Mud Lake, and the Killag River. On-going source term refinement is underway and modelling updates will be completed to confirm conclusions relating to the need for water treatment.

20.3.3 Fifteen Mile Stream and Cochrane Hill

Water Supply

Sources of water for Fifteen Mile Stream and Cochrane Hill will include mine dewatering operations, precipitation including run-off and snowmelt, reclaim water from the TMF and raw water. The bulk of the Plant Site water demand at both sites will be drawn as a recirculating flow from the TMF supernatant pond.

Supernatant pond water will consist of direct precipitation on the pond, runoff from the tailings beaches and embankments, tailings bleed water, and recycled seepage flows. This will be supplemented by site contact water and open pit dewatering flows, which will be collected in a system of collection ponds and pumped to the TMF supernatant pond.

Raw water for Fifteen Mile Stream will be drawn from a location at Seloam Lake, approximately two km north of the process plant. Raw water for Cochrane Hill will be drawn from a location at Archibald Lake, approximately 4 km southeast of the process plant.

Potable water for both sites will be produced by package water treatment plants and/or shipped to the sites via water tankers.

Surface Water

The landscape in the Fifteen Mile Stream project area is characterized by undulating to rolling topography, wetlands and woodlands dissected by a few lakes and streams. The project site is situated to the east of Provincial Highway 374 and the Fifteen Mile Stream watercourse, which runs approximately parallel to Provincial Highway 374 in the study area. Seloam Lake is a man-made reservoir (sometimes called Sloane Reservoir) that bounds the northern margin of the study area. Seloam Lake is drained by Seloam Brook, which runs through the project area and drains west to its confluence with Fifteen Mile Stream. Seventeen Mile Stream combines with Fifteen Mile Stream several kilometers upstream of the confluence with Seloam Brook. Fifteen Mile Stream is a tributary of the East River and forms a component of the Provincial hydroelectric system in Nova Scotia, specifically the East River Sheet Harbour Hydro System. Fifteen Mile Stream is regulated by the flow control structure at the Anti Dam Flowage (sometimes called Anti Dam Reservoir) located to the south of the project site. The proposed mine facilities will be located entirely within the drainage area of the Anti Dam Flowage and will be confined by natural topography to the west.

The proposed Egerton–MacLean open pit will lie below Seloam Brook, which will necessitate diversion of Seloam Brook around the open pit limits prior to commencement of mining. Multiple berm alignments were investigated to divert Seloam Brook around the open pit. Seloam Brook will be re-routed into a permanent constructed stream diversion approximately 1,500 m long. The berm has been designed with a 20 m crest width and 2H:1V side slopes. The preliminary route design avoids existing fish habitat as much as practical, and requires construction of a perimeter berm, approximately 1,500 m in length. The currently-proposed berm alignment and crest elevation sufficiently realigns and diverts flows from a one-in-200 year, 24-hour precipitation event away from the mine working areas.

The one-in-200 year, 24-hour precipitation event that was evaluated results in overbank flows for the natural stream channels. The maximum depth of water as a result of this storm event is approximately 1.35 m, which still leaves a minimum of 1.0 m freeboard along the entire berm alignment.

It is recommended that the berm ties into the existing road on the eastern side and that the road is at an elevation equivalent to that of the berm (117.0 masl). It is also recommended that the berm be lined with riprap along its entire length, considering that the storm water is in contact with the berm along almost the entire length. The maximum velocities along the berm during the one-in-200 year, 24-hour precipitation event are in the range of 0.5–0.7 m/s. Critical areas along the berm that may experience these maximum velocities and may require additional bank protection from erosion include the location where the berm ties into the existing road on the eastern side, the middle section of the berm directly north of the planned Egerton–MacLean open pit, and the western section of the berm immediately prior to the divide in the natural Seloam Brook.

Contact water runoff from the active mine areas will be collected and conveyed to the supernatant pond in the TMF and reused as a source of process water. If runoff complies with applicable water quality criteria, it will be discharged from the site to minimize water accumulation within the TMF.

The open pits will be dewatered by pumping to a collection pond, located at the toe of the ore stockpile. Runoff from the waste rock and till stockpiles, ore stockpile, open pits and site roads will be managed with collection channels and sediment settling basins and ultimately routed to a system of collection ponds. Contact water collected in these ponds will be pumped to the TMF supernatant pond.

Seepage from the TMF and runoff from the TMF embankment will be captured in the seepage collection ditches beyond the ultimate footprint of the embankment. Water will be conveyed to two seepage collection ponds, located downstream of the embankment along the northern and eastern toe of the embankment, and pumped back to the TMF supernatant pond during operations and closure until water quality is suitable for release to the downstream receiving environment. Surplus water will be pumped from the TMF to maintain freeboard within the facility. If the effluent quality does not meet applicable water quality criteria, the surplus water will be pumped to an effluent treatment plant (ETP), to be located near the proposed process plant, and treated water will be discharged to Anti Dam Flowage, located to the south of the project site, via a gravity discharge pipeline.

Baseline surface water and surface water to groundwater interaction data collection, suitable for final design requirements is underway and will continue through 2019. Surface water monitoring locations have been established and initial baseline information will inform any future surface water monitoring program. Fourteen surface water locations have been established at Fifteen Mile Stream, which are being sampled for quality and quantity quarterly.

The landscape in the Cochrane Hill project area is characterized by a gentle hillslope covered with areas of forest and some deforested areas. The project site is situated to the east of Provincial Highway 7, south of Melrose Country Harbour Road, and west of Indian River Road. The project facilities will be located entirely within the drainage area of McKeen Brook or its tributaries, which wraps around the northern and eastern sides of the project area. The project will be confined by topography to the south with the proposed open pit, ore stockpile, and mill site occupying the higher ground near the catchment divide.

Runoff from the active mine areas will generally flow towards the north and be directed to water management ponds around the mine site. Active mine areas will include the open pit area, mill site, waste rock and till stockpiles and the ore stockpile. Water from these areas will be directed to the supernatant pond within the TMF to be reused as a source of process water. Runoff downstream of the TMF will flow towards Cargill Lake. If runoff complies with applicable water quality criteria, it will be discharged from the site to minimize water accumulation within the TMF.

Surplus water will be pumped from the TMF to maintain freeboard within the facility and to prevent surplus water accumulation within the TMF supernatant pond. Surplus water from the TMF will be treated at an ETP, to be located near the plant site, and discharged from the site to Archibald Lake via a discharge pipeline.

Runoff from the waste rock and till stockpiles will be captured with perimeter collection ditches and treated in runoff collection ponds. If runoff complies with applicable water quality criteria, it will be discharged from the site to minimize water accumulation within the TMF. Water return pumps and pipelines are included at each collection pond to allow water to be conveyed to the TMF supernatant pond.

Seepage from the TMF and runoff from the TMF embankment will be captured in the seepage collection ditches beyond the ultimate footprint of the embankment. Water will be conveyed to two seepage collection points downstream of the embankment and pumped back to the TMF during operations and closure until water quality is suitable for release to the downstream receiving environment.

A dedicated ETP has been included for removal of arsenic, other metals, solids, and pH adjustment prior to discharge, if required.

Baseline surface water and surface water to groundwater interaction data collection, suitable for final design requirements has commenced and is scheduled to continue through 2019. Surface water monitoring locations have been established and initial baseline information will inform any future surface water monitoring program. Nineteen surface water locations have been established at Cochrane Hill, which are being sampled for quality and quantity quarterly.

An Erosion and Sediment Control Plan will be adapted for each of Fifteen Mile Stream and Cochrane Hill as development proceeds to account for changes in site conditions, changes in the development schedule or considerations for what constitutes best practices in the view of both the developer and the regulator. Nova Scotia has required proponents to post reclamation bonds and to carry insurance to ensure that costs are covered in the event of an accident or malfunction affecting surface water quality, including the costs of clean-up and remediation. Provisions for these costs are included in the project costs.

Annual and other periodic reports will be issued to Environment and Climate Change Canada and NSE to satisfy requirements under the MDMER and requirements under NSE Industrial and other approvals. These programs and requirements are well understood by Atlantic Gold, and there are available resources in Nova Scotia to support the sampling, analytical testing and data interpretation needs of the regulators.

Groundwater

Hydrogeologic programs have commenced at Fifteen Mile Stream. A series of 27 multilevel groundwater monitoring wells have been installed across the site. The wells are being tested and monitored to characterize hydrogeological conditions and sampled to characterize the groundwater chemistry. Surface water stations have been established to measure elevations and flow in adjacent and nearby water bodies. The collected data are being used and incorporated into a three-dimensional groundwater model that has been developed for the site using FEFLOW and used as a predictive tool for the purpose of facility design and to predict and assess potential surface water and groundwater interaction. In particular, the model will be capable of predicting potential changes to receiving environment water quality due to groundwater transport and site operations. The current 3D groundwater model constructed for the EIS represents a 12 km by 7 km area around the project focused on the Egerton–MacLean pit defined for the EIS. The maximum extent of the radius of influence of the open pit in this model is 630 m. An additional nine monitoring locations are proposed to support monitoring activities during operations and closure phases.

Hydrogeological programs have commenced at Cochrane Hill. A series of multilevel groundwater monitoring wells have been installed across the site. The wells will be tested and monitored to characterize hydrogeological conditions and sampled to characterize the groundwater chemistry. Surface water stations have been be established to measure elevations and flow in adjacent and nearby water bodies. The collected data will be used and incorporated into the three-dimensional groundwater models that will be developed for the sites and used as a predictive tool for the purpose of facility design and to predict and assess potential surface water and groundwater interaction. In particular, the model will be capable of predicting potential changes to receiving environment water quality due to groundwater transport and site operations.

20.4 Air Quality

20.4.1 Touquoy

An Emissions Summary (ES) and Dispersion Modelling (DM) assessment was conducted as part of the Environmental Assessment for Touquoy. It assessed potential air releases to the atmosphere and their impact on the surrounding receptors in support of a Class 1 Environmental Assessment under the Nova Scotia *Environment Act* and Environmental Assessment Regulations. The Ontario Air Compliance Regulation O. Reg. 419/05: *Air Pollution - Local Air Quality* was used to guide dispersion modelling and will continue to inform the monitoring effort. The maximum ground level concentrations for each air contaminant examined were predicted to be below the established limits.

Significant project-related effects on air quality were predicted to be unlikely to occur during construction and operation in consideration that appropriate mitigative action is applied, particularly to dust generation.

Annual air quality monitoring began in August 2017 at the Touquoy Mine in accordance with the Conditions of Industrial Approval and are on-going. The predictions of low significance regarding project-relating effects on air quality have been confirmed to date based on the results of the air quality monitoring programs.

Mitigative measures to minimize particulate emissions include wet/chemical suppression controls, speed reductions for vehicular traffic, and slope stabilization for WRSFs.

20.4.2 Beaver Dam

Air emissions were evaluated in the EIS.

Concentrations of operational dust at residential receptors are predicted to be below criteria, which the exception of an exceedance at one receptor at the west end of the haul road near Mooseland Road (2% of the time for particulate matter <10 µm or PM10). When background air concentrations are included, the cumulative total of total suspended particulates (TSP), PM10 and particulate matter <2.5 µm (PM2.5) showed no exceedances over guidelines with the exception of the same receptor at the west end of the haul road (TSP and PM10) and a single sensitive receptor located along Beaver Dam Mines Road (PM10).

Based on the air emission modelling, the concentrations of products of combustion (SO_2, NOx, and volatile organic compounds or VOCs) were screened out. Predicted concentrations of these compounds from the truck traffic on the haul road were at least an order of magnitude lower than relevant air quality criteria.

Concentrations of operational dust at the property boundary at the haul road are predicted to be above criteria (predicted with 75% effective dust mitigation measures in place along the haul road). Metals could be released from dust deposition along the haul road and have the potential to accumulate in soils, and thus vegetation. Risk analysis by the project team has concluded that it is unlikely that dust deposition from the haul road at the rates considered in this assessment will result in levels of metals in berries and leafy vegetation that would be harmful to human health, if consumed.

Further air quality monitoring may be required as part of permitting conditions. Mitigative measures are expected to be similar to those used at the Touquoy Mine.

20.4.3 Fifteen Mile Stream

It is anticipated that future air quality monitoring and management requirements at Fifteen Mile Stream will be similar to Touquoy. Baseline ambient air samples for TSP, PM10 and baseline metals (arsenic and mercury) were collected at two locations near the Fifteen Mile Stream site in November 2017 and data collected from Seal Harbour (70 km east of Fifteen Mile Stream) in 2004 was used for PM2.5, NO_2 and SO_2 baseline conditions.

Air dispersion modelling utilizing AERMOD was completed to predict concentrations of SO_2, NO_2, and TSP and PM10 in support of preparation of the EIS. Preliminary modelling results indicate that concentrations of all parameters will comply with NS Ambient Air Quality Guidelines and CCME Canada Wide Standards at the proposed EIS property boundary with consideration of mitigation of twice daily dust suppression when required. A preliminary Dust Management Plan and other management planning are currently underway to support the EA process for the site.

The extended resource will require further air modelling and management planning for this site.

20.4.4 Cochrane Hill

It is anticipated that future air quality monitoring and management requirements at Cochrane Hill will be similar to Touquoy. Baseline data collection occurred in 2018 and air dispersion modelling and management planning are currently underway to support the EA process for the site.

20.5 Noise

20.5.1 Touquoy

A complete Acoustic Assessment Report was completed for Touquoy as part of the Environmental Assessment, where sound level impacts were compared to the Nova Scotia Guidelines for Environmental Noise. Predicted ground vibrations are expected to be below the NSE criteria of 12.5 mm/s. Ground vibration monitoring data collected since 2016 indicate that the operation is well within this criterion.

Blasting event monitoring commenced with the construction of the Touquoy Mine, and will continue throughout operation when blasting activities occur. The predicted noise levels at the property boundaries of the Touquoy Mine site are well within the NSEL sound level limits for daytime and evening timeframes and are acceptable within the proposed hours of operation (no overnight trucking).

Noise emissions were predicted to meet the requirements outlined in the NSE Pit and Quarry Guidelines, 1999, as well as the Guidelines for Environmental Noise Measurement and Assessment, 1990. There have been no noise complaints from the general public from the Touquoy Mine.

20.5.2 Beaver Dam

Acoustical models were developed for the EIS to estimate predicted noise impacts. The model provided an order of magnitude estimation for predicted noise from both mining activities and haul road activities. An estimated worst-case facility sound level measurement for a one-hour period was estimated for each receptor.

The highest predicted noise levels at the property boundaries of the Beaver Dam Mine Site exceed the criteria outlined in the NSE Pit and Quarry Guidelines (1999) for all time periods. While the limits stated in these guidelines are clear and specific, they are not considered practical for open pit mines which do not have operations located in close proximity to residential receptors (in the case of Fifteen Mile Stream mine site, the nearest residence is more than 4 km distant). Mitigation of these noise excesses is not considered to be critical, as the predicted noise levels at the worst-case points of reception (residential receptors) are within the applicable limits.

The predicted noise levels at the property boundary of the haul road are variable based on topography; however, 60 dBA (the evening limit) is the average noise levels from 20 to 40 m from the centerline of the road and the values attenuate to 55 dBa (the overnight limit) at less than 70 m from the center of the haul road.

Further monitoring, especially of blasting events, will be required during construction and operation and specific monitoring programs will be further developed during the permitting process.

20.5.3 Fifteen Mile Stream

Baseline noise monitoring was completed in November 2017. Noise predictions were modelled for the EIS using noise sources for the current EIS infrastructure layout and a predicted 20 Mt of mined out materials. Based on this modelling, Pit and Quarry Guidelines noise thresholds will be met at the property boundaries.

It is anticipated that future noise emission monitoring and management for the Fifteen Mile Stream Mine would be similar to those in place for the Touquoy Mine and planned for the Beaver Dam Mine.

20.5.4 Cochrane Hill

It is anticipated that future noise emission monitoring and management for the Cochrane Hill would be similar to those in place for the Touquoy Mine and planned for the Beaver Dam Mine. Baseline data collection was completed in 2018 and noise modelling and management planning is currently underway to support the EA process for the site.

20.6 Wetlands

Wetlands in Nova Scotia are protected under the following policies and regulations and require a permit to alter: Wetland Conservation Policy (2011); the *Environmental Goals and Sustainable Prosperity Act* (EGSPA 2007); and, the *Environment Act* (1994) and its Activities Designation Regulations (1995).

Wetland management includes three key plans to be prepared by the Proponent once EA approvals are received: the Wetland Monitoring Plan, the Wetland Protection Plan, and the Wetland Compensation Plan. The Wetland Monitoring Plan outlines the methods used to evaluate remaining wetlands and portions of wetlands not altered by infrastructure but exist down-gradient or near the project infrastructure. The purpose of the Wetland Protection Plan is to provide an overview of methods by which wetlands existing within the project area, adjacent to the development area and down-gradient of the development area are protected from inadvertent disturbance and alteration. The Wetland Compensation Plan includes annual surveys of the project site to identify land areas disturbed as a result of project related activities. An annual update is normally submitted to NSE indicating actual areas of wetland altered over the calendar year and projected to be altered for the upcoming year.

Annual reports related to wetland monitoring will include information on actual area of wetland altered for the current year, a schedule of alteration expected in the upcoming year and updates regarding wetland compensation efforts, options, methods, and work being undertaken to satisfy compensation requirements.

20.6.1 Touquoy

Atlantic Gold has received approval (Nova Scotia Environment Approval No. 2016-095967-01 2016-097587, and 2016-095811) to alter 55.86 ha of wetland habitat associated with the Touquoy Mine. Most of the wetland alterations will be occur over the first four years of the project (2016 to 2019). The wetland protection plan for Touquoy was developed throughout the permitting and approval process and details are included in the Environmental Effects Monitoring Plan submitted to NSE in August 2017. A Wetland Monitoring Program is currently being implemented to ensure that unaltered wetland habitat remains viable, and presents healthy wetland characteristics throughout the lifetime of mine operations. Wetland compensation has been implemented to satisfy the 2016 Touquoy mine wetland alterations and a portion of the 2017 wetland alterations in consultation with NSE. Planning to meet remaining 2017 and 2018 wetland compensation requirements is underway.

Atlantic Gold will continue to work with the NSLF and NSE to develop the required measures including wetland compensation to mitigate the loss of habitat based on function and relative value. Assuming that the proposed compensation and mine site reclamation mitigation measures are applied, and that existing site drainage conditions are maintained, the project is not likely to have significant adverse effects on wetland functional attributes in the area.

20.6.2 Beaver Dam

Identification and evaluation of wetlands were conducted at the Beaver Dam site as part of ecological baseline studies conducted in 2015 and 2016 and further work was completed in 2018 to support Information Requests from CEAA and NSE. Wetland locations informed the siting of mine infrastructure to the extent possible to minimize potential wetland impacts. Wetland alterations will be required during construction and operation of the Beaver Dam Mine. Wetland Alteration Applications will follow as part of the permitting process and wetland monitoring and management will be ongoing throughout the life of the mine.

20.6.3 Fifteen Mile Stream and Cochrane Hill

Identification and evaluation of wetlands were undertaken as part of baseline ecological surveys across the Fifteen Mile Stream and Cochrane Hill project areas. Micro-siting of mine infrastructure has been ongoing, and efforts are being made to avoid wetland habitat wherever possible and practicable. Some wetland losses are expected, but will be minimized wherever possible. Permitting will be completed once the environmental assessment is approved. Wetland alterations will be required during construction and operation of the Fifteen Mile Stream and Cochrane Hill Mines. Wetland Alteration

Applications will follow as part of the permitting process and wetland monitoring and management will be ongoing throughout the life of the mine.

20.7 Ore Stockpiles and Waste Rock Storage Facilities

Ore stockpiles are discussed in Section 16.5; however, ore stockpiles will be progressively reclaimed throughout the mine life. Reclamation will see the remaining footprint area re-vegetated.

Reclamation will see any remaining stockpile material contoured to blend with the natural landscape and re-vegetated.

WRSFs as required for each mine will be progressively re-vegetated, where practicable, to enhance soil stability and minimize sediment transport. Additional specific environmental mitigation plans include:

- Environmental Protection Plan (EPP) prior to construction;
- Erosion and Sedimentation Plan for construction, operation and decommissioning;
- Hazardous Materials Management Plan;
- Emergency Response Plan;
- Environmental Effects Monitoring Plan.

20.8 Tailings Management Facilities

20.8.1 Touquoy

The TMF is located southeast of the Touquoy process plant. The TMF complex includes a tailings pond, WRSF, polishing pond, a constructed wetland and associated facilities (Figure 20-1). Design assumptions for the TMF are summarized in Table 20-3.

The TMF at Touquoy includes the following major facilities:

- Tailings pond;
- ETP;
- Polishing pond;
- Constructed wetland.

The tailings pond is formed by a ring dam constructed with a clay core and rockfill shell. Tailings from the mill will be distributed by pipeline throughout the pond area. Water collected in this pond will be reclaimed and used for various mill processes or treated and released to the environment.

Figure 20-1: Touquoy TMF Layout Plan

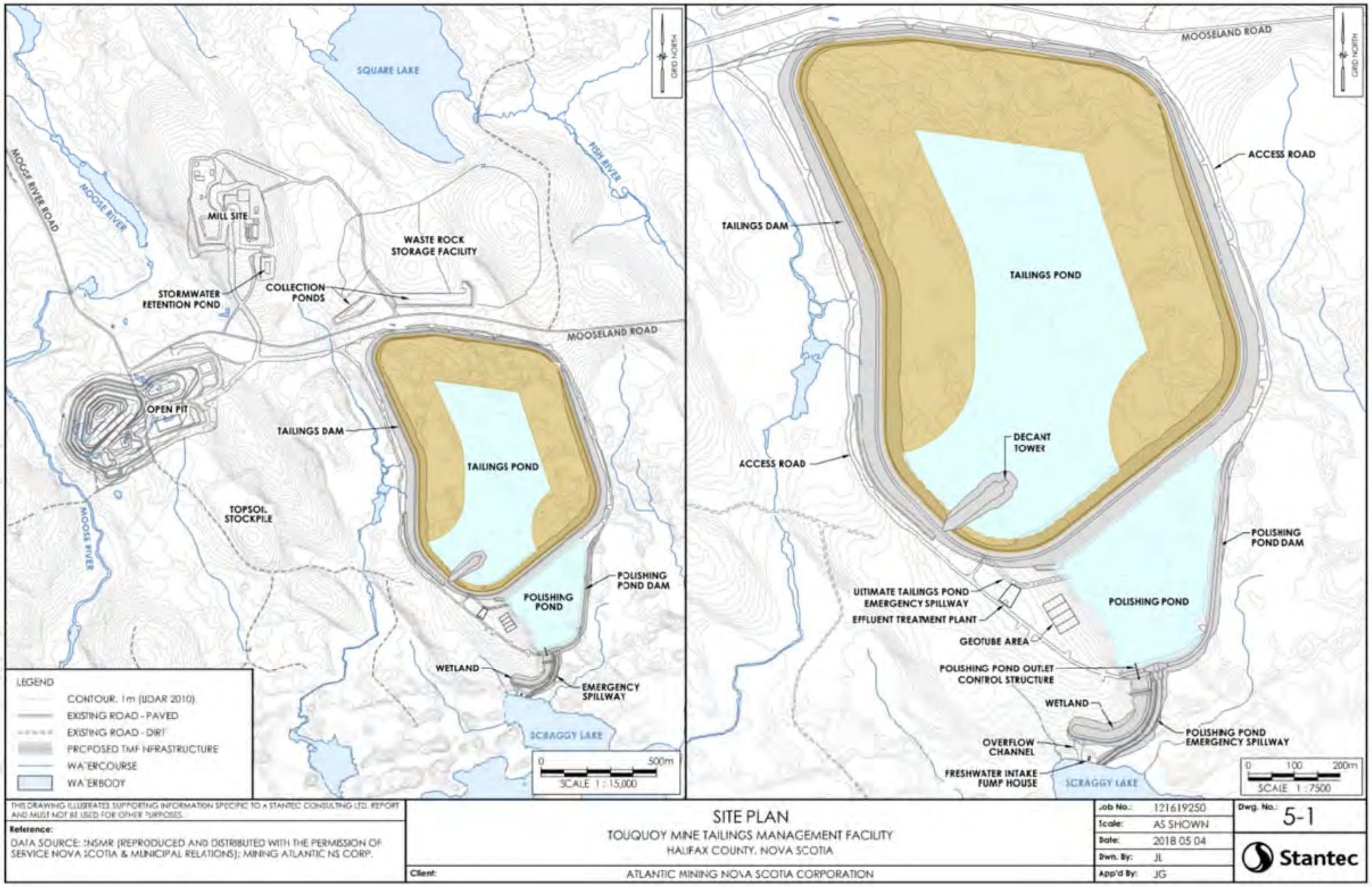


Table 20-3: TMF Design Parameters

Item	Value
Tailings tonnage	9,300,000 t
Deposition method	Sub-aerial spigot/end spill
Slurry discharge rate (water volume)	7,263 m^3/d
Tailings water reclaim rate	6,845 m^3/d
Mill freshwater make-up	399 m^3/d
Tailings slurry solids fraction	43 %
Specific gravity	2.86
Void ratio (design)	1.0
Deposited dry density (design)	1.49 t/m^3
Storage volume required (design)	6,300,000 m^3
Tailings pond upstream slope	2.5H:1V
Tailings pond downstream slope	1.8H:1V

Dedicated effluent treatment systems are required for Touquoy that involve initial upstream treatment for cyanide and arsenic in the process plant and then a downstream dedicated effluent treatment plant (ETP). The effluent treatment systems utilize proven treatment processes to handle feed concentrations of up to 2 mg/L As, 2 mg/L Fe, 1 mg/L total CN and 100 mg/L total suspended solids and are designed to meet applicable effluent requirements and regulations. The dedicated ETP reduces arsenic and other metals to acceptable levels in the aged tailings water discharging from the tailings impoundment. The system also removes suspended solids and adjusts the pH of the effluent as required. The ETP treats a nominal/peak flow rate of 350/450 m^3/h and treats a typical volume of 1.5 Mm^3 annually. This is based on a predicted and observed excess water balance around the TMF.

The treatment process flow involves the discharge of treated effluent from the ETP into dedicated geotubes which act to store precipitated arsenic and other minor metals for either onsite or offsite disposal. The clarified supernatant flow from the geobags is by gravity to the polishing pond for settling and release to the receiving environment (Scraggy Lake) via a constructed wetland.

The polishing pond is formed by a clay-core, rock fill dam that abuts the main tailings pond dam and natural topography. Effluent from the ETP is held in the polishing pond prior to the treated water being discharged via the constructed wetland into Scraggy Lake. It is also possible to reclaim water from this pond for further use in the processing plant.

Historic tailings that are disturbed during mining operations are removed, transported, and permanently stored within an engineered containment cell constructed with clay in the northwest end of the TMF.

A dam safety management system has been put in place with regular dam safety inspections and a dam safety review in Year 5.

Geochemical testing of waste rock, marginal ore and tailings effluent was completed by Golder (2007). Results from the static and kinetic testing indicated that the tailings and waste rock were not acid generating. This has since been confirmed by a test program implemented during operations.

20.8.2 Beaver Dam

There is no requirement for a TMF at Beaver Dam. The Beaver Dam development and mining plan requires only the construction of an open pit, WRSFs and surface support facilities. The ore will be crushed to optimal size for transport to the Touquoy Mine and thus there is no requirement for tailings ponds at the Beaver Dam site. Tailings will be disposed of in the mined-out Touquoy pit, which will then be reclaimed as a lake as per the existing Touquoy Reclamation Plan.

20.8.3 Fifteen Mile Stream

The embankment design section for Fifteen Mile Stream is generally consistent with the final design that was constructed at Touquoy, which allows the information gathered during construction of the Touquoy facility to be utilized in the estimates for the 2019 Pre-Feasibility Study.

Preliminary geochemical testing and characterization has been completed for waste rock and tailings materials for the Fifteen Mile Stream project. The Fifteen Mile Stream tailings are predicted to be NPAG under beached and subaqueous conditions. Geochemical characterization of waste rock from the open pit estimates that approximately 40% of the waste rock will be classified as PAG with the remainder being classified as NPAG. PAG waste rock will be stockpiled to the south of the Egerton–MacLean open pit, while NPAG waste rock will be used for TMF embankment construction in combination with till material from local borrow sources. The remainder of the NPAG waste rock will be stockpiled close to the open pit, in a separate stockpile to the PAG waste rock. Further waste rock static and kinetic testing on construction materials is underway to demonstrate the quantiles of NPAG waste rock and their suitability for TMF embankment construction.

A total of 16.8 Mt of ore will be milled during the Fifteen Mile Stream LOM to produce a concentrate for shipment to Touquoy. The milling process will produce tailings, which will be disposed of in the Fifteen Mile Stream TMF. The tailings slurry will be conveyed to the TMF by pipeline and deposited on a subaerial tailings beach from discharge points located along the embankment crest and interior tailings distribution causeway.

Several TMF site options were considered during preparation of the 2019 Pre-Feasibility Study. The selected TMF option is located to the east and up-gradient of the proposed open pit and is situated in a position that limits impacts to wetlands and streams frequented by fish to the maximum practical extent. The TMF positioned in this manner allows the mine facilities to be clustered upstream of the open pit and simplifies surface water and groundwater management requirements for the mine site.

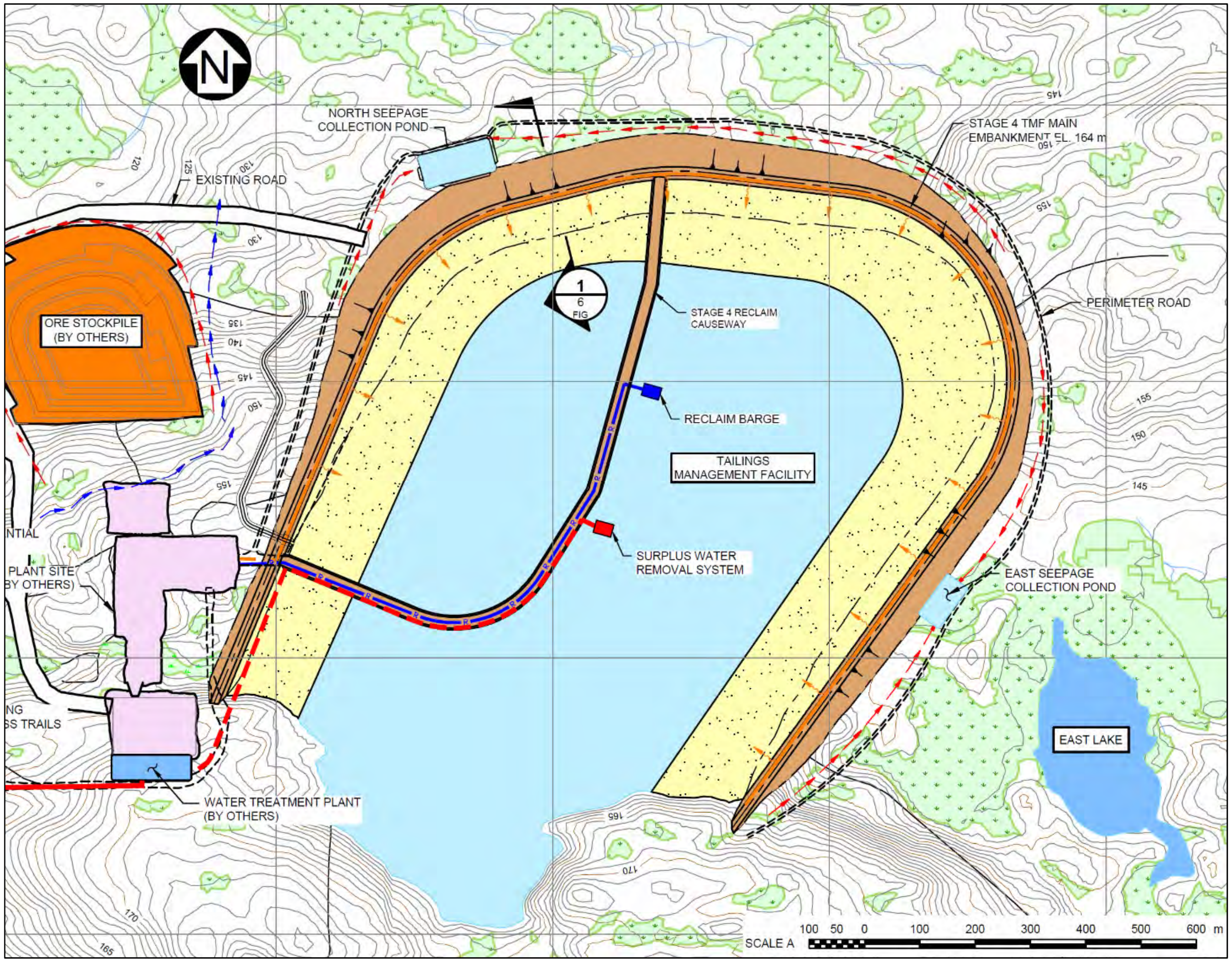
The TMF embankment staging for the 2019 Pre-Feasibility Study was based on the following assumptions:

- Average tailings settled dry density of 1.3 t/m^3;
- Operational supernatant pond allowance of 800,000 m^3;
- Environmental design flood (EDF) storage allowance of 640,000 m^3;
- Inflow design flood (IDF) of 1/3 between the 1/1,000-year return period precipitation event and the Probable Maximum Flood (PMF) event will be passed through the TMF spillway;
- Sufficient capacity at start-up for one year of tailings storage and supernatant water;
- Three downstream step-outs and staged raises of the embankment occurring during Years 1, 3 and 6 of operations;
- Waste rock and overburden used for TMF embankment construction are assumed to be NPAG and appropriate for use as construction materials.

The tailings mass will consolidate, and water trapped in the tailings voids will be released over time as the pore pressures generated during deposition dissipate. A higher final settled dry density of the tailings is reasonable to expect; however, no reliance on a density increase was assumed in the TMF staging. Geotechnical testing of the tailings, including consolidation testing, is presently underway.

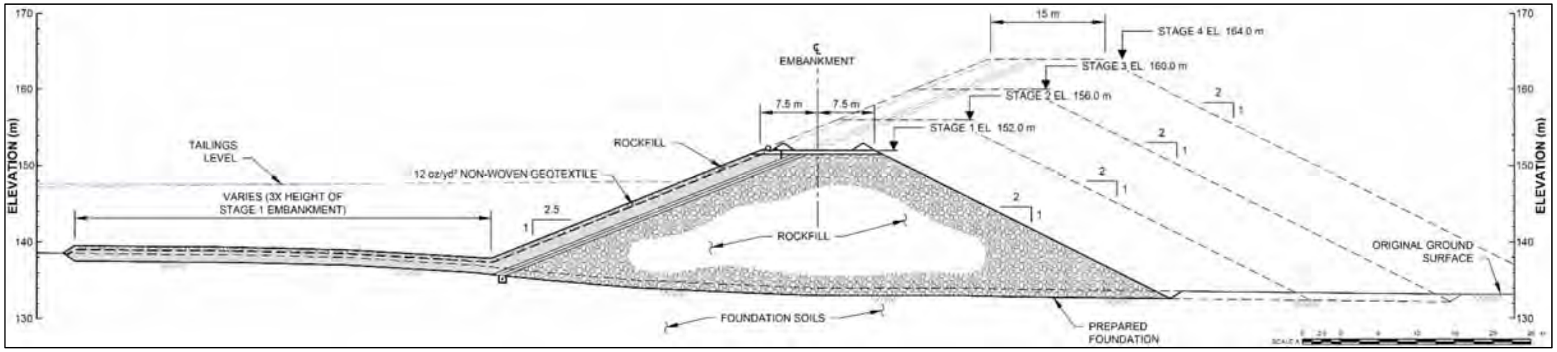
The TMF will be contained on three sides by a continuous embankment and on one side, to the south, by natural ground as shown on Figure 20-2. A rockfill causeway, raised with the accreting tailings mass, will separate the facility into two cells to increase filling efficiency and allow for positioning of the reclaim water pumps and pipeline. The TMF embankment is designed as an earthfill-faced rockfill embankment with appropriately graded filter and transition zones. Figure 20-3 is a cross-section showing the dam design.

Figure 20-2: Fifteen Mile Stream TMF Layout Plan



Note: Figure prepared by Knight Piésold, 2019.

Figure 20-3: Cross-Section Fifteen Mile Stream TMF Design



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The Stage 1 embankment will be 20 m high in maximum section and requires approximately 1.1 Mm^3 of material to construct. Approximately 970,000 m^3 of pit run rockfill will be provided by pre-stripping the open pit with the balance of material requirements coming from local borrow areas for glacial till and crushing/screening rockfill for the embankment filters. An upstream liner of compacted fine-grained earthfill is included in the Stage 1 design to reduce seepage gradients prior to development of the tailings beach. The required extents of the upstream liner will be re-evaluated following the results of an ongoing geotechnical site investigation program.

The embankment will be raised in three additional stages by downstream method to an ultimate elevation of approximately 164 m. The ultimate embankment will be 32 m high from crest to toe in maximum section and the maximum depth of stored tailings within the facility will be approximately 29 m. Sustaining embankment construction will require approximately 2.9 Mm^3 of construction material with 2.7 Mm^3 of pit-run rockfill and the balance sourced from external borrows or stockpiles. An additional 525,000 m^3 of pit-run rockfill will be used for the interior rockfill causeways over the life of the mine.

20.8.4 Cochrane Hill

The embankment design section for Cochrane Hill is generally consistent with the final design that was constructed at Touquoy, which allows the information gathered during construction of the Touquoy facility to be used in the estimates for the 2019 Pre-Feasibility Study.

Preliminary geochemical testing and characterization has been completed for waste rock and tailings materials for the Cochrane Hill Project. The Cochrane Hill tailings are predicted to be NPAG under beached and subaqueous conditions. Geochemical characterization of waste rock from the open pit estimates that there will be a large proportion of waste rock classified as PAG with the remainder being classified as NPAG. PAG waste rock will be stockpiled to the north of the open pit, while NPAG waste rock will be used for TMF embankment construction in combination with till material from local borrow sources. The remainder of the NPAG waste rock will be stockpiled in a separate stockpile to the PAG waste rock, located to the east of the PAG waste rock stockpile. Further waste rock static and kinetic testing on construction materials is underway to demonstrate the quantiles of NPAG waste rock and their suitability for TMF embankment construction.

A total of 15.2 Mt of ore will be milled during the life of the mine at Cochrane Hill to produce a concentrate for shipment to Touquoy. The milling process will produce tailings, which will be disposed of in the Cochrane Hill TMF. The tailings slurry will be conveyed to the TMF by pipeline and deposited on a subaerial tailings beach from discharge points located along the embankment crest. Several TMF site options were considered during preparation of the 2019 Pre-Feasibility Study.

The selected TMF option is located to the southeast of the open pit and south of the plant site, on the southern face of Cochrane Hill, and is situated in a position that limits impacts to forests, and to wetlands and streams frequented by fish to the maximum practical extent. The TMF positioned in this manner allows the planned mine facilities to be clustered in close proximity to the proposed open pit and simplifies water management requirements for the mine site and allows for reduced tailings pumping requirements as the TMF is located downslope of the plant site.

The TMF embankment staging for the 2019 Pre-feasibility Study was based on the following assumptions:

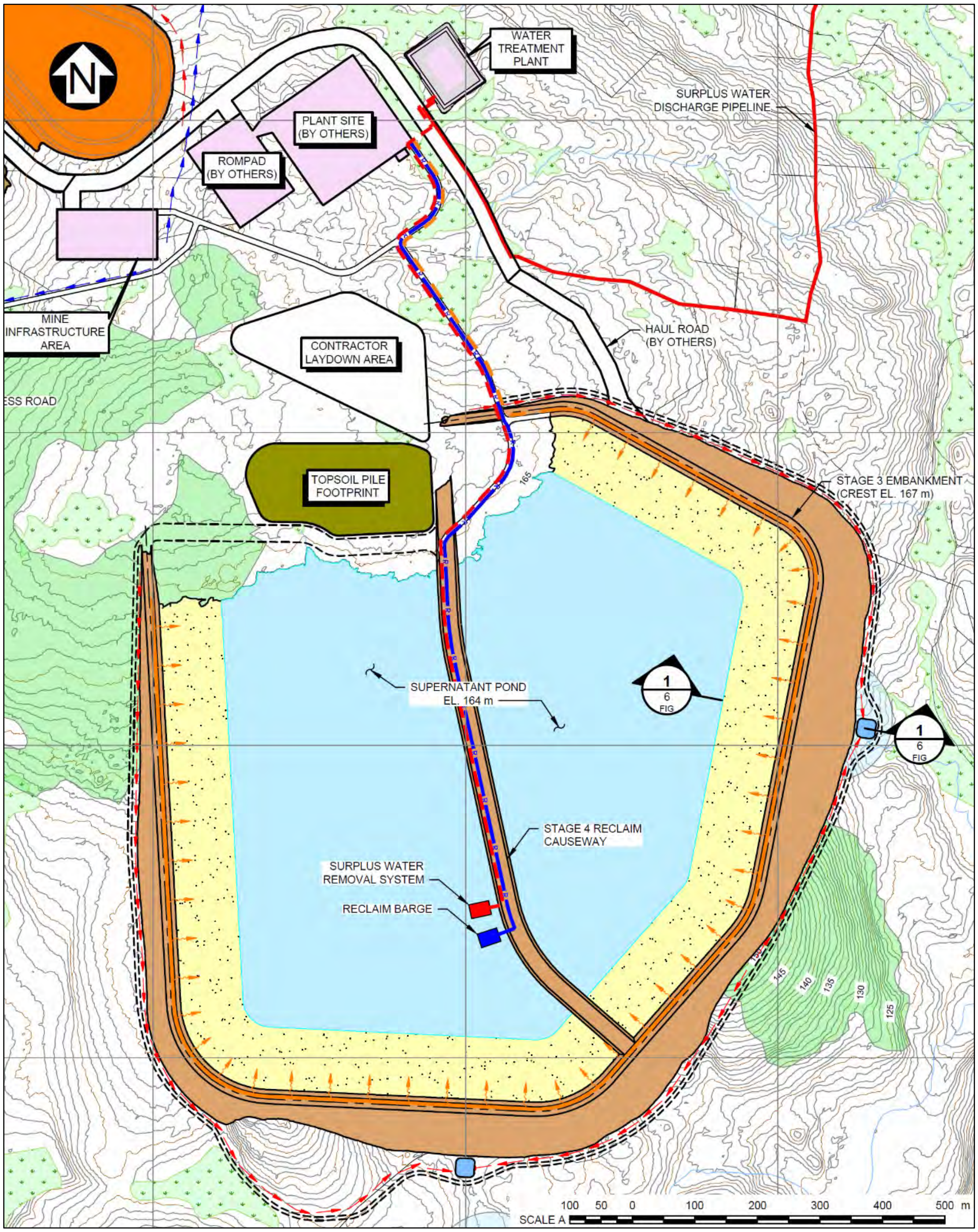
- Average tailings settled density of 1.3 t/m^3;
- Operational supernatant pond allowance of 800,000 m^3;
- EDF storage allowance of 640,000 m^3;
- IDF of 1/3 between the 1/1,000-year return period precipitation event and the PMF event will be passed through the TMF spillway;
- Sufficient capacity at start-up for one year of tailings storage and supernatant water;
- Three downstream step-outs and staged raises of the embankment occurring during Years 1, 3 and 5 of operations;
- NAG waste rock and overburden are assumed to be used as construction materials.

The tailings mass will consolidate, and water trapped in the tailings voids will be released over time as the pore pressures generated during deposition dissipate. A higher final settled dry density of the tailings is reasonable to expect; however, no reliance on the density increase was assumed in the TMF staging. Geotechnical testing of the tailings, including consolidation testing, is presently underway.

The TMF will be contained on three sides by a continuous embankment and on one side, to the north, by natural ground as shown on Figure 20-4. Figure 20-5 is a cross-section showing the dam design.

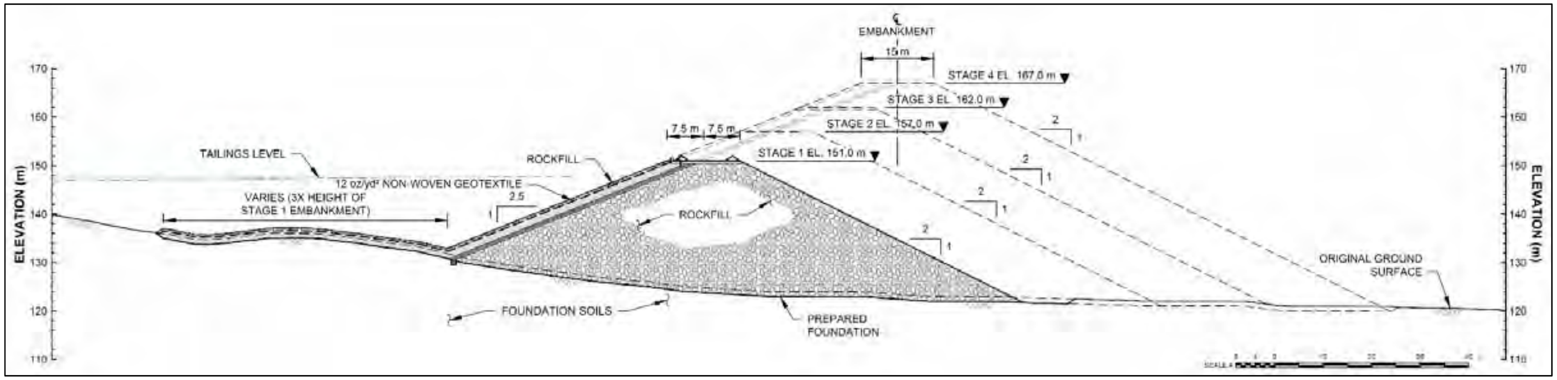
A rockfill causeway raised with the accreting tailings mass will separate the facility into two cells to increase filling efficiency and allow for positioning of the reclaim water pumps and pipeline. The TMF embankment is designed as an earthfill-faced rockfill embankment with appropriately graded filter and transition zones.

Figure 20-4: Cochrane Hill TMF Layout Plan



Note: Figure prepared by Knight Piésold, 2019.

Figure 20-5: Cross-Section Cochrane Hill TMF Design



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The Stage 1 embankment will be 30 m high in maximum section and requires approximately 1.3 Mm^3 of material to construct. Approximately 1.0 Mm^3 of pit-run rockfill will be provided by pre-stripping the open pit with the balance of material requirements coming from local borrow areas for glacial till and crushing/screening rockfill for the embankment filters. An upstream liner of compacted fine-grained earthfill is included in the Stage 1 design to reduce seepage gradients prior to development of the tailings beach. The required extents of the upstream liner will be re-evaluated following completion of a geotechnical site investigation program, which is presently underway.

The embankment will be raised in three additional stages by downstream method to an ultimate elevation of approximately 167 m. The ultimate embankment will be approximately 47 m high from crest to downstream toe; however, the maximum thickness of stored tailings within the facility will be less than 35 m due to the slope of the underlying natural ground. Sustaining embankment construction will require approximately 3.8 Mm^3 of construction material with 3.6 Mm^3 of pit-run rockfill and the balance sourced from external borrows or stockpiles. An additional 490,000 m^3 of pit-run rockfill will be used for the interior rockfill causeway over the life of the mine.

20.9 Closure Plans

20.9.1 Touquoy

A detailed reclamation plan was developed as part of the project. The general concept for reclaiming the project site is to remove all buildings and facilities that can be dismantled and return the site to a state that is stable and concordant with the pre-existing conditions or future land use as identified in consultation with stakeholders and regulators.

All static physical aspects including the open pit, plant site, WRSF and TMF will be contoured to blend with the natural landscape and re-vegetated. The tailings and polishing pond areas will be developed partially into wetlands.

The open pit will be allowed to flood creating a lake with a shallow water wetland border and a viable aquatic habitat.

All man-made slopes on the project site will be reduced, if necessary, to nominally 2.6:1 (h:v) or less to maintain safe and stable slopes that promote re-vegetation. Remaining exposed rock faces will be redeveloped to 1:1 slope. Removal of facilities and remediation of the site, including re-vegetation, will occur over an approximate two-year period. Monitoring of site conditions will be undertaken on a quarterly basis for the first five years with maintenance and remedial action occurring on an as required basis to ensure that the results of reclamation are sustainable.

The Touquoy Industrial Approval has conditions that require a security bond to cover reclamation activities, including closure and post-post operation and reclamation monitoring and final closure documentation. The cost of reclamation for Touquoy was established at $10.4 M. The security bond is submitted to the Province progressively; at the time of this report, $8.3 M out of the total $10.4 M estimate has been paid. The last reclamation surety tranche payment of $2.1 M is required to be paid by the fall of 2019, to bring the bond to the final $10.4 M total. The final reclamation cost will be re-evaluated six months prior to mine closure, when a Final Reclamation Plan and cost estimate will be submitted to the Province for approval.

20.9.2 Beaver Dam

Reclamation Plan requirements in Nova Scotia include the need to submit a Conceptual Plan at the EA stage, an interim Reclamation Plan as part of the Industrial Approval stage with updates approximately every three years, and a Final Reclamation Plan to be submitted six months prior to mine closure. A Conceptual Plan has been submitted for Beaver Dam as part of the EIS submission. The general concept for reclaiming this project site is to remove all facilities that can be dismantled and return the site to a state that is concordant with the pre-existing conditions or future land use as identified in consultation with stakeholders and regulators. All static physical aspects including the open pit, surface areas, and WRSFs will be contoured to blend with the natural landscape and revegetated. Some areas of the site such as the WRSFs may use a progressive reclamation approach thereby reducing the efforts needed at the time of closure and accelerating the revegetation process.

The open pit will be allowed to flood creating a lake with a shallow water wetland border and viable aquatic habitat. A connection will be formed between the lake and the Killag River. Depending on water quality at post-closure, a portable ETP can be mobilized to site for seasonal effluent treatment. The need for effluent treatment during post closure will be fully assessed during the operation and early closure phases of the Project. The potential need for effluent treatment is currently based on very conservative geochemical source terms that will be undergoing revision as additional information is collected and becomes available. In addition, mitigation methods at closure such as rapid filling of the open pit and installing an engineered waste rock storage area cover could be employed to mitigate effluent quality concerns if they are identified.

All man-made slopes on the project sites will be reduced, if necessary, to nominal 2.6:1 (h:v) or less to maintain safe and stable slopes that promote good vegetation uptake depending on approved reclamation plans. Remaining exposed rock faces will be redeveloped to 1:1 slope.

Removal of facilities and remediation of the sites, including re-vegetation, will take approximately two years at each site. Monitoring of reclaimed site conditions will be undertaken on a quarterly basis for a period specified by NSEM and NSE with maintenance and remedial action occurring on an as-required basis to ensure that the results of reclamation are sustainable.

A reclamation security bond will be estimated and negotiated with the Province during the Industrial Approval process. Provisions have been made for this bond in the feasibility study project costs for Beaver Dam. It is anticipated that the bond will be posted to the Province progressively as the project advances.

20.9.3 Fifteen Mile Stream and Cochrane Hill

Conceptual Reclamation Plans will be included in the Fifteen Mile Stream and Cochrane Hill EIS submissions. The general concept for reclaiming these project sites is to remove all facilities that can be dismantled and return the site to a state that is concordant with the pre-existing conditions or future land use as identified in consultation with stakeholders and regulators. All static physical aspects including the open pit, surface areas, and WRSFs will be contoured to blend with the natural landscape and revegetated. Some areas of the site such as the WRSFs may use a progressive reclamation approach thereby reducing the efforts needed at the time of closure and accelerating the revegetation process.

The TMFs at Fifteen Mile Stream and Cochrane Hill will be contoured to blend in with the natural vegetation and developed partially into wetlands similar to Touquoy TMF reclamation.

The open pits will be allowed to flood creating a lake with a shallow water wetland border and a viable aquatic habitat.

All man-made slopes on the project sites will be reduced, if necessary, to nominal 2.6:1 (h:v) or less to maintain safe and stable slopes that promote good vegetation uptake depending on approved reclamation plans. Remaining exposed rock faces will be redeveloped to 1:1 slope.

Removal of facilities and remediation of the sites, including re-vegetation, will take approximately two years at each site. Monitoring of reclaimed site conditions will be undertaken on a quarterly basis for a period specified by NSEM and NSE with maintenance and remedial action occurring on an as-required basis to ensure that the results of reclamation are sustainable.

The reclamation bond needed for the sites is negotiated with NSE and NSEM during the Industrial Approval process. Provisions will be included for the planned Fifteen Mile Stream and Cochrane Hill feasibility studies.

Progressive bonding, similar to what has been implemented at the Touquoy Mine site will be likely.

20.10 Permitting

20.10.1 Touquoy

An Industrial Approval (No. 2012-0842442013-084244; expires March 28, 2024) was granted in March 2014 by NSE to construct, operate and reclaim the Touquoy Gold Project.

A reclamation security bond has been posted with the Province as a Condition of the Industrial Approval.

Surface Water Withdrawal Approval to withdraw mill process water from Scraggy Lake was received July 2017. Updated mine and reclamation plans were submitted in April 2017 as part of the Annual Report to NSE and NSDEM.

20.10.2 Beaver Dam

The two main environmental approvals required for the project are:

- Federal and Provincial Ministerial Environmental Approval. The terms and conditions generated from the Environmental Assessment will help to guide the requirements for the Industrial Approval Application;
- Provincial Industrial Approval. The Industrial Approval documentation will detail the environmental controls required for the life of the project (pre-construction to post-reclamation) and will include such items as monitoring, environmental controls and management plans.

Destruction of habitat in watercourses and wetlands will require the appropriate alteration permits including Provincial wetland and watercourse permitting processes and expected Fisheries Authorization through Fisheries and Oceans Canada (DFO).

A landowner lease and a Crown land lease must be acquired for the Beaver Dam Mine site and the planned haul road.

20.10.3 Fifteen Mile Stream and Cochrane Hill

The Fifteen Mile Stream and Cochrane Hill sites have been previously worked as underground mines or have been exploration targets for many years and the province is aware of the potential for inclusion of the deposits in the larger Moose River Consolidated mining operation.

Environmental permits required to support advanced exploration and environmental baseline studies for Fifteen Mile Stream and Cochrane Hill have been received for the drilling programs completed to date. Additional permits as needed, will be requested from

NSE, NSLF and the Provincial Crown Lands group to support future exploratory, geotechnical, and hydrogeological drilling programs.

The main permit required once the EA approval has been received is the Industrial Approval. Crown land permitting will be required for both properties, including the Integrated Resource Management process (IRM). Mineral leases will also be required for both projects, through the NSDEM. In addition, a surface water withdrawal permit, wetland permit, watercourse permits, will be required. There will be a requirement for a fisheries authorization from DFO. The proposed road realignment at Cochrane Hill will need to be approved through the NSTIR process.

20.11 Social and Community Impacts

20.11.1 Touquoy

First Nations

There are no First Nations (Mi'kmaq) communities within the site boundaries. The closest reserve is Beaver Lake (IR 17), approximately 15 km to the northeast of Touquoy. A Mi'kmaq Ecological Knowledge Study of the project area was prepared as part of the EA.

Land Ownership

The project site encompasses Moose River Gold Mines, a former gold mining community with a peak population of up to 5,000 during its most productive period in the late 1800s. Census figures subsequent to the last underground mining activity in 1936 indicate that the number of permanent residents declined from 108 in 1941 to eight in 2006. There are currently no permanent residents in Moose River Gold Mines.

Atlantic Gold has resolved all landowner claims and has clear title or a Crown lease to all parcels of land required for the mining operation. There is a potential positive effect on tourism; therefore, no significant adverse effects are anticipated to result from mine development.

Archaeological Screening

An archaeological screening was conducted to evaluate the archaeological potential within the proposed development limits. The results of the study indicated that there is a low archaeological potential ascribed to the area, and no further investigation is required unless chance archaeological deposits or human remains are encountered during operations activities.

20.11.2 Beaver Dam

Location

The Beaver Dam Mine will be located near the community of Marinette, Halifax County, Nova Scotia, although it is more than 5 km from the nearest domicile. The area economy is heavily based on natural resource industries, mainly forestry.

First Nations

There are no First Nations (Mi'kmaq) communities within the site boundaries. The closest reserve is Beaver Lake (IR 17), 5.5 km from the mine site and 3 km from the haul road. Sheet Harbour IR36 is located 20 km south of the Project. Both IRs are administered by the Millbrook First Nation in Truro, Nova Scotia. A Mi'kmaq Ecological Knowledge study of the project area was prepared for Beaver Dam mine and the haul road as part of the EIS.

Information sharing with the Mi'kmaq community has occurred, generally following the "Made in Nova Scotia Protocol" for engagement. Four consultation open houses were held in May 2016. Two of these were open to the general public and two were specific to the community members of the Millbrook First Nation and Sipekne'katik First Nation. A Memorandum of Understanding was signed in 2014 with the Assembly of Nova Scotia Mi'kmaq Chiefs with ongoing efforts underway to complete a Mutual Benefits Agreement (MBA). Information gained from the public consultation and discussions with the Mi'kmaw communities has been used in the EIS document to outline public concerns and the ways in which the proponent will address these through project changes, monitoring, mitigation or other methods. Ongoing engagement, including consultation sessions with closest communities including Millbrook First Nation and Sipekne'katik First Nation, have continued to support the EA process.

There are currently no negotiations or agreements with local communities regarding this project other than a Memorandum of Understanding with First Nations interests. The Citizen's Liaison Committee (CLC) for the Touquoy project has been apprised of, and consulted on, the Beaver Dam Mine project. The CLC was expanded to include community members in the Beaver Dam area.

Archaeological Screening

A review of the Maritime Archaeological Resource Inventory shows no recorded archaeological sites in the project area. The potential for pre-Contact archaeological resources is considered moderate to high, although none have been recorded. The potential for historic (post-contact) archaeological resources at the site is considered to be moderate to high, as historic maps indicate settlement and land grants in the area and historic mining activity near the site.

Archaeological screening and reconnaissance surveys were carried out at various times between 2014 and 2018 at the Beaver Dam site. These surveys consisted of a visual inspection of the ground surface and did not involve sub-surface testing. The archaeological background research and field reconnaissance identified numerous sites which exhibited high potential for both pre-Contact (with Europeans) and historic archaeological resources.

The high-potential pre-Contact areas, together with six identified sites and historic industrial features should be avoided in the design of the site. If avoidance is not possible, the impacted sites will be subjected to intensified historical research to provide a more comprehensive context for interpreting features. This will include a program of shovel testing to determine whether or not buried archaeological resources are present and/or to determine the age, function and significance of identified features. It is recommended that all historic industrial features which cannot be avoided in the design and development of the Beaver Dam mine be subjected to detailed documentation. Documentation should include video, photography and surveyed plans.

20.11.3 Fifteen Mile Stream

Location

Fifteen Mile Stream is located along Provincial Highway 374, near Trafalgar, Halifax County, Nova Scotia, in the Liscomb Game Sanctuary. The area is very rural, consisting of sparsely-distributed residences ranging from a few permanent homes to seasonal camps. There are no residences within the study area. The proposed mine site is approximately five km from the nearest residence, a seasonal cottage, and more than ten km from the nearest permanent residence. Further study of potential impacts to neighbouring residences and potential receptors will be completed as part of the environmental assessment process.

First Nations

There are no First Nations (Mi'kmaq) communities within the site boundaries. The closest Mi'kmaq community to Fifteen Mile Stream study area is the Beaver Lake IR17 (Millbrook First Nation) located about 30 km southwest. Sheet Harbour IR36 (Millbrook First Nation) is located 30 km to the south.

Public Consultation

Public consultation and information sharing and discussions with the Mi'kmaw community is required as part of the EA process and follows similar processes and builds from the Touquoy and Beaver Dam experience.

An initial meeting with the Mi'kmaq Rights Initiative Office (KMKNO) to introduce the project, and on-going engagement with Millbrook First Nation was held in March 2018. An initial public engagement session was held in March 2018 in Sheet Harbour to introduce the proposed Fifteen Mile Stream mine to the local community. A second public open house was held in Sheet Harbour in March 2019 to present the technical summary information pre-submission of the EIS. A session with KMKNO was completed to share technical conclusions for the Project in April 2019.

A Community Liaison Committee (CLC) for the Fifteen Mile Stream project was established in 2018 as a means of engaging with the community.

A local community office has been established in the community of Sheet Harbour. The office provides an opportunity for interested community members to share their interests and concerns with Atlantic Gold personnel. The office is to be staffed part-time, based on an established and publicized schedule.

Archaeological Screening

Archaeological screening and reconnaissance surveys were carried out at various times between 2017 and 2018 at the Fifteen Mile Stream site. These surveys consisted of a visual inspection of the ground surface and did not involve sub-surface testing.

The archaeological background research and field reconnaissance identified numerous sites which exhibited high potential for both Mi'kmaw use and historic archaeological resources.

Seven archaeological sites associated with historical mining activities were identified within the Fifteen Mile Stream study, two of which will be impacted by the open pit.

Two areas of archaeological potential were identified near the shoreline of Anti Dam Flowage and Seloam Lake.

The areas of archaeological potential, together with five of the seven identified sites and historic industrial features should be avoided in the design of the site. Where avoidance is not possible, the impacted sites will be subjected to intensified historical research to provide a more comprehensive context for interpreting features. This will include a program of shovel testing to determine whether buried archaeological resources are present and/or to determine the age, function and significance of identified features. It is recommended that all historic industrial features which cannot be avoided in the design and development of the Fifteen Mile Stream Mine be subjected to detailed documentation. Documentation should include video, photography and surveyed plans.

20.11.4 Cochrane Hill

Location

Cochrane Hill is located within one km of the community of Melrose, Guysborough County, Nova Scotia. Further study of potential impacts to neighbouring residences and potential receptors is being completed as part of the environmental assessment process.

First Nations

There are no First Nations (Mi’kmaq) communities within the site boundaries. The closest and only nearby Mi’kmaq community to Cochrane Hill is the Paq’tnkek Mi’kmaw Nation located 23 km east of Antigonish and 44 km northeast of the proposed mine site. The Pictou Landing First Nation is located approximately 80 km northwest of the proposed mine site.

Public Consultation

Public consultation and information sharing and discussions with the Mi’kmaq community is required as part of the EA process and follows similar processes and builds from the Touquoy and Beaver Dam experience. Initial meetings with the Mi’kmaq Rights Initiative Office (KMKNO) and the Pictou Landing First Nation occurred in 2018 and 2019. A meeting with the Paq’tnkek First Nation is to be scheduled in the near future.

An initial public engagement session was held in March 2018 in the Village of Sherbrooke located 13 km south of the project to introduce the planned Cochrane Hill mine to the local community. A second open house is planned for later in 2019 to present the technical summary information pre-submission of the EIS.

During 2018 and 2019, Atlantic Gold has participated in many meetings with community groups and individuals in and around Sherbrooke.

A CLC for the Cochrane Hill project was established in 2018 as a means of engaging with the community.

A local community office has been established in the community of Sherbrooke. The office provides an opportunity for interested community members to share their interests and concerns with Atlantic Gold personnel. The office is to be staffed part-time, based on an established and publicized schedule.

Archaeological Screening

Archaeological screening was conducted to evaluate the archaeological potential within the proposed development limits as part of the EIS preparation. Preliminary work has been completed and follow-up reporting is underway.

20.12 Comments on Section 20

20.12.1 Touquoy

The Touquoy Mine is currently approved and operational and there is currently no requirement for additional permits or approvals for mining within the existing pit limit. If the pit is expanded beyond currently approved limits, then an amendment to the current Industrial Approval and/or a Provincial Environmental Assessment may be required. The mining lease may also require amendment. There may be also be the potential requirement for occasional permit amendments that are minor and routine in nature. None of the above noted items would represent a risk to the project schedule.

20.12.2 Beaver Dam

The potential risks to the Beaver Dam Project schedule include EIS and associated permitting, including EA approval and/or a delay in the Federal and Provincial EA processes. As well, there is an expected DFO Fisheries Authorization associated with impacts to watercourses and waterbodies from infrastructure placement and water balance during operations and post-closure. There is the unlikely potential that the project could require an amendment to the MDMER Schedule 2 related to the placement of mine wastes in areas of fish habitat. The areas in question are considered to be marginal fish habitat and hence it is anticipated that the MDMER Schedule 2 will not be triggered.

An application for the Provincial Industrial Approval will require that the proponent has the surface land rights for the use of the project lands. This is obtained by means of negotiation with landowners for private land and through submitting a Crown Lease application to the Province. Both of these processes are currently underway and advancing.

20.12.3 Fifteen Mile Stream

The potential risks to the Fifteen Mile Stream project schedule include EIS and associated permitting. This would include the EA approval and/or a delay in the Federal and Provincial EA processes. As well, there is a DFO Fisheries Authorization associated with impacts to watercourses, especially as related to the planned Seloam Brook diversion. There is a very low potential that the project could require an amendment to the MDMER Schedule 2 related to the placement of mine wastes in areas of fish habitat.

The application for the Provincial Industrial Approval will require that the proponent has the surface land rights for the use of the project lands. This is obtained by means of negotiation with landowners for private land and through submitting a Crown Lease application to the Province. A surface lease in currently in place for the private land and the Crown Lease application has been submitted and is advancing.

Some condemnation drilling is required in some areas under the TMF to confirm that there is no economic mineralization underlying this planned facility.

Current permitting efforts are focussed on the development of the Egerton–MacLean deposit. Once EA approval is received for the Egerton–MacLean deposit, then additional approvals will be sought for the Plenty and Hudson deposits which are scheduled for development subsequent to the completion of mining at Egerton–MacLean.

20.12.4 Cochrane Hill

The potential risks to the Cochrane Hill Project schedule include EIS and associated permitting. This would include the EA approval and/or a delay in the Federal and Provincial EA processes. A DFO Fisheries Authorization is associated with impacts to several minor ephemeral streams that lie within the TMF footprint. There is a low potential that the project could require an amendment to the MDMER Schedule 2 related to the placement of mine wastes in areas of fish habitat.

An application for the Provincial Industrial Approval will require that the proponent has the surface land rights for the use of the project lands including the proposed highway diversion. This is obtained by means of negotiation with landowners for private land and through submitting a Crown Lease application to the Province. Discussions with local landowners is progressing and the Crown Lease application has been submitted and is advancing.

21.0 CAPITAL AND OPERATING COSTS

21.1 Introduction

The Touquoy Mine capital and operating costs reflect the 2019 capital/operating budget for the site.

The Beaver Dam capital and operating costs are supported by a Feasibility Study completed in 2015 and updated and escalated to first quarter 2019. Capital and operating costs presented for Fifteen Mile Stream and Cochrane Hill are supported by a Pre-Feasibility Study completed in 2018, and updated (and escalated) to first quarter 2019. In the case of these three estimates, a review of cost inputs as a result of data from the 12 months of operations at Touquoy was undertaken. with capital estimates revised up or down using those current operation inputs to the estimates. Closure costs were re-examined based on Atlantic Gold's experience with the Industrial Approval process for Touquoy.

The following basic information pertains to the estimates:

- Unless otherwise stated, cost estimates are in Canadian Dollars with an effective date of first quarter 2019;
- Metric units of measure are used throughout the estimate

The exchange rates were set for the following currencies, as of 1 February, 2019:

- 1 AU$ = 0.955 C$;
- 1 Euro = 1.508 C$;
- 1 US$ = 1.316 C$.

The estimates in this Report are based on information provided by suppliers and assume that there are no problems associated with the supply and availability of equipment and services during the execution phase.

The following costs and scope are excluded from the capital cost estimates:

- All facilities not identified in the summary description of the Project;
- Escalation and currency exchange fluctuations after January 2019;
- Costs of public relations activities and any costs of impacts to construction work associated with implementation of public relations operations;
- Taxes and duties;
- Fees or royalties relating to use of certain technologies or processes;

- Permits or fees associated with government agency engineering certification processes;
- Costs associated with accelerated construction work;
- Financing charges and interest during construction;
- Costs associated with project development prior to project approval and commencement of construction.

21.2 Capital Cost Estimates

21.2.1 Basis of Estimate

The capital cost estimate for Moose River Consolidated Mine includes four separate cost estimates, one each for Touquoy, Beaver Dam, Fifteen-Mile Stream and Cochrane Hill. The major areas covered in each capital cost estimate are as follows:

- Mine area;
- Process plant;
- Tailings management;
- On-site infrastructure;
- Off-site infrastructure;
- Indirect costs;
- Owner's costs;
- Contingency.

Apart from Touquoy, capital cost estimates for the individual deposits were assembled based on input from the following:

- Moose Mountain: Mine development, mining equipment as well as mine services and infrastructure, including haul roads;
- Ausenco: Process plants and associated onsite infrastructure, including on site access roads and in-plant roads;
- Ausenco: Mine office, truck shop, and ancillary buildings;
- Knight Piésold: Access roads to tailings, tailings dam and water management, including that for the mine water management;

- All North: Off-site access road and high-voltage (HV) power transmission line, including switchyard for the 2017 cost estimate. The 2017 cost update was escalated to 2019 by +3%;
- Atlantic Gold: Owner's costs.

Touquoy

The Touquoy cost estimate represents the 2019 capital budget for the operation as developed by Atlantic Gold.

Beaver Dam

The Beaver Dam capital cost estimate is based on the developed 2015 Feasibility Study and escalated to first quarter 2019. The 2015 estimate was prepared in accordance with the recommended practices of the Association for the Advancement of Cost Engineering (AACE) guidelines and was classified as a Class 3 Feasibility Study estimate in 2015. The 2019 cost estimate has been updated by escalating cost elements only, and not re-soliciting for new equipment pricing, Because of this, it is deemed to meet AACE's Class 4 Pre-Feasibility requirements and Ausenco's standards with an accuracy range between -15%, +25% of final cost, rather than a Class 3 Feasibility Study Level of accuracy.

The updates to the 2015 cost estimate include scope additions such as a new jaw crusher in place of relocating the existing crusher from Touquoy, as well as escalating the 2015 cost elements to first quarter 2019 based on using published escalation indices.

Key information used from the 2015 Feasibility Study capital cost estimate included:

- Labour costs were escalated to 2019 based on 2% per annum compounded;
- Plant equipment were escalated to 2019, based on 3% per annum compounded;
- Bulk materials were obtained from vendors. A design growth allowance was applied to the material take-offs, based on the degree of engineering completed and escalated to 2019 based on 3% per annum compounded;
- Subcontractor and third-party costs were escalated to 2019, based on a 3% per annum compounded;
- Mine capital costs excluding mine development, pit water development and mine services were derived from historical data and escalated to 2019 based on a 3% percent per annum compounded;
- The engineering, procurement and contract management (EPCM) cost was escalated to 2019 based on a 3% per annum compounded.

Fifteen Mile Stream and Cochrane Hill

The estimates for Fifteen Mile Stream and Cochrane Hill estimates are based on the developed 2018 Pre-Feasibility Study and updated for scope and escalation to first quarter 2019.

The 2018 estimates were prepared in accordance with the recommended practices of the Association for the Advancement of Cost Engineering (AACE) guidelines and is continued to be classified as a Class 4 Pre-Feasibility Study estimate per AACE and per Ausenco's standards with an accuracy of -15%, +25%. The typical purpose of this class of estimate is for the development of a detailed project cost baseline consistent with the project objectives and target business plan.

The 2018 capital cost estimate has been updated and escalated to 2019 applying the following parameters:

- Mechanical equipment supply pricing (> $250,000) has been requoted by supply vendors (with an average increase of +7.5%);
- Mechanical equipment supply pricing (<$250,000) has been escalated by +5%;
- Electrical equipment supply pricing has been escalated by +7.8%;
- Bulk materials (platework, pipelines, architectural) have been escalated by +3%;
- Bulk materials (structural steel) has been requoted by steel fabrication shops;
- Labour has been escalated by +2%.

The estimates are structured as a build-up of direct and indirect costs for the calculated quantities including installation/construction hours, unit labour rates and contractor distributable costs, bulk and miscellaneous material and equipment costs, any subcontractor costs, freight, and growth.

It is important to note that the processing of both Fifteen Mile Stream and Cochrane Hill concentrate will be carried out in conjunction with ROM material from either Touquoy or Beaver Dam. Processing of concentrate through the Touquoy plant in the absence of ROM ore would require modification to the CIL circuit. This cost has been estimated by Ausenco at $6.1 M. For the purpose of this study this figure has been excluded on the basis that inferred resources within the $1,400/oz Au pit shell can be upgrade to measured and indicated and potentially converted to reserves at some point in the future subject to further studies.

21.2.2 Mining Costs

Mine capital costs are derived from vendor quotations and operational data collected by Moose Mountain and Atlantic Gold.

Pre-production mine operating costs, that is, all mine operating costs incurred before mill start-up, have been capitalized and are included in the capital cost estimate.

The majority of mine equipment is planned to be purchased through either finance or lease agreements with the vendors, and except for any applicable down payments, is not capitalized. The costs for these arrangements instead report to the 'lease costs' section of the mine operating cost.

21.2.3 Process Costs

In addition to the assumptions noted above, the capital cost estimate for each process plant is derived from a number of fundamental assumptions as shown on the process flow diagrams (PFDs), drawings, scope definition and work breakdown structure; it includes all associated infrastructure as defined within the scope of facilities.

Tailings management has been updated to 2019 costs by Knight Piésold.

21.2.4 Owners' Costs

Owners' costs have been provided by Atlantic Gold and consist of the following:

- Pre-production employment and training;
- Corporate expenses;
- Land compensation, permits, and commissioning;
- Insurance;
- Environmental;
- Reclamation;
- Salvage.

21.2.5 Contingency

Contingency is a cost element to accommodate unknown items that are expected to occur within the defined scope of the project, but which cannot be properly defined at the current stage of the project. The project contingency is meant to cover the normal inadequacies that are inherent in the estimate due to the dynamic nature of project engineering and construction. It should be assumed that the contingency will be spent.

The contingency allowance specifically excludes costs arising from scope changes, budget held as management reserve by Atlantic Gold and all other items that are excluded from the capital cost estimate.

The contingency applied reflect the availability of costing data from the operating Touquoy operation allowing for greater confidence in the estimates associated with the other deposits.

For the purpose of this study no contingency has been added to Touquoy cost estimates.

The recommended contingency for Beaver Dam is an average 14% of directs and indirect plus EPCM. The contingency was not applied to owner costs as the estimated cost provided by Atlantic reflects actual expenditures at Touquoy.

With regards to Fifteen Mile Stream and Cochrane Hill an overall recommended contingency is 11.3% and 10.6% of the total installed costs was applied respectively. Contingency attributed to individual areas of the estimate are as follows:

- Process and infrastructure: 15% (Fifteen Mile Stream), 15% (Cochrane Hill);
- Mining: 5% (Fifteen Mile Stream), 5% (Cochrane Hill);
- Tailings management: 10% (Fifteen Mile Stream), 20% (Cochrane Hill);
- Roads and main power supply: 15% (Fifteen Mile Stream), 15% (Cochrane Hill);
- Reclamation costs: a separate contingency of 15% was applied to reclamation costing within Owner costs.

21.2.6 Capital Cost Summary

The summary level project capital costs are outlined in Table 21-1.

21.2.7 Sustaining Capital

Sustaining capital costs include the costs for the mine fleet expansion and replacement, raising the tailings dam (as required over the life of the mine), plant, infrastructure spending, reclamation and salvage value.

The sustaining capital costs have been estimated using the same assumptions outlined above for initial capital cost estimates.

A summary of the sustaining capital requirements is provided in Table 21-2.

Table 21-1: Capital Cost Summary

Area	Touquoy Total Cost ($ M)	Beaver Dam Total Cost ($ M)	Fifteen Mile Stream Total Cost ($ M)	Cochrane Hill Total Cost ($ M)
Direct Costs				
Mine area	1.3	1.3	26.3	29.8
Process plant	1.7	4.9	55.9	55.2
On-site infrastructure	—	5.3	15.1	13.6
Off-site infrastructure	—	10.7	5.7	6.6
Growth	—	—	0.7	0.7
Subtotal Direct Costs	*3.0*	*22.2*	*103.7*	*106.0*
Indirect Costs				
Indirect cost (including EPCM, field indirect, freight, vendor, first fill and spare parts)	—	1.3	16.8	15.8
Owner's costs	1.9	2.4	9.2	8.8
Subtotal Indirect Costs	*1.9*	*3.7*	*26.0*	*23.0*
Contingency	—	1.8	12.7	13.8
Total Direct and Indirect Capital Costs	***4.9***	***27.7***	***142.4***	***144.4***

Note: Figures have been rounded and may not sum.

Table 21-2: Sustaining Capital

Area	Touquoy ($ M)	Beaver Dam ($ M)	Fifteen Mile Stream ($M)	Cochrane Hill ($M)
Mine	1.2	—	0.2	0.7
TMF	4.7	—	13.5	13.1
Process	3.4	0.4	2.6	2.0
Owners	8.0	7.9	11.6	9.3
Total Sustaining Capital	***17.3***	***8.3***	***28.0***	***25.2***

Note: Figures have been rounded and may not sum.

21.3 Operating Cost Estimates

21.3.1 Basis of Estimates

Operating costs were calculated based on manpower, process and maintenance consumables, transport, and G&A costs. Operating costs incurred and revenue from production realized during the period prior to achieving commercial production were capitalized within the Owner's costs. A review of cost inputs as a result of data from the 12 months of operations at Touquoy was undertaken, with operating cost estimates revised up or down using those current operation inputs to the estimates.

Key information used to support the operating cost estimates include:

- 2018 Touquoy operating cost data;
- 2019 Touquoy budget estimates;
- Vendor quotations and historical data;
- Production rates:
  - 2.24 Mt/a from Touquoy;
  - 2.0 Mt/a from Beaver Dam, Fifteen Mile Stream and Cochrane Hill.

21.3.2 Operating Cost Summary

Table 21-3 summarizes the overall operating cost assumptions.

21.3.3 Mine Operating Costs

Mine operating costs are derived from vendor quotations and historical data collected by Moose Mountain and Atlantic Gold. This includes the labour, maintenance, component repairs, fuel, tire and consumables costs.

Running hours (service meter unit) on each piece of equipment has been estimated based on operating capacities and requirements of the mine production schedule. These service meter unit hours are multiplied by the hourly consumables consumption rates and unit operating costs to calculate the total equipment operating costs for each year of operation for each deposit.

Table 21-3: Summary Operating Costs

Area	Unit	Touquoy	Beaver Dam	Fifteen Mile Stream	Cochrane Hill
Mining	$/t milled	7.07	17.97	9.56	11.84
Processing	$/t milled	11.01	12.46	7.20	8.24
Transportation	$/t milled	-	6.07	0.59	0.88
G&A	$/t milled	3.87	4.34	3.01	3.01
Total Cost	***$/t milled***	***21.95***	***40.84***	***20.36***	***23.97***
Overall average annual costs	***$M/a***	***49.2***	***81.6***	***40.7***	***47.9***

Note: Figures have been rounded and may not sum. Overall average annual costs include stockpile rehandle and processing.

21.3.4 Processing Costs

Process operating cost estimates for Touquoy and Beaver Dam are based on 2019 budget estimates for the Touquoy process plant which is based on 2018 operating data. The Beaver Dam process operating cost estimate assumes the same but has been adjusted to reflect a lower throughput as a result of increased ore hardness.

Process operating costs for Fifteen Mile Stream and Cochrane Hill have been calculated based on manpower, process and maintenance consumables, transport, and G&A costs. Key assumptions are summarized as follows:

- The labour force for plant operations and plant maintenance was estimated at 44 and 24 people respectively for both Fifteen Mile Stream and Cochrane Hill. Annual salaries and wages were supplied by Atlantic Gold. The operating cost estimate is based on providing a labour force to support continuous operations at 24 hours per day, 365 days per year.
- The power supply cost for Fifteen Mile Stream is based on an average use of 39,176 MWh per year and an electric energy price of $0.082/kWh with $40,343/month demand charge.
- The power supply cost for Cochrane Hill is based on an average use of 38,803 MWh per year and an electric energy price of $0.082/kWh for electric power with $40,469/month demand charge.
- The cost of operating consumables includes primary, secondary, and tertiary crusher liners, screens, grinding media, mill liners and reagents. Other maintenance consumable rates are estimated based on Ausenco's experience with similar operations. Unit costs are based on quoted rates obtained from suppliers. All costs include freight charges to site.

- Annual maintenance supplies costs are estimated as a percentage of major capital equipment costs.
- Administrative cost (Mill G&A) include:
  - Business travel/conferences
  - Supplies for protective equipment and clothing, stationery, and postage, courier and light freights
  - Medical for new recruits, employee training allowances, information technology (IT), and allowances for subscriptions and publications
  - Allowances for equipment and buildings asset operation cost
  - Physical services including communications, power for G&A buildings
  - Contract services costs, and an allowance for consultants cost
  - All surface service costs are captured under Atlantic Gold's Owner's cost

Process operating costs for Fifteen Mile Stream and Cochrane Hill are estimated with an accuracy of ±25%.

21.3.5 General and Administrative Costs

General and administrative costs are expenses not directly related to the production of gold and include matters not directly related to mining, processing, refining, and transportation costs. These costs are based on Atlantic Gold's existing operations and Ausenco's in-house data from similar sized plants and process operations.

G&A costs include:

- G&A personnel;
- Safety and emergency response;
- Security, IT and training;
- Vehicles, buildings, insurance, communication and property taxes;
- Human resources;
- Environment and permitting;
- Community relations.

Where practical, senior staff have been shared between the Fifteen Mile Stream and Cochrane Hill sites for the purposes of the operating cost estimate. Generally, the salaried staff will work 40 hours per week on a day shift. Hourly staff will work a 12-hour shift per day to support 24-hour operations.

22.0 ECONOMIC ANALYSIS

22.1 Cautionary Statement

The results of the economic analyses discussed in this section represent forward-looking information as defined under Canadian securities law. The results depend on inputs that are subject to a number of known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented here. Information that is forward-looking includes:

- Mineral Resource and Mineral Reserve estimates;
- Assumed commodity prices and exchange rates;
- Mine production plans;
- Projected recovery rates;
- Sustaining and operating cost estimates;
- Assumptions as to closure costs and closure requirements;
- Assumptions as to environmental, permitting and social risks.

Additional risks to the forward-looking information include:

- Changes to costs of production from what is assumed;
- Unrecognized environmental risks;
- Unanticipated reclamation expenses;
- Unexpected variations in quantity of mineralised material, grade, or recovery rates;
- Geotechnical and hydrogeological considerations during mining being different from what was assumed;
- Failure of plant, equipment, or processes to operate as anticipated;
- Accidents, labour disputes and other risks of the mining industry.

22.2 Financial Model Parameters

The economic analysis assumes a 100% equity financed project. The economic analysis takes into account the fact that Atlantic Gold's effective ownership in Touquoy is 63.1%, and that Atlantic Gold will recover all operational, overhead, financing and sunk costs prior to any distributions to its privately-owned partner. The total estimated operational, overhead, financing and sunk costs to be recovered under the agreement as at December 31, 2018 is approximately $178 M.

All dollar amounts in this analysis are expressed in Q1 2019 Canadian dollars, unless otherwise specified.

The economic analysis includes the entire project life, comprising two years of construction and over 10 of years of mining and milling.

Corporate sunk costs to that point in time, including costs for exploration, technical studies, and permitting, are excluded from initial capital but have been considered in the estimation of tax depreciation pools.

22.3 Economic Analysis

The production schedule on which the economic analysis is based is provided and discussed in Section 16 (refer to Table 16-6). Table 22-1 provides a summary of the inputs to the economic analysis.

Cashflows for the overall Project results attributable to Atlantic Gold are summarized in Table 22-2. The economic analysis for the overall Project is summarized in Table 22-3.

The net present value (NPV) at 5% is discounted to Q1 2019.

No internal rate of return (IRR) or payback period is reported as the project generates a positive cash flow from Year 1.

22.4 Sensitivity Analysis

A sensitivity analysis was performed examining capital costs, operating costs, foreign exchange rate and gold price (Figure 22-1). The Project is most sensitive to fluctuations in gold price and foreign exchange rate assumptions, and less sensitive to variations in capital and operating costs. The gold grade is not presented in the sensitivity graph because the impact of changes in the gold grade mirror the impact of changes in the gold price.

Table 22-1: Inputs to Economic Analysis

Item	Units	Value
Gold price	US$/oz	1,300
Currency exchange rate	C$:US$	0.75
Gold payable	%	99.9
Gold refining costs	$/oz	1
Dore transport costs	$/oz	1.5
Royalty, Touquoy	%	2
Royalty, Beaver Dam	%	1.6
Royalty, Cochrane Hill	%	2
Royalty, Fifteen Mile Stream	%	2
MRRI interest	%	36.9
Federal income tax rate	%	15
Provincial income tax rate	%	16

Note: Royalties are a combination of the net revenue royalty to Nova Scotia, as well as private royalties, after partial buyback, to former owners; and are applied to the gross revenue from gold production minus the costs of refining. MRRI interest is applied to the profits before income tax (post Nova Scotia Mining tax) from the Touquoy deposit, after the Touquoy project capital and corporate sunk capital have been recovered.

Table 22-2: Projected Cashflow (years)

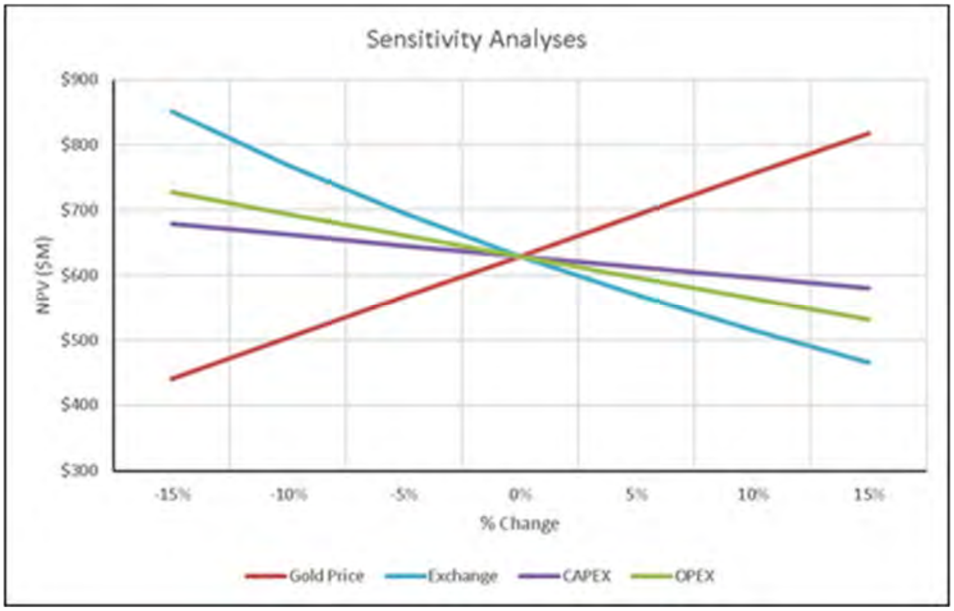
	Units	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
Recovered gold	('000 oz.)	97	104	90	174	231	254	234	196	161	103	59	32	0	0	1,735
Pre-tax cash flow	C$ (M)	88	104	-99	-10	204	227	201	171	145	90	43	8	-5	3	1,169
Income taxes	C$ (M)	0	-7	0	-10	-50	-61	-55	-47	-42	-26	-10	-2	0	0	-310
Post-tax cash flow	C$ (M)	88	97	-99	-21	154	166	145	124	103	64	33	7	-5	3	860

Note: numbers may not sum due to rounding.

Table 22-3: Economic Analysis

Item	Unit	Value
Pre-tax NPV (5%)	C$ M	849
Post-tax NPV (5%)	C$ M	629
Total LOM gold production	oz Au	1,735,000
LOM strip ratio	Waste:ore	2.9:1
Average grade	g/t Au	1.12

Figure 22-1: After Tax NPV5% Sensitivity Analysis



Note: Figure prepared by Moose Mountain, 2019.

23.0 ADJACENT PROPERTIES

This section is not relevant to this Report.

24.0 OTHER RELEVANT DATA AND INFORMATION

This section is not relevant to this Report.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Introduction

The QPs note the following interpretations and conclusions in their respective areas of expertise, based on the review of data available for this Report.

Mineral Resources were reported for the Touquoy, Beaver Dam, Cochrane Hill and Fifteen Mile Stream deposits. Mineral Reserves were estimated, and mine plans were developed, for the Touquoy, Beaver Dam, Cochrane Hill and Fifteen Mile Stream deposits.

25.2 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

- Information from Atlantic Gold experts supports that the mining tenure held is valid and is sufficient to support declaration of Mineral Resources and Mineral Reserves;
- Surface rights necessary to allow the operation of the Touquoy Mine have been obtained. Additional surface rights negotiations will be required for Beaver Dam, Cochrane Hill and Fifteen Mile Stream;
- Royalties are payable to third-parties and the Province of Nova Scotia;
- To the extent known, there are no other significant factors and risks that may affect access, title, or the right or ability to perform work on the property that have not been discussed in this Report.

25.3 Geology and Mineralization

- The known deposits within the Project area are considered to be examples of turbidite-hosted mesothermal gold deposits;
- Knowledge of the deposit settings, lithologies, mineralization style and setting, and structural and alteration controls on mineralization is sufficient to support Mineral Resource and Mineral Reserve estimation.

25.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

- The quantity and quality of the lithological, geotechnical, collar and downhole survey data collected in the exploration and infill drill programs conducted during the Atlantic Gold campaigns are sufficient to support Mineral Resource and Mineral Reserve estimation;

- Most drill holes intersect the mineralized zones at an angle, and the drill hole intercept widths reported for the Project are greater than true widths;
- Sample security procedures met industry standards at the time the samples were collected. Current sample storage procedures and storage areas are consistent with industry standards;
- Data verification has been extensively conducted by Atlantic Gold and its predecessor companies, and no material issues have been identified by those programs. In addition, Atlantic Gold has regularly used various computerized procedures to verify the quality of the data;
- Data collected have been sufficiently verified that they can support Mineral Resource and Mineral Reserve estimation and be used for mine planning purposes.

25.5 Metallurgical Testwork

- Metallurgical testwork completed has been appropriate to the style of mineralization;
- Considering the very similar recoveries obtained for each deposit and the similar head grades, an overall recovery of gold of 94% was used for both Touquoy and Beaver Dam;
- A high proportion of the gold contained in the Touquoy, Fifteen Mile Stream and Cochrane Hill mineralization is coarse grained and recoverable by gravity concentration;
- A life of mine gold recovery to doré of 88.34% has been calculated based on testwork for Fifteen Mile Stream and 88.3% for Cochrane Hill.

25.6 Mineral Resource Estimates

- Multiple indicator kriging (MIK) was used to estimate the Mineral Resources;
- Mineral Resources are reported to a gold cut-off grade of 0.30 g/t Au for all deposits. The cut-off grade includes the following considerations: gold price of US$1,400/oz; exchange rate of 0.80 US$: C$; mining cost of C$3.25/t; process costs (including general and administrative (G&A) cost) of C$11.73/t; process recovery of 95%; and over-all pit slope angle of 45º;
- Mineral Resources for all deposits were reported using the 2014 CIM Definition Standards;
- Factors that may affect the estimates include: metal price assumptions, changes in interpretations of mineralization geometry and continuity of mineralization zones, changes to MIK panel assumptions, metallurgical recovery assumptions, operating

cost assumptions, confidence in the modifying factors, including assumptions that surface rights to allow mining infrastructure to be constructed will be forthcoming, delays or other issues in reaching agreements with local or regulatory authorities and stakeholders, and changes in land tenure requirements or in permitting requirements from those discussed in this Report.

25.7 Mineral Reserve Estimates

- Proven and Probable Mineral Reserves have been modified from Measured and Indicated Mineral Resources at Touquoy, Beaver Dam, Fifteen Mile Stream, and Cochrane Hill. Inferred Mineral Resources have been set to waste. The Mineral Reserves are supported by the 2019 LOMP;
- Factors that may affect the Mineral Reserves estimates include metal prices, changes in interpretations of mineralization geometry and continuity of mineralization zones, kriging assumptions, geotechnical and hydrogeological assumptions, ability of the mining operation to meet the annual production rate, operating cost assumptions, process plant and mining recoveries, the ability to meet and maintain permitting and environmental licence conditions, and the ability to maintain the social licence to operate.

25.8 Mine Plan

- Reasonable mine plans, mine production schedules and mine capital and operating costs have been developed for Mineral Reserves at Touquoy, Beaver Dam, Fifteen Mile Stream, and Cochrane Hill;
- Three stand-alone mine operations are planned. The first is at the existing Touquoy operation, which will continue pit mining until 2023, then transition to Beaver Dam until 2027. Fifteen Mile Stream mine operations will occur from 2021 to 2030; and Cochrane Hill from 2022 to 2030;
- Pit layouts and mine operations are typical of other open pit gold operations in Canada, and the unit operations within the developed mine operating plan are proven to be effective for these other operations;
- As part of day-to-day operations, Atlantic Gold will continue to undertake reviews of the mine plan and consideration of alternatives to and variations within the plan. Alternative scenarios and reviews may be based on ongoing or future mining considerations, evaluation of different potential input factors and assumptions, and corporate directives.

25.9 Recovery Plan

- The process design at Touquoy assumes a conventional flowsheet, including crushing, grinding, gravity recovery, CIL, desorption/electrowinning/refining, cyanide destruction and tailings management;
- The process design at Fifteen Mile Stream assumes a conventional flowsheet, including crushing, grinding, gravity recovery, conventional flotation recovery and tailings management.
- The process design at Cochrane Hill assumes a split-circuit flowsheet, including crushing, grinding, gravity recovery, flotation recovery, hydroflotation recovery and tailings management.
- Concentrate from both Fifteen Mile Stream and Cochrane Hill will be processed to doré at Touquoy through an intensive leach reactor and CIL, desorption/electrowinning/refining;
- Equipment proposed is appropriate for the type of flowsheet;
- Reagent usage and storage requirements are typical of the industry and require no specialist handling.

25.10 Infrastructure

- All infrastructure required to support operations at the Touquoy Mine has been constructed and is in use;
- Infrastructure required to support operations at Beaver Dam, Fifteen Mile Stream and Cochrane Hill will include site access roads, internal roads, powerlines, WRSFs, and TMFs;
- Built infrastructure will include administration offices, control room complexes, mill maintenance offices, process plant buildings, reagent storage, laboratory, workshops and warehouses, main plant motor control centre rooms, and fire protection;
- The TMF designs are conventional;
- Water sources in use and planned include mine dewatering operations, raw water, precipitation including run-off and snowmelt and return water from the TMFs.

25.11 Markets and Contracts

- A contract was entered into for the transportation, security, insurance, and refining of doré gold bars from Touquoy, and doré is currently shipped to a customer for refining;

- It is expected that doré produced from Beaver Dam, Fifteen Mile Stream and Cochrane Hill would be subject to similar contracts to that in place for Touquoy;
- The financial analysis uses a gold price of US$1,300/oz Au, and an exchange rate of Canadian $1:US$0.75;
- In order to mitigate gold price, Atlantic Gold entered into margin-free gold forward sales contracts. The ounces associated with these forward gold sales contracts are delivered during production;
- There are major contracts currently in place to support the Touquoy Mine operations, in addition to the refining contract. These contracts cover items such as bulk reagents, operational and technical services, process equipment maintenance support, earthworks projects, transportation and logistics, and administrative services;
- Atlantic Gold may enter into additional operational contracts including, but not limited to, equipment maintenance and ore haulage between Touquoy and Beaver Dam, Fifteen Mile Stream and Cochrane Hill, depending upon operational requirements. These will be reviewed on a continual basis as the project moves forward. Contracts would be negotiated and renewed as needed. Contract terms would be in line with industry norms, and typical of similar contracts in Nova Scotia that Atlantic Gold is familiar with.

25.12 Environmental, Permitting and Social Considerations

- Touquoy has received all relevant permits required for operations. There is currently no requirement for additional permits or approvals. There may be the potential requirement for occasional permit amendments that are minor and routine in nature and do not represent a risk to the project schedule;
- The Beaver Dam Environmental Impact Statement (EIS) was submitted to the Canadian Environmental Assessment Agency (CEAA) and NSE on June 12, 2017. CEAA and NSE issued Information Requests (Round 1) in August 2017. A revised EIS was submitted by Atlantic Gold on February 28, 2019, and accepted by CEAA, meeting concordance with the Information Requests (Round 1). Once the Environmental Assessment Registration is approved, as generated from this process, then an Industrial Approval to construct, operate and reclaim will be sought from NSE, and a Mineral Lease will be sought from NSEM. Following approval of the Beaver Dam Mine Beaver Dam Mine Project EA by CEAA and NSE, an additional three months' work is required to prepare and submit support documents for the Industrial Approval and other approvals such as water withdrawal for pit dewatering, and wetland and watercourse alterations. Preparation of some aspects

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of the Industrial Approval support documents will be undertaken concurrent with the EA review;

- The potential risks to the Beaver Dam Project schedule include EIS and associated permitting, including EA approval and/or a delay in the Federal and Provincial EA processes. As well, there is an expected DFO Fisheries Authorization associated with impacts to watercourses and waterbodies from infrastructure placement and water balance during operations and post-closure. There is the unlikely potential that the project could require an amendment to the MDMER Schedule 2 related to the placement of mine wastes in areas of fish habitat. The areas in question are considered to be marginal fish habitat and hence it is anticipated that the MDMER Schedule 2 will not be triggered. An application for the Provincial Industrial Approval will require that the proponent has the surface land rights for the use of the project lands. This is obtained by means of negotiation with landowners for private land and through submitting a Crown Lease application to the Province. Both of these processes are currently underway and advancing;
- Baseline environmental studies in respect of the Fifteen Mile Stream Egerton–MacLean deposit commenced in June 2017 and were completed in October 2018 (16 months of seasonally-relevant data). Results will be incorporated into an EIS to be submitted to provincial and federal regulators in Q2, 2019, and to the public, for registration. Further baseline environmental studies will be targeted in future to support the development of the Plenty and Hudson deposits, which will be permitted and developed subsequent to the approval of the Egerton–MacLean deposit;
- The potential risks to the Fifteen Mile Stream project schedule include EIS and associated permitting. This would include the EA approval and/or a delay in the Federal and Provincial EA processes. As well, there is a DFO Fisheries Authorization associated with impacts to watercourses, especially as related to the planned Seloam Brook diversion. There is a very low potential that the project could require an amendment to the MDMER Schedule 2 related to the placement of mine wastes in areas of fish habitat. The application for the Provincial Industrial Approval will require that the proponent has the surface land rights for the use of the project lands. This is obtained by means of negotiation with landowners for private land and through submitting a Crown Lease application to the Province. A surface lease in currently in place for the private land and the Crown Lease application has been submitted and is advancing. Some condemnation drilling is required in some areas under the TMF to confirm that there is no economic mineralization underlying this planned facility;
- Current permitting efforts are focused on the development of the Egerton–MacLean deposit. Once EA approval is received for the Egerton–MacLean deposit, then additional approvals will be sought for the Plenty and Hudson deposits which are

scheduled for development subsequent to the completion of mining at Egerton–MacLean;

- Baseline environmental studies in respect of the Cochrane Hill deposit commenced in 2015 and re-initiated in June 2017 and were completed in fall 2018 (13 months of seasonally-relevant data). Results will be incorporated into an EIS to be submitted to Provincial and Federal regulators in Q3 2019, and to the public, for registration;
- The potential risks to the Cochrane Hill Project schedule include EIS and associated permitting. This would include the EA approval and/or a delay in the Federal and Provincial EA processes. A DFO Fisheries Authorization is associated with impacts to several minor ephemeral streams that lie within the TMF footprint. There is a low potential that the project could require an amendment to the MDMER Schedule 2 related to the placement of mine wastes in areas of fish habitat. An application for the Provincial Industrial Approval will require that the proponent has the surface land rights for the use of the project lands including the proposed highway diversion. This is obtained by means of negotiation with landowners for private land and through submitting a Crown Lease application to the Province. Discussions with local landowners is progressing and the Crown Lease application has been submitted and is advancing;
- A detailed reclamation plan was developed for Touquoy and Beaver Dam. The cost of reclamation for Touquoy was established at $10.4 M under the Industrial Approval. The final reclamation cost will be re-evaluated six months prior to mine closure, when a Final Reclamation Plan and cost estimate will be submitted to the Province for approval;
- Conceptual closure plans will be included in the Cochrane Hill and Fifteen Mile Stream EIS submissions. Progressive bonding, similar to what has been implemented at the Touquoy Mine site will be likely;
- There are no First Nations (Mi'kmaq) communities within the Touquoy, Beaver Dam, Cochrane Hill or Fifteen Mile Stream site boundaries;
- A CLC for each of the Fifteen Mile Stream and Cochrane Hill projects were established in 2018 as a means of engaging with the communities;
- Local community offices have been established in the communities of Sheet Harbour and Sherbrooke. The offices provide an opportunity for interested community members to share their interests and concerns with Atlantic Gold personnel. The offices are to be staffed part-time, based on an established and publicized schedule.

25.13 Capital Cost Estimates

- Total capital cost estimates are:

- Touquoy: $4.9 M (direct and indirect capital); $17.3 M (sustaining);
- Beaver Dam: $27.7 M (direct and indirect capital); $8.3 M (sustaining);
- Fifteen Mile Stream: $142.4 M (direct and indirect capital); $28.0 M (sustaining);
- Cochrane Hill: $144.4 M (direct and indirect capital); $25.2 M (sustaining).

25.14 Operating Cost Estimates

- Total operating cost estimates are:
  - Touquoy: $21.95/t milled, $49.2 M/a average;
  - Beaver Dam: $40.84/t milled, $81.6 M/a average;
  - Fifteen Mile Stream: $20.36/t milled, $40.7 M/a average;
  - Cochrane Hill: $23.97/t milled, $47.9 M/a average.

25.15 Economic Analysis

- All dollar amounts in the analysis are expressed in Q1 2019 Canadian dollars, unless otherwise specified;
- The economic analysis includes the entire project life, comprising two years of construction and over 10 of years of mining and milling;
- Corporate sunk costs to that point in time, including costs for exploration, technical studies, and permitting, are excluded from initial capital but have been considered in the estimation of tax depreciation pools;
- The NPV at 5% is discounted to Q1 2019;
- No internal rate of return (IRR) or payback period is reported as the project generates a positive cash flow from Year 1;
- Pre-tax NPV (5%): $849 M;
- Post-tax NPV (5%): $629 M.
- The Project is most sensitive to fluctuations in gold price and foreign exchange rate assumptions, and less sensitive to variations in capital and operating costs.

25.16 Conclusions

Under the assumptions presented in this Report the Moose River Consolidated Mine shows positive economics.

26.0 RECOMMENDATIONS

26.1 Introduction

A two-stage (phase) work program has been proposed. Stage 1 comprises exploration drilling. Stage 2 consists of a feasibility study, and mining, process, and tailings management studies and related testwork, together with project environmental studies and permitting activities.

Stage 2 can be undertaken concurrently with the Stage 1 work, and the Stage 2 work is not dependent on the results of Stage 1.

The Stage 1 program is estimated at $4.01–$7.7 M, depending on the number of metres drilled. Stage 2 is estimated at $8.28–$10.53 M.

26.2 Stage 1

Atlantic Gold is planning to complete regional exploration between known deposit locations in the Touquoy–Beaver Dam–Fifteen Mile Stream corridor. A reconnaissance core drill program of between 6,000–20,000 m, estimated to cost approximately $1.26–$4.2 M, is planned, using an all-in drilling cost estimate of $210/m.

Additional drilling is also planned to infill drill Inferred Mineral Resource blocks within the Fifteen Mile Stream and Cochrane Hill deposits to potentially support conversion of Inferred Mineral Resources to higher-confidence categories. Approximately 10,000 m of core drilling and 3,600 m of RC drilling is proposed for this program at an estimated cost of $2.75–$3.5 M.

26.3 Stage 2

The Stage 2 work program proposed will consist of a feasibility study on the Fifteen Mile Stream and Cochrane Hill deposits, and concurrent permitting activities for the Beaver Dam, Fifteen Mile Stream and Cochrane Hill projects.

26.3.1 Feasibility Study

Atlantic Gold plans to undertake a Feasibility Study on the Fifteen Mile Stream and Cochrane Hill deposits. This study is likely to be about $2.0 M to complete.

As part of the feasibility study, the following evaluations are recommended; costs are provided for each evaluation and are additive to the feasibility study report costs.

Mining

The following recommendations are made with respect to future mining studies:

- For Cochrane Hill and Fifteen Mile Stream, geological and structural geology interpretations should be advanced to include the geotechnical drill holes and the proposed pit walls, as part of a collaborative contribution to the geotechnical pit slope design. This includes rendering the interpreted faults in 3D, as well as other major structures such as fold axes, inferred faults and features of interest, and any known underground workings. Once the underground workings and the faults are interpreted in 3D, it is recommended that pump tests be designed and carried out;
- Geotechnical analysis of the foundations identified for the WRSFs at Beaver Dam, Cochrane Hill and Fifteen Mile Stream should be carried out to ensure suitability of site selections presented in this study;
- Condemnation drilling of the footprints identified for the WRSFs and site infrastructure at Beaver Dam, Cochrane Hill, and Fifteen Mile Stream should be carried out;
- Updates to detailed designs of open pits, WRSFs, and external haul roads based on information gathered in the above studies;
- Explore opportunities to increase project value via alternative deposit development strategies.

These studies are estimated to cost approximately $750,000.

Process

The following recommendations are made with respect to information required to support the process design for Fifteen Mile Stream and Cochrane Hill:

- Materials handling testwork to determine crushed ore flowability and storage characteristics;
- Additional variability testing to establish the variances in metallurgical performance across each deposit. Variability testing should include:
  - Rock hardness tests including BWI, SMC, and JK drop;
  - QEMSCAN and mineralogical analysis with estimates of sulphide mineral liberation;
  - Gravity gold recovery plus conventional flotation rougher tests to provide baseline metallurgical performance with varying grind size and head grades;
  - Gravity plus split circuit flotation tests with grind size and head grade variations;
- Cleaner concentrate dewatering (settling and filtration) tests;
- Tailings slurry rheology test;

- Cyanidation leach tests on concentrates produced from variability samples to examine leach extractions and optimise conditions;
- An additional trade-off is being conducted to asses various comminution circuit options for Fifteen Mile Stream. The study examines the relative merits of a 3CB versus SABC circuit. A similar study should be performed for Cochrane Hill.

This additional testwork and incorporation of the results into the process design is estimated at a cost of $530,000.

Tailings Management

The following recommendations are made with respect to information required to support future tailings management studies for Fifteen Mile Stream and Cochrane Hill:

- Completion of the in-progress geotechnical and hydrogeological site investigations of foundation conditions for the TMF and water management infrastructure at Cochrane Hill (Fifteen Mile Stream completed Q1 2019);
- Geotechnical analyses should be performed based on the collected site investigation data to verify that site selections and design assumptions are appropriate;
- Completion of in-progress geotechnical testwork should be performed on representative tailings and overburden samples for each project to verify design assumptions;
- Completion of embankment seepage and stability analyses should be completed to assess the performance and adequacy of design concepts of the TMF embankments for both projects under both seismic and static loading conditions;
- Advancement of design concepts to support an industrial approval permit application for the projects;
- Development of a full closure and reclamation management plan.

These studies are estimated to cost about $1 M.

26.3.2 Permitting/Environmental

The following recommendations are made with respect to information requirements and stakeholder engagement to support permitting of the Beaver Dam, Fifteen Mile Stream and Cochrane Hill projects:

- Advance project through the environmental and industrial approval permitting process;
- Ongoing site monitoring and baseline data collection;

- Stakeholder engagement;
- Land acquisition.

These studies and data collection activities are estimated to cost $4–$6 M.

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