NOUVEAU MONDE GRAPHITE

NI 43-101 TECHNICAL FEASIBILITY STUDY REPORT FOR THE MATAWINIE GRAPHITE PROJECT

FINAL REPORT

Prepared for:

Nouveau Monde Graphite Inc.

By:

QPs

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Effective Date: July 10th, 2018

Issue Date: December 10th, 2018

Project Number: J02761

MET-CHEM DRA

IMPORTANT NOTICE

This Report, following National Instrument 43-101 rules and guidelines, was prepared for Nouveau Monde Graphite Inc. ("**NMG**") by Met-Chem, a division of DRA Americas Inc. ("**MC-DRA**"). The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in MC-DRA's services, based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this Report. This Report can be filed as a Technical Report with Canadian Securities Regulatory Authorities pursuant to National Instrument 43-101, Standards of Disclosure for Mineral Projects. Except for the purposes legislated under Canadian securities laws, any other uses of this Report by any third party are at that party's sole risk.

This Technical Report contains estimates, projections and conclusions that are forward-looking information within the meaning of applicable laws. Forward-looking statements are based upon the responsible Qualified Person's ("**QP**") opinion at the time they are made but, in most cases, involve significant risks and uncertainty. Although each of the responsible QPs has attempted to identify factors that could cause actual events or results to differ materially from those described in this Report, there may be other factors that could cause events or results not be as anticipated, estimated or projected. There can be no assurance that forward-looking information in this Report will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements or information, Accordingly, readers should not place undue reliance on forward-looking information. Forward-looking information is made as of the effective date of this Technical Report, and none of the QPs assume any obligation to update or revise it to reflect new events or circumstances, unless otherwise required by applicable laws.

DATE AND SIGNATURE PAGE – CERTIFICATES

Effective Date: July 10th, 2018

Issue Date: December 10th, 2018

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Céline M. Charbonneau, P. Eng., do hereby certify that:

1) I am Senior Project Manager with Met-Chem, a division of DRA Americas Inc, with an office at 555 René-Lévesque Blvd. West, 6th Floor, Montréal, Canada;

2) I am a graduate from "*École Polytechnique de Montréal"* with B.Eng. in Geological Engineering in 1985;

3) I am a registered member of "*Ordre des Ingénieurs du Québec*" (#41764);

4) I have worked as a Geological Engineer or Project Manager continuously since my graduation from university;

5) I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;

6) I am responsible for Sections 2.0, 3.0, 18.0 except 18.6 and 18.12, 19.0, 22.0, and 24.0 and contributed part of Sections 1.0, 21.0, 25.0, and 26.0;

7) My prior involvement with the project is preparing and supporting the Technical Report entitled "NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of July 28th, 2017, issued on December 8th, 2017. As well as, the Technical Report entitled "NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of June 27th, 2018, issued on August 10th, 2018;

8) I have visited the project site on May 8th, 2017, May 2nd, June 6th, as well as September 4th, 2018;

9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;

10) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

11) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

Céline M. Charbonneau (sign and seal)

Céline M. Charbonneau, P.Eng., M.Sc.
Senior Project Manager
Met-Chem, a division of DRA Americas Inc.

CERTIFICATE OF AUTHOR

To accompany the Report entitled “NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project” prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Bernard-Olivier Martel, P. Geo, do hereby certify that:

1) I am consulting geologist with B.O Martel Inc., with an office at 5500 Chemin Chambly, office 1, St-Hubert, Canada;

2) I am a graduate from *Université du Québec à Montréal* with in the bachelor’s degree program in geology in 1999;

3) I am a registered member of “*Ordre des géologue du Québec*” (#492);

4) I have worked as a geologist continuously since my graduation from university;

5) I have read the definition of “qualified person” set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;

6) I am responsible for Sections 4.0 to 10.0 and 23.0 and contributed part of Sections 1.0, 25.0, and 26.0;

7) My prior involvement with the project is preparing and supporting the Technical Report entitled “NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project” with an effective date of July 28th, 2017, issued on December 8th, 2017. Aa well as, the Technical Report entitled “NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project” with an effective date of June 27th, 2018, issued on August 10th, 2018.

8) I have visited the project from 24 July to 16 August 2015, from 5 September to 27 September 2015, from 22 October to 2 December 2015, from 6 July to 28 July 2016, from 25 May to 15 June 2017 and from 7 January to 27 January 2018;

9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;

10) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

11) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

____

Bernard-Olivier Martel, P. Geo., # 492
Consulting Geologist
B.O Martel Inc.

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Yann Camus, P. Eng. of Blainville, Quebec, do hereby certify:

1) I am a Mineral Resource Engineer for SGS Canada Inc. - Geostat with an office at 10 Boul. de la Seigneurie East, Suite 203, Blainville, Quebec, Canada, J7C 3V5;
2) I am a graduate of the École Polytechnique de Montréal (B.Sc. Geological Engineer, in 2000). I am a member of good standing, No. 125443, of *the l'Ordre des Ingénieurs du Québec* (Order of Engineers of Quebec). My relevant experience includes continuous mineral resource estimation since my graduation from University (18 years). I am a "Qualified Person" for purposes of National Instrument 43-101 (the "Instrument");
3) I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;
4) I am responsible for Sections 12.0 and 14.0 and contributed part of Section 1.0;
5) My prior involvement with the property is the preparation of the updated mineral resources presented in the Press Release "Nouveau Monde Updates Mineral Resource Estimate for its West Zone Deposit, Matawinie Graphite Property" dated March 2nd, 2017 and preparing and supporting the Technical Report entitled "NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of July 28th, 2017, issued on December 8th, 2017. Aa well as, the Technical Report entitled "NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of June 27th, 2018, issued on August 10th, 2018;
6) I have visited the site on June 21st, 2018 and November 9th, 2016 for one-day each time;
7) I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared along the guidelines of the Instrument;
8) As of the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report, or part that as a qualified person I'm responsible for, contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

INGÉNIEUR - ENGINEER
Yann Camus
125443
QUÉBEC

Yann Camus, P.Eng.
Mineral Resource Engineer
SGS Canada Inc. - Geostat

Metpro Management Inc.

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Oliver Peters, P.Eng., M.Sc., MBA, do hereby certify that:

1) I am President and Principal Metallurgist with Metpro Management Inc. with an office at 102 Milroy Drive, Peterborough, Ontario, Canada;

2) I am a graduate from RWTH Aachen with a M.Sc. in Mineral Processing in 1998 and an MBA from Athabasca University in 2007;

3) I am a registered member the Professional Engineers of Ontario (100078050);

4) I have worked as a Mineral Processing Engineer and Project Manager continuously since my graduation from university;

5) I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;

6) I am responsible for Sections 13.0 and contributed to parts of Sections 1.0, 25.0, and 26.0;

7) My prior involvement with the project is preparing and supporting the Technical Report entitled "NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of July 28th, 2017, issued on December 8th, 2017. As well as, the Technical Report entitled "NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of June 27th, 2018, issued on August 10th, 2018.

8) I have not visited the project site;

9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;

10) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

11) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

Oliver Peters, P.Eng., M.Sc., MBA
President & Principal Metallurgist
Metpro Management Inc.

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Patrick Pérez, P.Eng., do hereby certify that:

1) I am Senior Mining Engineer with Met-Chem, a division of DRA Americas Inc, with an office at 555 René-Lévesque Blvd. West, 6th Floor, Montréal, Canada;

2) I am a graduate from "*Ecole Nationale Supérieure de Géologie de Nancy*", in France, with a M.Sc. in Geological Engineering in 2003;

3) I am a registered member of APEGS (Association of Professional Engineers and Geoscientists of Saskatchewan), membership #16131;

4) I have worked as a Mining Engineer or Project Manager continuously since my graduation from university;

5) I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;

6) I am responsible for Sections 15.0 and 16.0 and contributed part of Sections 1.0, 21.0, 25.0, and 26.0;

7) My prior involvement with the project is preparing and supporting the Technical Report entitled "NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of July 28th, 2017, issued on December 8th, 2017. As well as, the Technical Report entitled "NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of June 27th, 2018, issued on August 10th, 2018.

8) I have visited the project site on May 8th, 2017;

9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;

10) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

11) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

PROFESSIONAL ENGINEER P. PEREZ MEMBER 16131 SASKATCHEWAN

Patrick Pérez, P.Eng. M.Sc.
Manager Mining Engineering
Met-Chem, a division of DRA Americas Inc.

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Ewald Pengel, P. Eng., do hereby certify that:

1) I am a Senior Process Engineer with Met-Chem, a division of DRA Americas Inc, with an office at 555 René-Lévesque Blvd. West, 6th Floor, Montréal, Canada;

2) I am a graduate from Queen's University, Kingston, Ontario with a B.Sc. in Metallurgical Engineering in 1982 and the University of Pittsburgh, Pittsburgh, Pennsylvania (USA) with a M.Sc. in Mining Engineering in 1985;

3) I am a registered member of Professional Engineers Ontario (90520297) and I am a member of the Canadian Institute of Mining Metallurgy and Petroleum;

   I have worked for 30 years in the mineral industry since graduation;

4) I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;

5) I have prepared and am responsible for Section 17.0 and contributed part of Sections 1.0, 21.0, 25.0, and 26.0;

6) My prior involvement with the project is preparing and supporting the Technical Report entitled "NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of July 28th, 2017, issued on December 8th, 2017. Aa well as, the Technical Report entitled "NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of June 27th, 2018, issued on August 10th, 2018.

7) I have not visited the project site.

8) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;

9) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

10) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

11) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

12) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

LICENSED PROFESSIONAL ENGINEER
E. A. PENGEL
90520297
PROVINCE OF ONTARIO

Ewald Pengel, M.Sc., P. Eng.
Senior Process Engineer
Met-Chem, a division of DRA Americas Inc.

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Jordan Zampini, P. Eng., do hereby certify that:

1) I am a Process Engineer with Met-Chem, a division of DRA Americas Inc, with an office at 555 René-Lévesque Blvd. West, 6th Floor, Montréal, Canada;

2) I am a graduate from McGill University, Montreal, Quebec with a Bachelor of Materials Engineering (Metallurgy) in 2012;

3) I am a registered member of *Ordre des ingénieurs du Québec* (5028661) and I am a member of the Canadian Institute of Mining Metallurgy and Petroleum;

   I have 6 years of experience as a metallurgical or process engineer. I have experience working on engineering studies of all levels from scoping to feasibility preparing process deliverable including flow sheets, design criteria, material balances, equipment lists, equipment sizing and selection, and cost estimates. In addition to engineering studies, I have experience in test work supervision, data analysis, modelling, and simulation, as well as some experience in detailed engineering.

4) I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;

5) I have participated in Section 17.0 and part of Sections 1.0, 21.0, 25.0, and 26.0;

6) I have not visited the project site.

7) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;

8) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

9) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

10) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

11) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

Jordan Zampini
5028661
2018-Dec-10

Jordan Zampini, P. Eng.
Process Engineer
Met-Chem, a division of DRA Americas Inc.

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Martine Paradis, P.Eng. M.Sc., PMP, do hereby certify that:

1) am Environmental Mining Senior Engineer at SNC-Lavalin, with an office at 5500 boulevard des Galeries, Ville de Quebec, Quebec, Canada, G2K 2E2;
2) I am a graduate from Laval University with B.Eng. in geological engineering in 2001 and from Laval University with M.Sc. in Earth Sciences in 2004 respectively;
3) I am a registered member of "*Ordre des Ingénieurs du Québec*" (#126444);
4) I have worked as a Mining Environmental Engineer or Project Manager continuously since my graduation from university;
5) I have read the definition of "qualified person" set out in the National Instrument 43-101 and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be an independent qualified person for the purposes of NI 43-101;
6) I am responsible for Sections 18.6, 18.12, and 20.0 and contributed part of Sections 1.0, 21.0, 25.0, and 26.0;
7) My prior involvement with the project is preparing and supporting the Technical Report entitled "NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of July 28th, 2017, issued on December 8th, 2017. Aa well as, the Technical Report entitled "NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project" with an effective date of June 27th, 2018, issued on August 10th, 2018.
8) I have visited the project site on November 26th, 2017, and May 2nd, 2018;
9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;
10) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

11) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

INGÉNIEURE · ENGINEER
Martine Paradis
126444
QUÉBEC

Martine PARADIS, Eng. M.Sc., PMP
Environmental Mining Engineer & Mine Closure Design Manager
Sustaining Capital, Mining & Metallurgy
SNC-Lavalin Inc

CERTIFICATE OF AUTHOR

To accompany the Report entitled "NI 43-101 Technical Feasibility Study Report for the Matawinie Graphite Project" prepared for Nouveau Monde Graphite Inc. effective as of July 10th, 2018, issued on December 10th, 2018.

I, Martin Saint-Amour, P. Eng., do hereby certify:

1) I am Senior Estimator with Met-Chem, a division of DRA Americas Inc, with an office at 555 René-Lévesque Blvd. West, 6th Floor, Montreal, Quebec, Canada;

2) I am a graduate from "École Polytechnique de Montréal", Montreal, Quebec, Canada with a bachelor's degree in engineering.

3) I am a member of the "Ordre des Ingénieurs du Québec" (membership #116377).

4) I have worked as an engineer for more than 20 years, most of which in the mining and metallurgy industry, in various positions. Prior to joining Met-Chem, I was a consultant in estimating and a lead estimator at SNC-Lavalin Inc. My relevant experience for the purpose of the Study is in estimating on projects' execution as well as studies for the mining and metallurgy industry.

5) I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6) I am responsible for Section 21.0 and contributed part of Section 1.0.

7) I have not had prior involvement with the property that is the subject of the Technical Report.

8) I have not visited the site.

9) I have no personal knowledge as of the date of this certificate of any material fact or change, which is not reflected in this Report;

10) Neither I, nor any affiliated entity of mine, is at present, under an agreement, arrangement or understanding or expects to become, an insider, associate, affiliated entity or employee of Nouveau Monde Graphite Inc., or any associated or affiliated entities;

11) Neither I, nor any affiliated entity of mine, own, directly or indirectly, nor expect to receive, any interest in the properties or securities of Nouveau Monde Graphite Inc., or any associated or affiliated companies;

12) Neither I, nor any affiliated entity of mine, have earned the majority of our income during the preceding three (3) years from Nouveau Monde Graphite Inc., or any associated or affiliated companies;

13) I have read NI 43-101 and Form 43-101F1 and have prepared the Technical Report in compliance with NI 43-101 and Form 43-101F1; and have prepared the Report in conformity with generally accepted Canadian mining industry practice, and as of the date of the certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

This 10th day of December 2018.

INGÉNIEUR - ENGINEER
Martin Saint-Amour
116377
QUÉBEC

Martin Saint-Amour, P. Eng.
Senior Estimator
Met-Chem, a division of DRA Americas Inc.

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

Nouveau Monde Graphite Inc. ("**NMG**") is a listed company trading on the Toronto Stock Exchange under the symbol NOU. NMG owns the Matawinie graphite Property ("**Property**"). The Property consists of 210 map-designated claims forming eight (8) main claim blocks. The Tony Block consists of 145 contiguous map-designated claims. The Tony Claim Block center is located approximately six (6) km South West of the community of Saint-Michel-des-Saints, 120 km as the crow flies North of Montréal.

Following completion of a Pre-Feasibility Study and an Updated Pre-Feasibility Study NI 43-101 Technical Report on the Property prepared by Met-Chem, a division of DRA Americas Inc ("**MC-DRA**") and published in 2017 and in 2018 respectively, NMG mandated MC-DRA to complete a Feasibility Study ("**FS" or "Report**") following National Instrument 43-101 ("**NI 43-101**") rules and guidelines, regarding the Tony Block in order to advance the Project to the next phase.

The FS incorporates the following changes from the Pre-Feasibility Study:

- New results from core and hydrogeology drilling programs performed in late 2017 and early 2018;
- Increase in the production rate from 52,000 tonnes to 100,000 tonnes of graphite concentrate per year;
- Replacement of a permanent crushing system by a semi-mobile in-pit crushing system;
- Relocation of the de-sulphurization plant and related temporary storage facilities for Non-Acid Generating ("**NAG**") and Potentially Acid Generating ("**PAG**") materials from the south of the pit to the concentrator plant area;
- Replacement of the NAG and PAG tailings stockpiles by co-disposition tailings storage whereby the NAG and PAG materials are co-disposed with waste rock underlain with impervious geomembrane liners;
- Change in the mining operation from diesel to an all-electric operation;
- The increase in plant throughput and the addition of the all electric mining fleet coupled with the limited power available at 34.5 kV, requires that the incoming power line from Hydro-Québec to be at 120 kV;
- A mining contractor would be responsible for providing the all-electric mine and service equipment and provide the quality and quantity of ore to the concentrator on a cost per tonne basis over the life of the mine.

To finalize the Report to the requisite standard, MC-DRA worked with renowned engineering firms and suppliers who provided design and cost information to support the capital and operating cost estimates, project schedule, and economic analysis. As shown in Table 2.1, MC-DRA was supported by SGS Geostat, Metpro, and SNC-Lavalin ("**SNC**") as well as ABB and MEDATECH.

1.2 Property Description, Location and Ownership

The Matawinie Property consists of 210 map-designated claims forming eight (8) main claim blocks totalling 11,360 hectares. The Property is fully owned by NMG and is spread over an area of approximately 75 km by 45 km. Since the main focus of this FS is to present an assessment on the Tony Claim Block, only that claim block will be described in this Report. The Tony Block currently consists of 145 contiguous map-designated claims totalling 7,543.86 ha.

The centre of the Tony Claim Block is located approximately six (6) km to the South-West of the community of Saint-Michel-des-Saints in the National Topographic System ("**NTS**") map sheets 31J/09 and 31I/12. Most of the Tony Block lies within the municipality of Saint-Michel-des-Saints, Lanaudière Administrative Region, Province of Quebec, Canada. The centre of the Tony Block is positioned approximately 120 km as the crow flies north of Montréal, more or less at latitude 46.63° and longitude -73.96°.

A large part of the Tony Claim Block is subject to a 2 % Net Smelter Return ("**NSR**") royalty agreement which can be bought back by NMG from 3457265 Canada Inc. and Éric Desaulniers with a total of two (2) lump sum payments of $ 1,000,000 (one payment for each tranche of 1 %). The portion of the claim block subject to the NSR agreement is located over the main mineralized zones, one (1) of which, the West Zone, contains the Mineral Reserves identified in this FS.

1.3 Geological Setting and Mineralization

The Matawinie Property, including the Tony Claim Block, lies in the southwestern portion of the Grenville geological province, and more specifically in the Morin Terrane. The area is host to a variety of rock types, mainly composed of deformed metamorphosed sediments, including paragneiss and calc-silicates. Granitic and pegmatitic intrusions are also present and are observed locally on the Property. The graphite mineralization identified in the Tony Block is hosted in paragneiss horizons and appears as disseminated graphite flakes.

1.4 Exploration

Exploration work on the Tony Block was initiated in late 2013, when a detailed airborne geophysical survey was performed in the area. The 2013 survey was executed following positive results from a regional survey by 3457265 Canada Inc., pursuant to the instructions provided by NMG's technical staff, covering over 2,100 km^2 (confidential internal documents).

NMG's field exploration programs on the Tony Block focused on graphite exploration consisting of:

- Airborne TDEM surveys (2013 and 2015);
- Ground prospecting of conductive targets identified by the airborne surveys (2014-2015);
- Ground geophysical surveying using a portable TDEM system (2014-2017);
- Trenching and channel sampling of the main conductors (2014-2016);
- Drilling of the main mineralized zones (2015-2016 and 2018);
- Metallurgical testing of surface and drill core samples.

From 2014 to 2017, ground PhiSpy TDEM surveys totalling 110 line-kilometres using 100 m line spacing in the targeted areas and 25 m line spacing over the more promising South-East, South-West and West Zones, was performed. The PhiSpy survey results provided a detailed outline of the conductive areas and thus possible mineralized zones, which were used as a basis for planning the trenching and drilling programs.

Trenching on the Tony Block from 2014 to 2016 confirmed the extent of the graphite mineralization on the Property. The trenching work targeted wide conductors on each of the main conductive zones outlined by the 2015-2016 ground PhiSpy surveys. A total of 511 channel samples were collected from the Tony Block. The results from trenches TO-14/16-TR-03, TO-16-TR-10 and TO-16-TR-11 were used in the mineral Resource Estimate for the West Zone (West Zone Deposit).

1.5 Drilling

Exploration drilling on the Tony Block targeted wide conductors on each of the main conductive areas outlined by the 2014 to 2017 ground PhiSpy surveys. A total of 123 exploration drill holes, numbered TO-15-05 to TO-15-74, TO-16-75 to TO-16-116 and TO-18-127 to TO-18-137, were drilled in the Tony Block totalling 19,780.60 m. This included 80 holes totalling 13,848.04 m drilled in the West Zone (or the "West Deposit"). The exploration drill holes mentioned above do not include ten (10) holes drilled for the pit slope geotechnical study and 14 vertical holes for overburden thickness survey in the West Zone.

Mineralization was intercepted 270 times by drilling in the West Zone resulting in the interpretation of a mineralized envelope of about 100 m to 150 m thick from which 19 graphitic horizons, or volumes, were interpreted. These horizons can be followed, sometimes sporadically, from sections W-0400 to W+2200 (a distance of 2,600 m). An additional feature of the West Zone is that some of the horizons separate and coalesce to form wider mineralized volumes. The longest intersection along drill core returned a graphite content of 4.76 % C(g) over 133.7 m although this intersection is considered as being down-dip. Mineralization is open to the North, to the south and at depths greater than 200 m from surface.

The drilling in the South-East Zone of the South deposit consisted of nine (9) holes for a total of 1,551.99 m drilled. Mineralization was intercepted 13 times by drilling resulting in the interpretation that the South-East Zone is composed of two (2) main mineralized horizons (S1 and S2). The highlight of the South-East Zone is the large width of the mineralized horizons. From section S2600 to section S2900 (300 m length), the mineralized horizon ranges from 117 to 160 m true width, with grades varying from 3.19 % to 3.62 % C(g).

The drilling in the South-West Zone of the South deposit consisted of 22 holes for a total of 2,616.6 m drilled. Mineralization was intercepted 57 times by drilling resulting in the interpretation that the South-West Zone is composed of two (2) main mineralized horizons (S1 and S2). The highlight of South-West Zone is a first graphitic horizon (S1) about 30 m thick, followed by a mostly barren interval between 25 and 63 m thick, and finally, a second graphitic horizon (S2) around 40 to 50 m thick, with both graphitic horizons varying from 2.79 % to 5.29 % C(g).

A total of 12 other exploration holes totalling 1,763.97 m was drilled in other mineralized zones on the Property. Although most of these holes intercepted graphite mineralization, the potential for the presence of an economic deposit was lower than that for the West, South-East and South-West Zones, due to thinner mineralized intercepts and/or lower graphite grades.

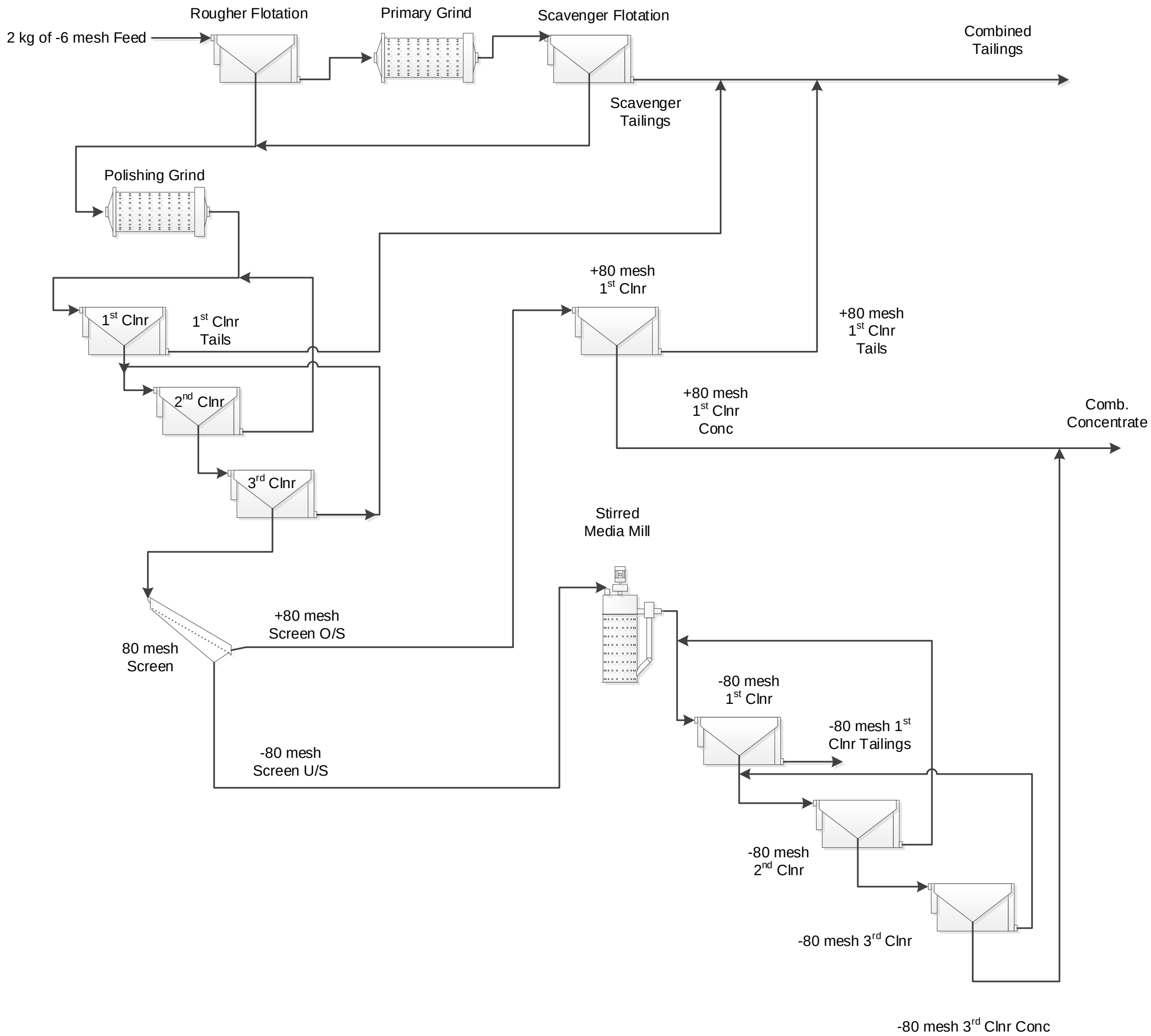
Quality control samples, including blanks, duplicates and graphite standards, were included in the drill core sample stream. Out of the 7,252 drill core samples from the Tony Block sent for graphic carbon [“**C(g)**”] analysis in 2015, 2016 and 2018, 771 were sent as quality control samples. Quality control sample results retuned within acceptable limits. No bias was introduced in the sampling procedures.

1.6 Mineral Processing and Metallurgical Testing

The process component of the FS is based on the results of eight (8) metallurgical programs that were carried out on numerous composites from the Matawinie graphite Project. All test work was completed by SGS Minerals in Lakefield, Ontario. The test work included laboratory scale testing and two (2) bulk sample processing campaigns on a pilot scale.

The process development and optimization programs that were carried out in preparation for the Pre-Feasibility Study (“**PFS**”) culminated in the flotation flow sheet that is depicted in Figure 1.1. One (1) locked cycle test (LCT) was carried out during the FS stage using this flow sheet and a Master composite that represented the first several years of mining operations.

Figure 1.1 – Locked Cycle Test Flow Sheet



The LCT mass balance and results of the size fraction analysis on the final concentrate is presented in Table 1.1 and Table 1.2, respectively. The graphite recovery into the final concentrate was 94.3 % at a combined concentrate grade of 97.0 % C(t). These results are in very good agreement with 97.0 % C(t) at 94 % carbon recovery, which were selected for the PFS and FS to generate the process design criteria and circuit mass balance.

Table 1.1 – Locked Cycle Test Results

Sample ID	Weight (%)	Assays (%) C(t)	Distr. (%) C(t)
Combined Concentrate	4.30	97.0	94.3
+80 mesh 1st Clnr Concentrate	2.20	96.6	48.1
+80 mesh 1st Clnr Tailings	0.01	50.0	0.1
-80 mesh 3rd Clnr Concentrate	2.10	97.4	46.2
-80 mesh 1st Clnr Tailings	0.13	28.3	0.8
1st Clnr Tailings	3.59	1.95	1.6
Scavenger Tailings	92.1	0.15	3.2
Combined Tailings	95.8	0.26	5.7
Head (calc.)	100.1	4.42	100.0

Table 1.2 – LCT Graphite Concentrate Size Fraction Analysis

Size Fraction	Weight (%)	Assays (%) C(t)	Distribution (%) C(t)
+32 mesh	1.0	97.2	1.0
+48 mesh	12.5	97.6	12.5
+65 mesh	18.1	96.8	18.0
+80 mesh	11.4	96.6	11.3
+100 mesh	13.5	96.9	13.4
+150 mesh	13.5	98.4	13.7
+200 mesh	9.8	98.3	9.9
+325 mesh	9.1	97.8	9.1
+400 mesh	2.8	97.3	2.8
-400 mesh	8.2	97.2	8.2
Final Concentrate (SA)	**100.0**	**97.4**	**100.0**

1.7 Mineral Resources Estimates

The block model used to generate the Current Resource of the West Zone for this FS has an effective date of July 10th, 2018. This Resource is based on a total of 104 core drill holes which produced 4,491 samples as well as 207 samples collected from channeling work in three (3) trenches. This does not include the quality control samples which are comprised of 198 duplicates, 198 blanks and 96 standard samples, all of which returned within acceptable limits. In all, 19 mineralized horizons encased in paragneiss units were interpreted and modelled from this data.

The Current Resource block model for the West Zone was prepared by Yann Camus, P. Eng., of SGS Canada Inc. - Geostat office in Blainville, Quebec, Canada ("SGS Geostat"), using the Genesis© mining software. Interpolation was performed using inverse square distance ("**ID²**") as well as different search ellipses which were adapted to the geology of the deposit. The block model was then processed by GEOVIA's Whittle software to provide an optimized pit. The optimized pit containing the Current Resource was limited to the Tony Block Property boundary to the South of the West Zone Deposit at the effective date of the Resource Estimate (July 10th, 2018). The Mineral Resources of the West Zone are presented in the Table 1.3.

Table 1.3 – Pit-Constrained Mineral Resource Estimate for the West Zone[1]

Mineral Resource Category[2]	Current Resource (July 10th, 2018) [7]		
	Tonnage (Mt)[5,6]	Grade [% C(g)][3]	C(g) (Mt)
Indicated	95.8	4.28	4.10
Inferred[4]	14.0	4.19	0.59

1 The Mineral Resources provided in this table were estimated using current Canadian Institute of Mining, Metallurgy and Petroleum ("**CIM**") Standards on Mineral Resources and Reserves, Definitions and Guidelines.
2 Mineral resources that are not mineral reserves have not demonstrated economic viability. Additional trenching and/or drilling will be required to convert Inferred and Indicated Mineral Resources to Measured Mineral Resources. There is no certainty that any part of a mineral resource will ever be converted into reserves.
3 All analyses used for the Resource Estimates were performed by ALS Minerals Laboratories and delivered as % C(g), internal analytical code C-IR18.
4 Inferred Mineral Resources represent material that is considered too speculative to be included in economic evaluations. Additional trenching and/or drilling will be required to convert Inferred Mineral Resources to Indicated or Measured Mineral Resources. It cannot be assumed that all or any part of the inferred resources will ever be upgraded to a higher resource category.
5 Current Resource effective July 10th, 2018.
6 Mineral Resources are stated at a cut-off grade of 1.78 % C(g).
7 Standards used for this resource update are the same standards produced over the course of the Pre-Feasibility Study (results published October 25th, 2017). The difference comes from a newly acquired land package (see July 5th, 2017 press release), the south-west extension drilled in 2018, the new hydrogeological and geotechnical data.

1.8 Mineral Reserve Estimates

The Mineral Reserves for the West Zone Deposit were prepared by MC-DRA using best practices in accordance with CIM guidelines and following National Instrument 43-101 rules and guidelines. The Mineral Reserves are the Measured and Indicated Mineral Resources that have been identified as being economically extractable and which incorporate mining losses and the addition of waste dilution.

The first step in the Mineral Reserve estimate was to carry out a pit optimization analysis. The pit optimization analysis used economic criteria to determine the cut-off grade and to limit the extent at which the deposit can be mined profitably. The pit optimization analysis was done using the MS-Economic Planner module of MineSight®. The optimizer uses the 3D Lerchs-Grossmann algorithm to determine the economic pit limits based on input of mining and processing costs and revenue per block.

The pit optimization analysis shows that the open pit design should be based on PIT33 (Revenue Factor - 0.7). This pit shell contains 63.9 Mt of Indicated Mineral Resources at a strip ratio of 0.8 to 1 (waste to ore). Mining additional resources with an open pit beyond the limits of this pit shell increases the stripping ratio. Although a slight increase in NPV is observed for PIT38, it was decided to remain at a lower stripping ratio.

The pit designed for the Tony Block consists of five (5) phases of varying size and grade. The ultimate pit (all phases combined) is approximately 2,600 m long and 380 m wide at surface with a maximum pit depth from surface of 235 m. The total surface area of the pit is roughly 680,000 m^2. The overburden thickness varies along the strike of the mineralization, increasing in thickness towards the North. For Phases 1, 2, and 3 of the Project, overburden thickness is on average five (5) m ranging between 0 to 15 m in thickness. In Phases 4 and 5, overburden thickness increases and varies between 10 and 38 m.

The open pit design includes 59.8 Mt of Probable Mineral Reserves at a diluted grade of 4.35 % Cg. In order to access these reserves, 13.2 Mt of overburden and 50.0 Mt of waste rock will need to be removed. This results in a stripping ratio of 1.06 to 1 (waste/ore). Table 1.4 presents the open pit Mineral Reserves for the Tony Block.

The effective date of the Mineral Reserve estimate is July 10th, 2018.

Table 1.4 – Open Pit Mineral Reserves

Category	Tonnage (Mt)	Cg Grade (%)
Proven	0	0
Probable	59.8	4.35
Proven & Probable	59.8	4.35

1.9 Mining Methods

The mining method selected for the Project will consist of an open pit truck and shovel operation considering an all-electric fleet. In addition, an in-pit crushing and conveying system will supply crushed ore to the concentrator. Vegetation, topsoil and overburden will be stripped and stockpiled for future reclamation use. The ore and waste rock will be mined with five (5) m high benches, drilled, blasted and loaded into rigid frame haul trucks with hydraulic excavators.

The use of electric equipment for drilling, loading and hauling operations will minimize carbon emissions over the duration of the mine life. This incentive aligns directly with NMG's low environmental impact initiative. The design and implementation of an all-electric mining project is an opportunity to reduce the environmental impact on the community of Saint-Michel-des-Saints.

A mine plan was developed which supplies the required amount of ore to produce 100,000 tonnes of graphite concentrate per year. The ultimate pit design consists of five (5) phases of production to assure a consistent feed grade for the entire 26-year mine life of the Project.

The initial starter pit (Phase 1) was designed at the south most extension closest to NMG's Property boundaries. The majority of the Run-of-Mine ("**ROM**") ore for the first four (4) years of the operation will be supplied from the initial starter pit and will be mined to completion to allow in-pit backfilling of waste and tailings (PAG and NAG). Mining will commence in Phase 1 and progress toward the north reaching Phase 5.

This mining sequence will help minimize the Project's environmental footprint as the disposal of waste, PAG and NAG tailings can commence backfilling in-pit as early as Year 5 of production. The driving factor for the mining sequence is the progressive reclamation of the site while minimizing the environmental footprint and assuring a consistent feed grade (Cg %) to the mill. This involves maximizing the backfilling of waste and tailings in-pit and minimizing the size of any external co-disposal stockpile.

Due to the configuration of the pit, starting in the south extension will also minimize overburden ("**OB**") removal as the majority of overburden is located in the Phases 4 and 5 areas. Phase 2 consists of an extension of Phase 1 to the north and will be predominately mined between Years 2 and 8 of operation. Phase 3 consists of a high-grade zone which will be blended with Phase 4 material (located north of Phase 3) to facilitate a consistent blend to the mill.

The mining operations will be carried out by a mining contractor who will operate the mine, five (5) days per week, and 16-hour per day. The mining contractor will also operate the in-pit crushers five (5) days per week and 12-hour per day. Since the concentrator is designed to operate continuously 24-hour per day year-round, an ore stockpile was designed in order to maintain the ROM ore feed to the plant during nights, weekends and when mining operations are idle.

1.10 Recovery Methods

The concentrator is located near the open pit mine and is designed to produce a nominal 100,000 tonnes of high-grade graphite concentrate per year.

The ROM mineralized material will be crushed by the in-pit crushers prior to being transported from the pit to the covered stockpile by conveyor. The crushed material is reclaimed from the stockpile and ground in a SAG mill. The SAG mill discharge is screened and the screen oversize is returned back to the SAG mill. The SAG screen undersize is pumped to the ball mill circuit. The ball mill is in closed circuit with rougher flotation and the cyclones. This allows for the removal of larger graphite flakes as soon as they are liberated from the ore and helps maintain graphite flake integrity. The cyclone overflow flows to scavenger flotation. The scavenger tailings are pumped to the final tailings treatment plant via the concentrator tailings thickener.

The combined rougher and scavenger concentrates are dewatered to obtain the proper pulp density and polished in a polishing mill using ceramic media. The polishing mill scrubs the surface of the graphite flakes and thus removes the gangue minerals that are attached to the flakes. The polished concentrate is refloated in the primary column.

The primary cleaner concentrate is screened to separate fine and coarse flakes. The screen oversize is the final product and is transported to the graphite concentrate thickener. The screen undersize undergoes the same process with slightly harsher polishing and column flotation. The fine cleaner concentrate combines with the coarser concentrate and both are pumped to the graphite concentrate thickener. Both cleaner tailings go to the tailings thickener.

The final graphite concentrate is thickened, filtered and dried. After drying the product is dry screened into four (4) products and bagged in super sacks for transport.

The graphite flotation reagents are fuel oil and Methyl Isobutyl Carbinol (“**MIBC**”). Almost all the flotation reagents will be adsorbed by the graphite.

The concentrator tailings are initially thickened for process water recovery and then pumped to the de-sulphurization plant. The concentrator tailings are de-sulphurized by sulphide flotation and magnetic separation to produce clean Non-Acid Generating (“**NAG**”) tailings. The NAG tailings and the sulphide concentrate (“**PAG**” tailings) are filtered and stockpiled before being trucked to the co-disposition site.

1.11 Project Infrastructure

The Project infrastructure includes the 120 kV electrical power line, the main access road and site roads, general site works, site electrical distribution and communication, site fire protection, fresh water, potable water and sewage treatment, auxiliary buildings, water treatment and tailings and water management facilities.

1.11.1 Water Management Plan

The mine water management plan addresses the surface runoff and the process water that are to be collected from the industrial areas including the open pit, the overburden/topsoil stockpiles and co-disposal storage facilities (“**CSF**”) of the Matawinie mine site. The water management infrastructure (i.e. basins and pumping requirements) is sized based on the required volume of surface runoff to manage, which varies based on the catchment area of the CSF and the open pit. Hence, the water management plan is divided into three (3) distinct phases (A, B1 and B2) as the drainage area increases with the mine development. Treated water from the Water Treatment Plant will be discharged into a polishing basin to be partly reused in the mineral processing plant while the remaining water will be discharged in the *ruisseau à l'eau morte* following monitoring of flow and water quality in full compliance with applicable laws, regulations and standards.

1.11.2 Tailings and Waste Rock Storage Facility

Co-disposal methodology will be used to manage tailings and waste rock generated by mining activities. Tailings produced at the NMG concentrator are PAG and will be subjected to a de-sulphurization process. De-sulphurized tailings (NAG) and sulphide concentrate (PAG) will then be filtered and placed with the waste rocks in co-disposition cells to form a co-disposal stockpile. From Year 5, co-disposition will also be carried out in the mine pit. A total of 56.49 Mm^3 (60 %) of waste rocks and tailings will be managed out of which 22.6 Mm^3 (40 %) will be placed in-pit. Progressive restoration of the co-disposal stockpile will also be carried out starting at Year 4 of mine operation.

1.12 Market Studies and Contracts

Graphite is a material with unique chemical, electrical, mechanical and thermal properties, which allows it to find demand from a very wide array of applications, from pencil lids and refractory bricks, to battery active anode. Natural Graphite is one of the commercial types of this material and is available in an array of commercial grades with different purity, particle size and morphology. Among the traditional applications, the refractory industry is the most relevant, and looking into future trends, anode material for lithium-ion batteries is the most promising. China is the largest producer, followed by Brazil and Mozambique.

The graphite concentrate sales price used for the FS was established at $ 2,261 (1,730 USD) per tonne. The selling price was calculated using price forecasts provided by Benchmark Mineral Intelligence ("**Benchmark**"). Benchmark is an independent credible source who compiles international graphite prices for various commercial size fractions and concentrate purities. The Tony Block's West Zone graphite concentrate value was calculated based on the weighted average of each size fraction and purity obtained during the metallurgical testing. No contracts relevant to the FS have been established by NMG. NMG has not hedged, nor committed any of its production pursuant to an offtake agreement.

1.13 Environmental Studies, Permitting and Social or Community Impact

Several environmental baseline studies have been completed since 2015 to set environmental reference values and to identify any major environmental issues. In parallel, several stakeholder and public engagement activities were set forth since 2015 to obtain an overview of potential socioeconomic issues and to propose adequate measures to foster the social acceptability of the Project and its harmonious insertion at the local level.

Fieldwork to describe the receiving environment started in June 2016 and continued through to October 2018, and focused on the following components: soil characterization; sediment characterization; geochemistry, hydrogeology; surface water quality; groundwater quality; noise environment; vegetation, wetlands and special status plant species; aquatic fauna and fish fauna; small mammals; amphibians and reptiles; bats; and birds. Some results on soil characterization, geochemistry, hydrogeology, and groundwater quality are still to come as these studies are in progress.

Modelling studies are under preparation to better understand the Project's impacts and propose relevant mitigation measures (noise, air emission, hydrogeology, etc.). Baseline studies on other environmental components were completed using existing data. According to the results of the current baseline studies, no major environmental issues likely to have an impact on resource extraction were identified in the study area. However, specific mitigation measures have been integrated into the FS as progressive reclamation of the co-disposal waste and tailings storage facility. In addition, stakeholders and the public have raised issues that relate to noise, air quality, transportation and safety, loss of property value and physical and psychosocial health, among others. A stakeholder committee has been formed to follow up on the Project's advancement and to collaboratively design adequate mitigation measures. The Atikamekw First Nation of Manawan and the Council of the Atikamekw First Nation is also involved in this process and in discussions aiming to lead to a pre-development agreement.

NMG is planning to prepare an Environmental and Social Impact Assessment ("**ESIA**") report based on the directive issued in February 2018 by the Ministry responsible for the Environment ("**MDDELCC**") in order to get a Decree. If and once the Certificate of Authorization is issued, NMG will be required to obtain all other environmental permits requested by the law to fully operate its mining project. At the same time, the Project will need to undertake the environmental monitoring activities as described in the ESIA report and/or requested by the government authorities.

1.14 Capital and Operating Costs

1.14.1 Capital Cost Estimate

The Project scope covered in this Report is based on the construction of a green field mining and processing facility with an average mill feed capacity of 2.37 million tonnes per year of ore and producing 100,000 tonnes per year of graphite concentrate. The capital and operating cost estimates related to the mine, the concentrator, and all required facilities and infrastructure have been developed by MC-DRA or consolidated from external sources.

The capital cost estimate (“**Capex**”) consists of direct and indirect capital costs as well as a contingency. Provision for sustaining capital is also included, mainly for the development of the co-disposition area, and capital requirements as the mine development moves from the south to the north. Amounts for closure and rehabilitation of the site have been estimated as well.

The Capex includes the material, equipment, labour and freight required for the mine pre-development, processing facilities, tailings storage and management, as well as all infrastructure and services necessary to support the operation.

The Capex prepared for this Study is based on a Class 3 type estimate as per the American Association of Cost Engineers (“**AACE**”) Recommended Practice 47R-11 with a target accuracy of ± 15 %.

Table 1.5 presents a summary of the pre-production initial capital and the sustaining capital costs for the Project.

Table 1.5 – Summary of Capital Cost Estimate

Summary of Capital Cost Estimate ($000 CAD)			
Description	**Initial Costs**	**Sustaining Costs**	**LoM Costs**
Direct Costs			
Mining	16,833	4,155	20,988
Processing Plant	105,017	-	105,017
Infrastructure	11,420	-	11,420
Tailings and Water Management	48,177	38,760	86,937
Electrical Distribution	23,486	8,085	31,571
Sub-Total Direct Costs	**204,933**	**51,000**	**255,933**
Indirect and Owner's Costs			
Project Development Costs	2,327	-	2,327
EPCM Costs	21,703	957	22,660
Owner's Costs	14,732	-	14,732
Sub-Total Indirect Costs	**38,762**	**957**	**39,719**
Contingency	31,476	8,731	40,207
Closure Costs	6,250	6,250	12,501
NSR Buyout	2,000	-	2,000
Total Costs	**283,421**	**66,938**	**350,360**

Totals may not add up due to rounding

1.14.2 Operating Costs Estimate

The estimated operating costs of the Project cover the mining, processing, general administration and site services. Table 1.6 presents the operating costs summary.

The sources of information used to develop the operating costs include in-house databases and outside sources, particularly for materials, services and consumables.

Table 1.6 – Operating Costs Summary

Description	Cost per Year ($)	Cost /tonne of concentrate ($/t concentrate)	Total Costs (%)
Mining (Average over life)	17,776,100	177.76	35.6
Tailings (Average over life)	5,872,892	58.73	11.8
Ore Processing	23,270,908	232.70	46.6
Site Services	886,080	8.86	1.8
General and Administration	2,123,010	21.23	4.3
Total Opex	**49,928,990**	**499.29**	**100.0**

*Totals may not add up due to rounding

1.15 Economic Analysis

An economic analysis based on the production and cost parameters of the Project was prepared and the results are shown in Table 1.7. In the analysis, an average EXW-mine graphite concentrate selling price of $ 1,730 US per tonne and a USD/CAD exchange rate of 0.7651 (1.307 CAD/USD) were assumed.

Table 1.7 – Summary of Life of Project Production, Revenues, and Costs

Description	Units	Value
Production – Mineralization	M tonnes	59.9
Production – Concentrate @ 97.0 % Cg	k tonnes	2,520.4
Revenue	M CAD	5,703.0
Operating Costs	M CAD	1,261.2
Initial Capital Costs (excludes Working Capital)	M CAD	276.2
Sustaining Capital Costs	M CAD	59.8
Closure Costs	M CAD	14.4
Total Pre-Tax Cash Flow	M CAD	4,091.4
Total After-Tax Cash Flow	M CAD	2,449.5

The financial indicators associated with the economic analysis are summarized in Table 1.8.

Table 1.8 – Summary of Financial Indicators

Description	Units	Value
Pre-Tax		
Payback Period	Years	2.2
NPV @ 6 %	M CAD	1,673.8
NPV @ 8 %	M CAD	1,286.8
NPV @ 10 %	M CAD	1,002.7
Internal Rate of Return	%	40.6
After-Tax		
Payback Period	Years	2.6
NPV @ 6 %	M CAD	986.7
NPV @ 8 %	M CAD	750.8
NPV @ 10 %	M CAD	577.2
Internal Rate of Return	%	32.2

Figure 1.2 and Figure 1.3 show the sensitivity of the after-tax NPV and IRR, respectively, to variations in Capex, Opex, Selling Prices and the USD/CAD Exchange Rate. The vertical dashed lines represent the typical margin-of-error interval associated with FS-level cost estimates.

This Report was compiled according to widely accepted industry standards. However, there is no certainty that the conclusions reached in this Report will be realized.

Figure 1.2 – Sensitivity of Project NPV @ 8 % (After Tax)

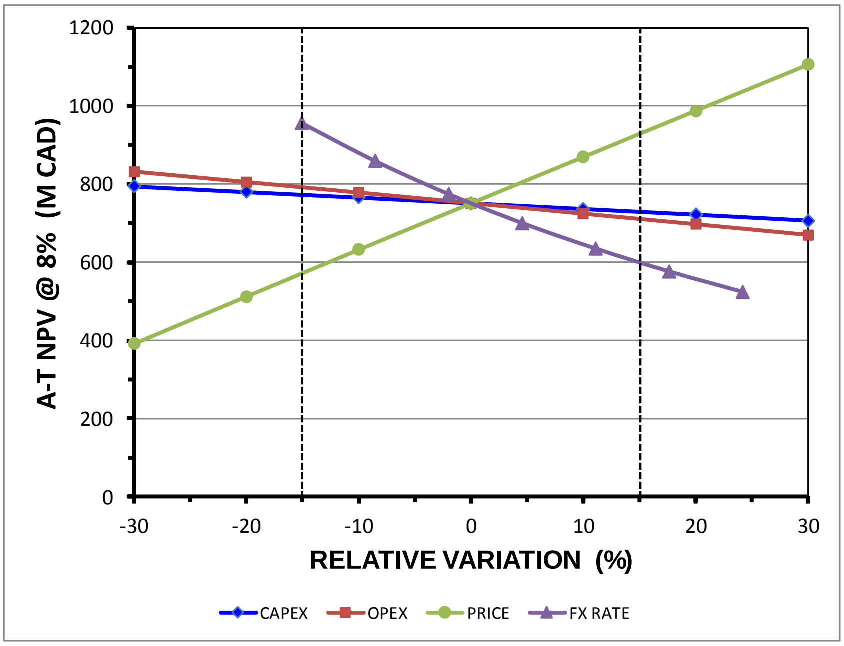
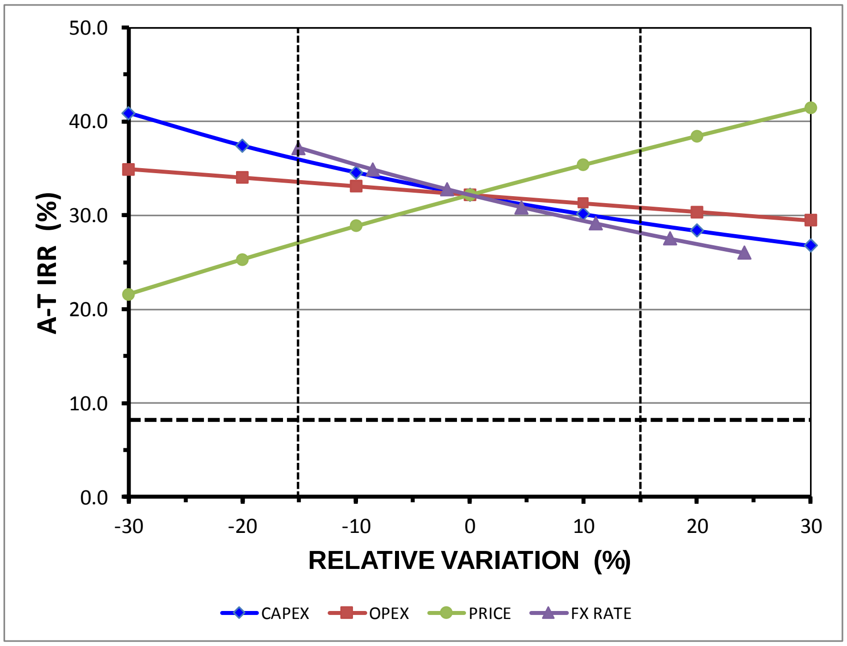


Figure 1.3 – Sensitivity of Project IRR (After Tax)



1.16 Interpretation and Conclusions

1.16.1 Exploration Activities

Exploration work on the Project targeted graphite mineralization and consists to date of airborne geophysics (Mag and TDEM), prospecting, ground TDEM surveying, trenching/channel sampling and core drilling. Surface and core samples were also collected for metallurgical tests including representative master composites of the West Zone. Exploration work by NMG was initiated on the Tony Claim Block in summer of 2014 which resulted in the discovery of seven (7) mineralized zones. These zones are named the Far West, West, North, North-East, East, South-East and South-West Zones. No other known mineral occurrences were identified on the Project area prior to the exploration work performed by NMG.

Exploration activities by NMG have culminated in the identification of a Probable Mineral Reserve for the West Zone as well as a Mineral Resource Estimate combining the South-East and South-West mineralization present on NMG's Tony Claim Block. The Probable Mineral Reserve of the West Zone is based on 4,491 assay intervals collected from core drilling and three (3) surface trenches providing 207 channel samples. Proper quality control measures were used throughout the exploration programs leading to the Probable Mineral Reserves detailed in this Report.

1.16.2 Mineral Processing and Testing

The metallurgical test program that was carried out to support the FS confirmed the robustness of the flow sheet that was developed during the PFS.

The additional testing that was completed to address risks and opportunities that have been identified led to the following conclusions:

- A Master composite representing the first few years of planned mining operation and mine plan variability composites confirmed the metallurgical results that were obtained in the flow sheet development and optimization programs. This consistent metallurgical response further reduces the process risk of the Project.
- Process water re-circulation can result in undesirable activation of sulphides in the rougher/scavenger stage and increased sulphide grades in the final graphite concentrate. Further work will be required to develop a better understanding of the impact of process water circulation time and ageing on the activation of sulphides.
- Laboratory simulations of the Outotec SkimAir® technology has not resulted in a superior concentrate product. However, this evaluation is based on two (2) tests only. Longer term and larger scale testing would be required to determine the attractiveness of the technology.

- Optimized conditions have been developed for the desulphurization stage, but a full characterization of representative low-sulphur and high-sulphur tailings have not been completed.

All test programs completed to-date generated conclusive results and further laboratory scale development testing is deemed unnecessary at this point, especially when considering the new 3.5 t/h demonstration plant commissioned to process the West Zone material.

The demonstration plant has been designed with a capacity of 3.5 t/h will process approximately 40,000 tonnes of ore over a period of two (2) years. The operation of the demonstration plant will facilitate the optimization of all unit operations and a systematic investigation of the grinding conditions for the polishing and stirred media mill applications. It will also allow to test process options such as the SkimAir® technology or spirals in the secondary cleaning circuit. The operation of the demonstration plant will provide critical process data to finalize the flow sheet necessary for the detailed engineering phase.

1.16.3 Recovery Methods

The processing plant is designed to process 6,449 t/d of run of mine to produce 100,000 tonnes per year of graphite concentrate grading at about 97 % C(t) based on a concentrate recovery of 94 %. A suitable process flow sheet has been developed which includes crushing, grinding, flotation, polishing, thickening, filtering and drying. The dried concentrate is then classified into various sized products as required by customers.

The concentrator tailings are de-sulphurized in the de-sulphurization plant. The NAG tailings and the sulphide tailings (PAG) are conveyed to separate stockpiles before being trucked to the co-disposition storage facility.

1.16.4 All-Electric

Based on the work carried out in the FS, it was concluded that for this Project, the following all-electric operation scheme was appropriate:

- Waste rocks (0-750 mm) to be transported from the pit to the CSF by electric haul trucks;
- Both NAG and PAG tailings to be transported from their respective stockpiles to the CSF by electric haul trucks;
- Backfill material to be transported to the pit by electric haul trucks; and
- Run-of-mine ore (0-750 mm) to be transported by electric haul trucks to electrically-cabled in-pit crushers, and then subsequently by electrically-fed overland conveyors (0-150 mm) to the concentrator.

1.16.5 Market

NMG is developing a natural graphite Project which will have competitive advantages due to its privileged location, cost structure and experienced team. A demonstration plant (see Press Release dated September 18th, 2018) located near the mine site has been constructed to allow NMG to have an earlier debut in the market and de-risk the first years of sales. One of the goals of this demonstration plant is to secure medium to long term supply agreements with different customers.

1.16.6 Economic Analysis

This Report shows that the Project is technically feasible as well as economically viable.

Based on a 26-year production period and assuming 100 % equity financing, the IRR is 40.6 % before taxes and 32.2 % after taxes.

The authors of this Report consider that the Project is sufficiently robust to warrant moving it to the mine development phase.

1.16.7 Risk Evaluation

There are a number of risks and uncertainties identifiable to any new project and usually cover the mineralization, process, financial, environment and permitting aspects. This Project is no different and an evaluation of the possible risks was undertaken which is summarized in this Section.

1.16.7.1 Mineralization

- The estimates of Mineral Resources and Mineral Reserves for the Property have been prepared in accordance with NI 43-101 rules and guidelines. There are numerous uncertainties inherent in estimating Mineral Resources and Mineral Reserves and no assurance can be given that the anticipated tonnages and grades will be achieved, that the indicated level of recovery will be realized or that any categories of Mineral Resources or Reserves will be upgraded to higher categories. The estimation of mineralization is a subjective process and the accuracy of estimates is a function of quantity and quality of available data, the accuracy of statistical computations and the assumptions and judgments made in interpreting engineering and geological information.
- The Probable Mineral Reserves on which this FS is based are derived from Indicated Resources and thus, have a lower level of confidence than Proven Mineral Reserves which are derived from Measured Mineral Resources. Hence, there could be unexpected internal grades or variations which could result in the Project being uneconomic.

- Limited mineralogical data is presently available for the West Zone mineralization. While this is not an immediate risk, a better understanding of the host rock mineralogy may assist in the final optimization of the graphite and sulphide circuits and may provide an opportunity for generating a saleable by-product.
- Hydrogeology studies are ongoing. Potential water sources that affect the mining operation are surface run-off, rainfall, snowmelt, and groundwater. Additional information will be required prior to construction to assess possible risks. The work needed to gather the necessary data will be included in the next phase of the Project.

1.16.7.2 Process

- The process has been developed based on significant test work on representative samples extracted from the mineralization. Major variations in the quality of mineralization could result in limitation of throughput and quality throughout the process. These limitations include:
    - The crushing and grinding circuit has been designed based on limited comminution data. Significant variations in hardness throughout the life of mine resource could cause a throughput limitation in the comminution circuit;
    - Variability flotation tests completed to date have revealed a consistent metallurgical response of composites representing large areas within the resource. However, the risk of increased variation for smaller areas within the deposit still exists. Any significant variation in the metallurgical response of the mill feed during the first few months and years of operation can have a significant impact on the economics of the Project;
    - The addition of xanthate in the sulphide circuit which may lead to residual xanthate in the process water that is cycled back to the front end of the graphite circuit. The xanthate could result in elevated sulphur recovery into the graphite cleaning circuit and possibly the final graphite concentrate.

1.16.7.3 All-Electric

- Maintenance intervals of battery-electric mobile fleet is uncertain due to a general lack of reference data available in the industry.
- The information from Hydro-Québec for the costs and the schedule to build the new 120 kV power line is incomplete.

1.16.7.4 Mine Infrastructure

- Lack of detailed geotechnical assessment could result in unintended consequences and have a significant impact in the construction Capex and hence must be completed before the start of basic engineering and the finalization of the Project budget.

1.16.7.5 Financing

- The results of the Report were based on certain assumptions that were given as of the date of the Report. The economic assessment reveals that the Project's viability will not be significantly vulnerable to variations in capital and operating costs, within the margins of error associated with the Report estimates. However, the Project's viability remains more vulnerable to the USD/CAD exchange rate and the larger uncertainty in future market prices. Delays and cost overrun can impact the Project rendering it uneconomic.
- Currently, there is a significant demand on the mining community for funds for mining opportunities worldwide. NMG is one of those mining companies who would be seeking financing for a project. Even though, the results of this financial analysis is very positive and shows an excellent return on investment, NMG is a smaller mining operator and funds could be difficult to obtain.
- The mining industry is heavily dependent upon the market price of the metals or minerals being mined. There is no assurance that a profitable market will exist for the sale of the same. There can be no assurance that mineral prices will be such that the Project can be mined at a profit. Mineral prices largely fluctuated over the last years and any serious downturn could prevent the continuation of the exploration, construction and development activities of the Corporation.

1.16.7.6 Environmental and Permitting

- The Project requires licenses and permits from various governmental authorities such as the MELCC. There can be no assurance that NMG will be able to obtain or maintain all necessary licenses and permits that may be required to carry out exploration, development and mining operations and failure to do so could delay or prevent the construction and start-up of the mine as planned.
- Any delay in obtaining the anticipated construction permits would have an adverse effect on the timing and costs associated with start-up. Such delays could also allow other third-party projects to commence production before the Matawinie Graphite Property, thereby potentially reducing NMG's target market share, which would have an adverse impact on the level of product sales and economics of the Matawinie Graphite Property.
- Although NMG has had communications with the local communities and has worked with these communities to mitigate their concerns about the potential project's environmental and social impact, the Project could be delayed by changes in the communities' attitudes necessitating additional studies and design alternatives.

1.17 Recommendations

1.17.1 Next Phase Estimated Costs

Table 1.9 presents the estimated costs for the next phase and the Section below describes the work to be done.

Table 1.9 – Next Phase Estimated Costs

Activity	Estimated Costs ($)
Condemnation Drilling Program, Geotechnical, Hydrology and Hydrogeology Studies	1,050,000
Metallurgical Studies and Tests Works	100,000
Complementary Environmental Studies or Surveys	100,000
Hydro-Québec Preliminary Study (“*Avant-projet*”)	700,000
Hydro-Québec Down Payment	3,000,000
Advance Engineering	2,142,000
Estimated Total Costs	**7,092,000**

1.17.2 Mining and Geology

1.17.2.1 Condemnation Drilling and Geotechnical Studies for Infrastructure

It is proposed to proceed with a 1,500 m drilling program in the sector of the West Zone Deposit aimed at providing more detailed geological data in areas where permanent infrastructure is planned. The goal is to ensure that the permanent infrastructure does not conflict with possible economic mineral deposits in the area. Condemnation drilling will also be combined with geotechnical studies since both aim to characterize the planned locations of the co-disposal stockpiles, the main concentrator site and the water collecting basins. Results will also help in determining the suitability of the underlying material for use in construction. The provisions estimated for the work include all field-work expenses, personnel, laboratory analysis, and the preparation of a final report.

Further geotechnical investigation will have to be carried out at the location of the proposed CSF and water management infrastructure (collecting basins, ditches). Investigations will include additional geotechnical boreholes with rock coring supplemented with laboratory tests including particle size distribution, moisture content, and uniaxial compressive strength on selected soils and rock samples.

Geotechnical and hydrogeology studies aimed at characterizing the overburden, pit wall stability and water pressure within the pit area are a necessary step for the project to go forward. The pit angles could be optimized further once geotechnical and hydrogeological assessments of the mine site are completed.

The work program aims to enhance the understanding of the geotechnical and hydrogeological conditions onsite and to characterize materials in support of the design of the open pit. The work program also includes consultant support to perform geo-mechanical mapping, drilling, trenching and a laboratory program as well as computer modelling to simulate groundwater regime and effects from the mining activities. Additional drilling and testing are recommended in the open pit area to get detailed geotechnical information of the overburden. The use of existing and future exploration drill holes could help in lowering the proposed budget for the hydrogeology program.

1.17.3 Metallurgical Studies and Test Work

A number of process areas require additional characterization in preparation of the detailed engineering stage. Testing to optimize the process and conditions will be completed in the demo plant due to the larger scale and continuous operating mode:

- Optimize the process variables associated with the polishing and stirred media mills. This includes a systematic investigation of the impact of grinding media type and size, retention time, mill speed, and pulp density on the metallurgical response in terms of concentrate grade and flake size distribution. The results of this will help determine whether polishing/cleaning of the coarse fraction is required, and whether upgrading of the graphite using spirals or WHIMS is required to meet the required specifications.
- Establish realistic reagent dosages for the various flotation circuits. Since the demo plant recirculates 100 % of the process water, any residual frother and collector will reduce the reagent dosage requirements.
- Optimize any process equipment design specifications that will require modifications due to the specific nature of graphite. For example, operation of the intermediate and final concentrate thickeners can be challenging due to the persistent froth often observed for graphite concentrates. Specific measures may have to be implemented to address these frothing issues.
- Develop a better understanding of the relationship between PAX dosage in the sulphide rougher and the recovery of sulphides into the final graphite concentrate under continuous operating conditions. This includes the implementation of control mechanisms to reduce the risk of overcollection and the investigation of xanthate destruction technologies and xanthate degradation over time.
- Evaluation of the SkimAir® technology. Outotec can provide a pilot scale cell, which aligns well with the 3.5 t/h nameplate capacity of the demo plant.

- Evaluation of screening and cycloning as dewatering technologies to confirm technical requirements for dewatering.
- Full characterization work on representative low-sulphide and high-sulphide tailings.
- Determine the material characteristics for storage and handling of ore and products. Parameters required for proper bin and pile sizing shall be determined whether with the demonstration plant or with specialized laboratories.
- Packaging cycle times will be determined, and logistics will be optimized for bag loading, inflating, filling, and storage.

1.17.4 Co-Disposal and Water Management Infrastructure

The following additional information is required to address project design refinements and confirm the assumptions made in co-disposal and water treatment engineering:

- Additional stability analysis will be required to include recommendations and optimization in the next engineering phases for:
  - The co-disposal stockpile including the pit wall data for areas where the pile will be located near the pit;
  - The co-disposal stockpile when placed over the backfilled mine pit;
  - Depending of geotechnical data interpretation after the next investigation, stability analysis for collecting basins design may be required;
  - Additional stability analyses to evaluate the effect of the blasting activities on the pit and the co-disposal pile will have to be carried out.
- Additional validation and engineering will have to be carried out regarding a protective rock layer between the in-pit co-disposal and the northern part of the pit where a lake will form after site reclamation;
- Perform instrumented experimental test cell monitoring on site and gather data (oxygen consumption, water content, suction) to improve co-disposal design;
- Collect surface water and process water quality data from laboratory tests and the demonstration project.

1.17.5 All-Electric

- It is recommended that automated (unmanned) charging technology be demonstrated in Canadian climatic conditions, in order to de-risk the Project.
- It is recommended for NMG to market benchmark EV operations for open pit mining applications. It could also target underground mining EV applications which would use the same technology.

1.17.6 Environment

- Undertake air emission, noise, hydrogeology and landscape modelling during the preparation of the environmental impact assessment;
- Perform a land survey in order to properly assess the location and proximity of private and leased lands within a 1 km radius of the proposed open pit;
- Continue the collaborative work with the Community, the Atikamekw First Nation of Manawan and the Stakeholder Committee;
- Continue the engagement with the Atikamekw First Nation of Manawan and the Council of the Atikamekw First Nation in order to reach the pre-development agreement;
- Ensure that all stakeholders and members of the public are engaged for the purpose of the upcoming ESIA;
- Continue holding public consultations in order to properly inform and take into account the local communities' and stakeholders' concerns regarding the Project;
- Pursue the proactive acquisition process;
- Fulfill NMG's engagements and put forth mitigation measures when possible;
- Complete the Environmental and Social Impact Assessment ("**ESIA**") report in winter 2019 following the directive that has been issued by the MELCC for the project (February 2018) and the new set of directives issued after the approval of the new *Loi sur la qualité de l'environnement (March 23, 2018).*

1.18 Opportunities

The location of NMG's Project is a key competitive advantage to supply natural graphite to the North American market. NMG's demonstration plant, which uses ore material from the West Zone to create natural graphite flakes concentrate, (see Press Releases dated May 24th, 2018 and September 18th, 2018) is a pivotal component in de-risking NMG's open pit natural graphite mining project on its Matawinie Property. The demonstration plant will serve to:

- Supply enough quantities of each material group to support an adequate market approach:
- Qualify NMG graphite products and establish a sales record;
- Test and improve processes for commercial operation optimization;
- Implement high standard and innovative technology for tailings and mine waste management as well as site reclamation;
- Start employee training and local future workforce outreach program.

2.0 INTRODUCTION

2.1 The Property

The Matawinie Property presently consists of 210 map-designated claims forming eight (8) main claim blocks totalling 11,360 ha. The Property is spread over an area of approximately 75 km by 45 km. Since the focus of this Report is to detail a Feasibility Study on the Mineral Reserves identified in the Tony Block, only that claim block will be described in the present document. It is important to note that the Tony Block was formally known as claim block "H" or "Hotel" and that a name change occurred in 2015 (see June 17th, 2015 press release). The Tony Block now consists of 145 contiguous map-designated claims totalling 7,543.86 ha.

2.2 Terms of Reference

Following completion of a Pre-Feasibility Study and an Updated Pre-Feasibility Study NI 43-101 Technical Report on the Property prepared by Met-Chem, a division of DRA Americas Inc ("**MC-DRA**") and published in 2017 and in 2018, NMG has mandated MC-DRA to complete a Feasibility Study ("**FS" or "Report**"), following National Instrument 43-101 ("**NI 43-101**") rules and guidelines, regarding the Tony Block in order to advance the Project to the next phase.

This FS is based on the same Resources that were presented in the Updated Pre-Feasibility Study dated August 10th, 2018. The Resources were first presented publicly in the June 27th, 2018 Press Release and the current FS results were presented in the October 25th, 2018 Press Release.

The Report incorporates the new drilling results from the drilling program in late 2017 and 2018.

The Report is based on NMG's decision to increase the production rate from 52,000 tonnes per year to 100,000 tonnes of graphite concentrate per year. Other major changes to the production facilities include replacement of the permanent crushing system to a semi-mobile in-pit crushing system and relocation of the de-sulphurization plant and related temporary storage facilities for NAG and PAG materials from the south of the pit to the plant facilities.

Another major revision from the Pre-Feasibility Study is the elimination of the NAG and PAG tailings stockpiles and addition of a co-disposition tailings storage whereby the Non-Acid Generating ("**NAG**") and Potentially Acid Generating ("**PAG**") materials are co-disposed with waste rock over impervious geomembranes liner at the base of the Co-Disposal Storage Facilities ("**CSF**").

The Report also reflects an all-electric mining operation which is a major change compared to the operation described in the Pre-Feasibility Study. The increase in power requirements along with the limited power available from the previously planned 34.5 kV line necessitated a change in the incoming power line from 34.5 kV to 120 kV to be supplied by Hydro-Québec.

The Report was based on a mining contractor who would be responsible for supplying the all-electric mine and service equipment and to provide the quality and quantity of ore to the concentrator on a cost per tonne basis over the life of the mine.

To finalize the Report to the requisite standard, MC-DRA worked with renown engineering firms and suppliers who provided design and cost information to support the capital and operating cost estimates, project schedule, and economic analysis. As shown in Table 2.1, MC-DRA was supported by SGS Geostat, Metpro, and SNC-Lavalin ("**SNC**") as well as ABB and MEDATECH.

2.3 Source of Information

Much of the historical and geological information was gathered from Québec government databases and NMG internal documents.

When applicable, the document code given for historical assessment reports made available by the *Ministère de l'Énergie et des Ressources Naturelles* ("**MERN**") in the form of GM XXXXX (and others in the form of DV XXX, RG XXX or MM XX-XX etc…) was used for reference purposes in this Report. These reports can be viewed free of charge on the MERN website (http://sigeom.mines.gouv.qc.ca/signet/classes/I1102_indexAccueil?l=a) using the SIGEOM or EXAMINE applications. Such reports usually contain technical information on geological, geochemical or/and geophysical work conducted by mineral exploration companies. Government compilations of geoscientific work, historical drilling, geophysical surveys and other aspects of mineral exploration are also available on the SIGEOM and EXAMINE systems.

Information about land tenure or claims was gathered from the MERN's online GESTIM system (https://gestim.mines.gouv.qc.ca) on October 24th, 2018. This system provides a downloadable claim database in various GIS formats, as well as an online viewer.

Some land tenure information was provided by NMG, as well as the underlying agreements and technical information not in the public domain. All of this information appears to be of sound quality.

In addition to public information, reports and information supplied by NMG, MC-DRA used the information contained in relevant reports by SGS Geostat and by Metpro Management Inc., in the preparation of the present Report.

Other sources of information used in this Report are listed in the references or elsewhere in the text of the Report.

2.3.1 Contributing Authors

This Report was completed with the efforts of five (5) companies and one (1) individual: SGS Geostat, Metpro Management Inc, SNC-Lavalin, MC-DRA, Bernard-Olivier Martel, P. Geo.

2.3.2 Qualified Persons

The main Qualified Persons ("**QP**s") responsible for the development of this Report are Yann Camus P. Eng. from SGS Geostat, Oliver Peters P. Eng., M. Sc., MBA from Metpro Management Inc., Martine Paradis, P. Eng., M. Sc. from SLC-Lavalin, Patrick Perez, P. Eng., M. Sc., Ewald Pengel, P. Eng., M. Sc., Jordan Zampini, P. Eng., Martin Saint-Amour, P. Eng. and Celine M. Charbonneau, P. Eng., M. Sc. all with MC-DRA, Bernard-Olivier Martel, P. Geo., B. Sc.

Table 2.1 provides a list of QPs and their respective sections of responsibility. The QP's certificates can be found at the beginning of the Report under Date and Signature – Certificates.

Table 2.1 – Qualified Persons and their Respective Sections of Responsibilities

Section	Title of Section	Qualified Persons
1.0	Summary	Céline M. Charbonneau and related QPs
2.0	Introduction	Céline M. Charbonneau and related QPs
3.0	Reliance on Other Experts	Céline M. Charbonneau and related QPs
4.0	Property Description and Location	Bernard-Olivier Martel
5.0	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Bernard-Olivier Martel
6.0	History	Bernard-Olivier Martel
7.0	Geological Setting and Mineralization	Bernard-Olivier Martel
8.0	Deposit Types	Bernard-Olivier Martel
9.0	Exploration	Bernard-Olivier Martel
10.0	Drilling	Bernard-Olivier Martel
11.0	Sample Preparation, Analysis and Security	Bernard-Olivier Martel
12.0	Data Verification	Yann Camus, SGS Geostat
13.0	Mineral Processing and Metallurgical Testing	Oliver Peters, Metpro Management Inc.
14.0	Mineral Resources Estimates	Yann Camus, SGS Geostat

Section	Title of Section	Qualified Persons
15.0	Mineral Reserve Estimates	Patrick Pérez, MC-DRA
16.0	Mining Methods	Patrick Pérez, MC-DRA
17.0	Recovery Methods	Ewald Pengel, MC-DRA Jordan Zampini, MC-DRA
18.0	Project Infrastructure	Céline M. Charbonneau, MC-DRA
18.6	Surface Water Management	Martine Paradis, SNC-Lavalin
18.12	Tailings and Waste Rock Storage Facilities	Martine Paradis, SNC-Lavalin
19.0	Market Studies and Contracts	Céline M. Charbonneau, MC-DRA
20.0	Environmental Studies, Permitting and Social or Community Impact	Martine Paradis, SNC-Lavalin
21.0	Capital and Operating Costs	Martin Saint-Amour, MC-DRA and related QPs
22.0	Economic Analysis	Céline M. Charbonneau, MC-DRA
23.0	Adjacent Properties	Bernard-Olivier Martel
24.0	Other Relevant Data and Information	Céline M. Charbonneau, MC-DRA
25.0	Interpretation and Conclusions	Céline Charbonneau and related QPs
26.0	Recommendations	Céline Charbonneau and related QPs
27.0	References	

2.4 Effective Date and Declaration

This Report is issued in support of the NMG press release, dated October 25th, 2018, entitled "Nouveau Monde Feasibility Study Shows Pre-tax NPV of $ 1,287 Million and IRR of 40.6 % and After-tax NPV of $ 751 Million and IRR of 32.2 % From Its All-Electric Open Pit Mining Project" as well as the NMG press release, dated June 27th, 2018, entitled "Nouveau Monde Increases its Indicated Resources to 95.8 Mt at a Grade of 4.28 % Cg for its West Zone Graphite Deposit – Matawinie Property. The effective date of this Technical Report, completed following NI 43-101 guidelines, is July 10th, 2018 and the issue date is December 10th, 2018.

This Report provides an independent Technical Report for the Feasibility Study of the graphite mineralization of the West Zone Deposit, in conformance with the standards required by NI 43-101 rules and guidelines and Form 43-101 F1. The estimate of mineral resources contained in this Report conforms to the CIM Mineral Resources and Mineral definitions.

The information, conclusions, opinions, and estimates contained herein are based on information available at the effective date of this Report, assumptions, conditions, and qualifications as set forth in this Report, and data, reports, and opinions supplied by NMG and other third-party sources.

It should be understood that the mineral resources which are not mineral reserves do not have demonstrated economic viability. The mineral resources presented in this Technical Report are estimates based on available sampling and on assumptions and parameters available.

2.5 Site Visit

M. Bernard-Olivier Martel, P. Geo. (Québec), B. Sc a qualified person under the terms of NI 43 101, conducted a site visit to the Property from July 24th to August 16th, 2015, from September 5th to September 27th, 2015, from October 22nd to December 2nd, 2015, from July 6th to July 28th, 2016, May 25th, to June 15th, 2017, and from January 7th to January 27th, 2018.

Mr. Yann Camus, P. Eng., a qualified person under the terms of NI 43 101, conducted a site visit to the Property on November 9th, 2016 and on June 21st, 2018.

Patrick Perez, P. Eng., M. Sc., a qualified person under the terms of NI 43-101, conducted a site visit to the Property on May 8th, 2017.

Martine Paradis, P. Eng., M. Sc., a qualified person under the terms of NI 43-101, conducted a site visit to the Property on November 26th, 2017, and May 2nd, 2018. The information required for her work was obtained by SNC team members following site visits (see Section 20.1 for details).

Ms. Céline Charbonneau, P. Eng., M.Sc., a qualified person under the terms of NI 43-101, conducted a site visit to the Property on May 8th, 2017, May 2nd, June 6th, as well as September 4th, 2018.

2.6 Units and Currency

In this Report, all currency amounts are Canadian Dollars ("**CAD**" or "**$**") unless otherwise stated, with commodity prices typically expresses in US Dollars ("**USD**"). Quantities are generally stated in *Système international d'unités* ("**SI**") metric units, the standard Canadian and international practices, including metric tons ("**tonnes**", "**t**") for weight, and kilometres ("**km**") or metres ("**m**") for distance. Abbreviations used in this Report are listed in Section 28.0.

3.0 RELIANCE ON OTHER EXPERTS

MC-DRA prepared this Report using reports and documents as noted in Section 27.0 − References. The authors wish to make clear that they are qualified persons only in respect to the areas in this Report identified in their “Certificates of Qualified Persons”, submitted with this Report to the Canadian Securities Administrators.

The authors wish to state that an independent verification of land titles and tenure was not performed, nor has MC-DRA verified the legality of any underlying agreement (s) that may exist concerning the licences or other agreement (s) between third-party, but has relied on NMG to have conducted the proper legal due diligence.

A draft copy of the Report has been reviewed by NMG. Any changes made as a result of these reviews did not involve any alteration to the conclusions made. Hence, the statement and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are neither false nor misleading at the date of this Report.

MEDATECH has contributed to Section 16.1.9 – Cycle Time and Truck Productivity Estimation, of this Report by providing reference for electric truck travel times including battery charging times given the battery technology selected for the Project. MEDATECH also assisted in developing the Capex for the transition from diesel to all-electric power trains in all the mining equipment. MEDATECH worked very closely with ABB in establishing the power needs and battery charging stations required to maximize the battery charging and minimize the interruption of the mine operations.

MEDATECH is a specialist in Powertrain, Hydraulics and Controls System Engineering. They provide engineering, design, and prototyping service to original equipment manufacturers “OEM’s” specializing in Mobile Equipment. Their products and services range from Electric and Hybrid Powertrain Design such as MEDATECH’s ALTDRIVE system.

Mr. Armando Farhate supplied the data and elaborated the basis of Section 19 – Market Studies and Contracts from the previous study. He is a mechanical engineer who graduated from UNIP – São Paulo, SP, Brazil in 1987. He obtained a postgraduate in Business Administration (MBA) from Mauá – São Paulo, SP, Brazil in 1998. He has worked as a C-Level executive in graphite mining companies in Brazil and Canada for six (6) years.

ABB contributed to this Report, providing the design and Capex and Opex values for the electrical, instrumentation / automation and fire detection and protection systems. ABB is a technology leader in power grids, electrification products, industrial automation and robotics and motion, serving customers in utilities, industry and transport and infrastructure globally. ABB is continuing its history of innovation spanning more than 130 years.

MC-DRA has not verified the legal aspects of the NSR buyout due by NMG. This information was provided by NMG in Section 4.3.

4.0 PROPERTY DESCRIPTION AND LOCATION

The Matawinie Property presently consists of 210 map-designated claims (or "**CDC**") forming eight (8) main claim blocks totalling 11,360 ha. The Property is spread over an area of approximately 75 km by 45 km. Since the focus of this Report is to detail a Feasibility Study on the Mineral Reserves identified in the Tony Block, only that claim block will be described in the present document. It is important to note that the Tony Block was formally known as claim block "H" or "Hotel" and that a name change occurred in 2015 (see June 17th, 2015 press release). The Tony Block now consists of 145 contiguous map-designated claims totalling 7,543.86 ha.

4.1 Location and Access

The centre of the Tony Block is located approximately six (6) km to the South-West of the community of Saint-Michel-des-Saints. The claim block overlaps the National Topographic System (or "**NTS**") map sheets 31J/09 and 31I/12. Most of the Tony Block lies within the municipality of Saint-Michel-des-Saints, Lanaudière Administrative Region, Province of Quebec, Canada. A total of 18 claims on the southwestern portion are completely or partly located within the Unorganized Territory of Saint-Guillaume-Nord, Matawinie Regional County Municipality (or "**MRC**" for *Municipalité Régionale de Comté* in French), also located in the Lanaudière Administrative Region. The centre of the Tony Block is positioned approximately 120 km, as the crow flies, North of Montréal, more or less at latitude 46.63° and longitude -73.96° (See Figure 4.1 and Figure 4.2).

4.2 Type of Mineral Tenure

In the Province of Quebec, claims are now referred to as map-designated claims. These predetermined claims each measure 30" longitude by 30" latitude. Claims can be acquired for a fee using an online form on the GESTIM website (https://gestim.mines.gouv.qc.ca). Claims are valid for a period of two (2) years, after which a certain amount of accumulated work credits on the claims is required for renewal as well as a renewal fee. All 145 claims composing the Tony Claim Block are 100 % owned by NMG. A sufficient amount of credits has been obtained to satisfy statutory work obligations needed to renew the entire Tony Claim Block until at least April of 2019. An amount of $ 8,791.93 will be required to renew all claims forming the Tony Claim Block for an additional two (2) years following their present expiry date.

Figure 4.1 – Matawinie Property Location

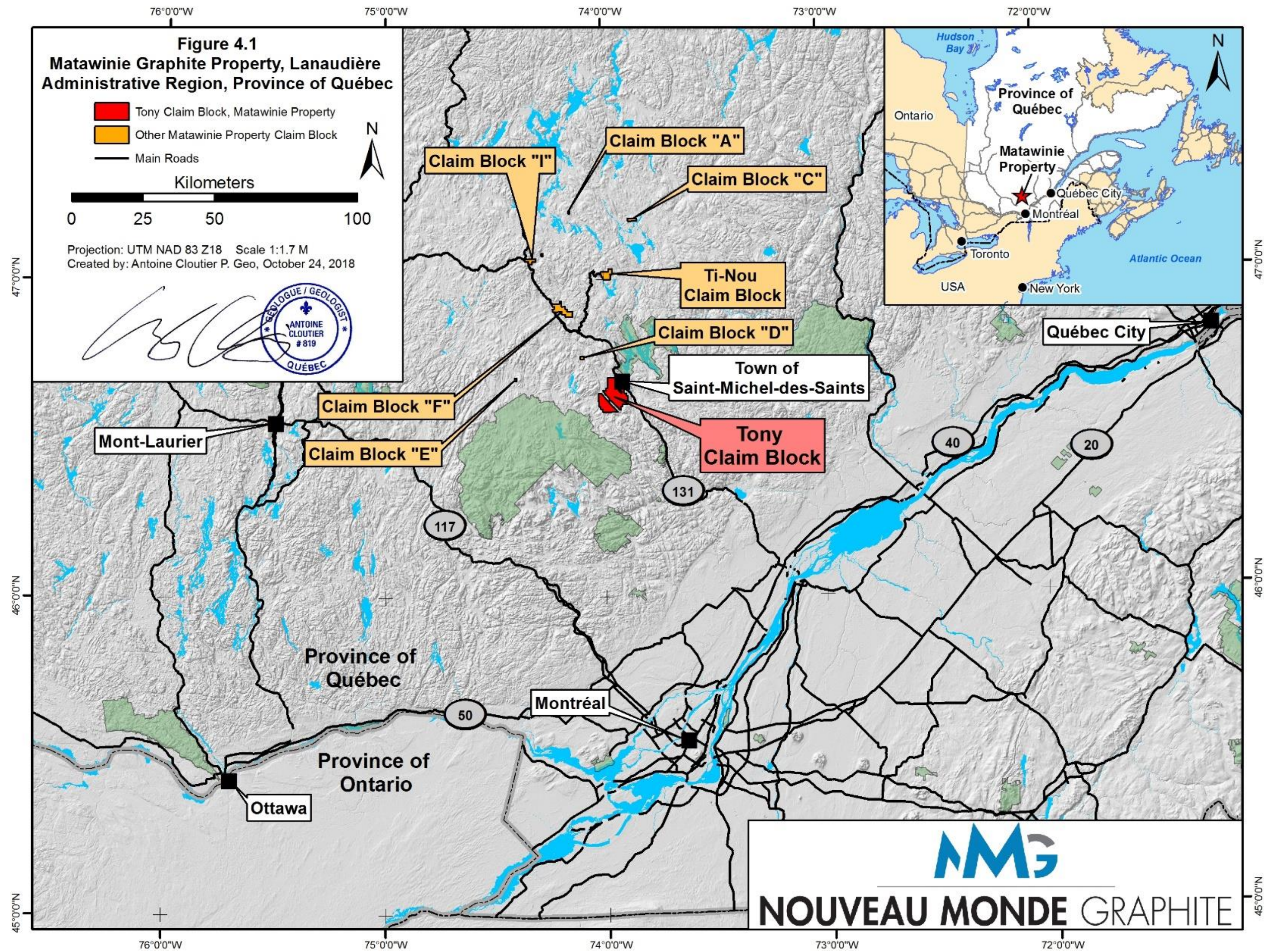
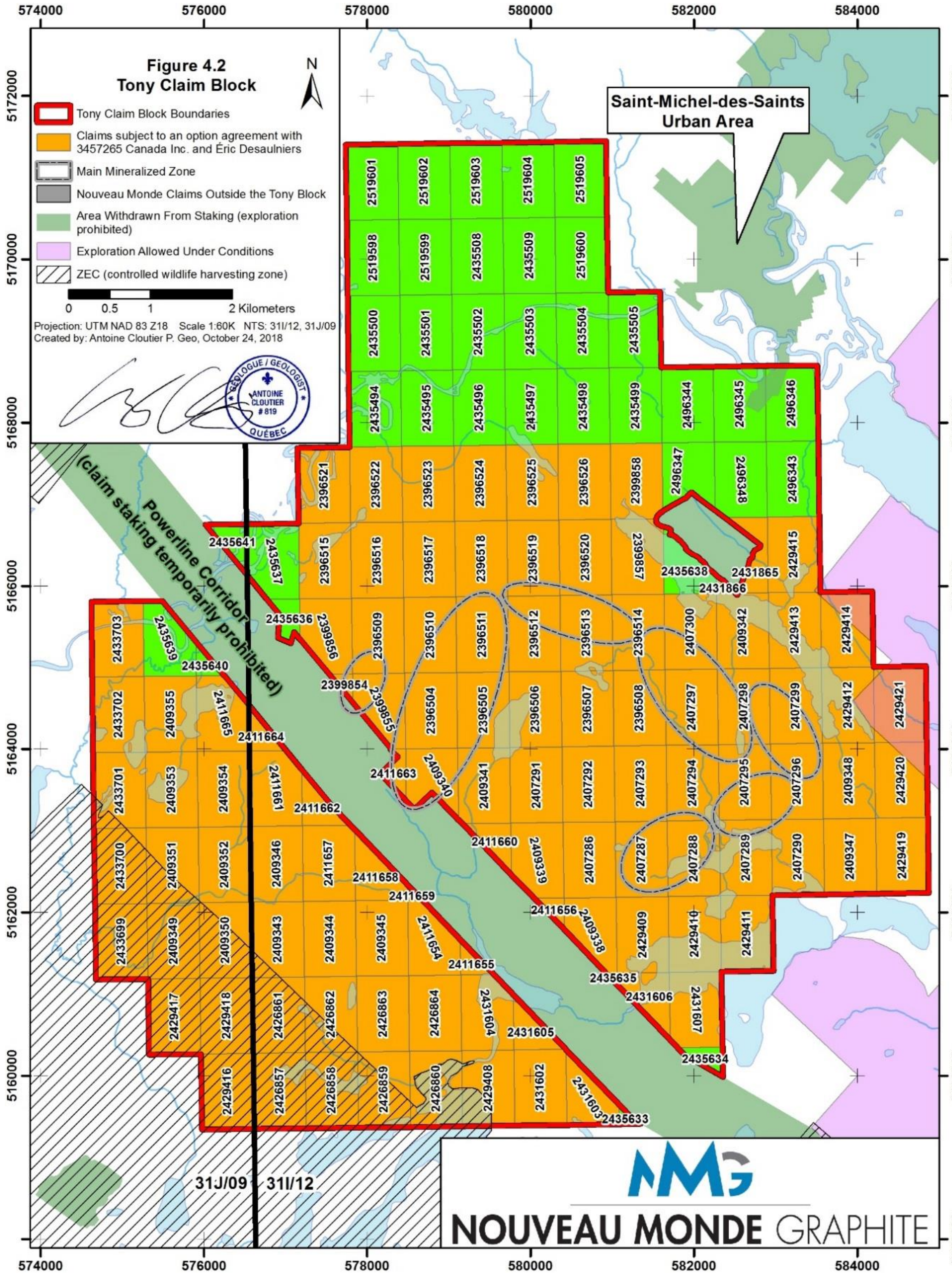


Figure 4.2 – Tony Claim Block



The information, downloaded from the GESTIM website on October 24th, 2018 concerning the claims of the Tony Block, such as work credits required for renewal, credits accumulated from recent work, claim size and expiry date, is presented in Appendix A. Please note that work credits accumulated between April 1st, 2016 and December 31, 2017 are pending approval by the Ministry of Energy and Natural Resources (or "**MERN**"), this includes the 2016-2017 drilling campaigns as well as work pertaining to the preparation of the Preliminary Economic Assessment report (Norda Stelo, 2016), the Pre-Feasibility Technical Report (MC-DRA, 2017).

4.3 Agreements and Royalties Obligations

Of the 145 claims currently comprising the Tony Block, 108 claims totaling 5,695.94 ha were optioned from 3457265 Canada Inc. ("**3457265**"). These claims are illustrated in Figure 4.2. Under the terms of the agreement, 3457265 performed a regional airborne survey over a total surface area of approximately 2,100 km^2, pursuant to the instructions provided by NMG's technical staff. Based on the results of this survey, 3457265 acquired four (4) blocks of claims comprising the Matawinie Property Blocks "F", "G", "I" and part of the Tony Block, previously referred to as Block "H" or "Hotel" (Figure 4.1).

In consideration of the technical support, 3457265 granted NMG an exclusive and irrevocable option to acquire a 100 % interest in the mineral claims forming the four (4) blocks mentioned above. The following summarizes the agreement mentioned above dated February 28th, 2014 and an amendment to that agreement dated January 28th, 2016:

1. Reimbursement of the airborne survey costs and costs related to claim acquisition ($ 317,700) by the issuance of shares at a set price of $ 0.25 per share, subject to approval of the option agreement by the TSX Venture Exchange (the "**Exchange**");
2. The completion of a total of $ 300,000 in exploration work over a period of 24 months, $ 100,000 of which must be provided in the first 12 months and $ 200,000 in the following 12 months;
3. Should NMG proceed with the filing of a positive Preliminary Economic Assessment ("**PEA**"), NMG undertook, within a period of five (5) days following such filing, to either issue 1,000,000 common shares of its share capital, to be divided between 3457265 (900,000 shares) and Éric Desaulniers, President and CEO of NMG, (100,000 shares), or to pay a sum of $ 1,000,000 which will be divided between 3457265 ($ 900,000) and Éric Desaulniers ($ 100,000), at NMG's sole discretion;
4. Should NMG proceed with the filing of a positive Feasibility Study ("**FS**"), NMG undertook, within a period of five (5) days following such filing, to either issue 1,000,000 common shares of its share capital, to be divided between 3457265 (900,000 shares) and Éric Desaulniers (100,000 shares), or to pay a sum of $ 1,000,000 which will be divided between 3457265 ($ 900,000) and Éric Desaulniers ($ 100,000), at NMG's sole discretion;

5. On successful completion of the terms of the agreement, NMG will assume a 100 % interest in the mineral claims subject to a two percent (2 %) Net Smelter Return ("**NSR**") royalty held by 3457265 (1.8 %) and Éric Desaulniers (0.2 %). NMG can buy back the NSR Royalty for the sum of $ 1,000,000 for each 1 % at any time to be shared on a prorate basis between 3457265 and Éric Desaulniers.

It is important to note that since the execution of that agreement and subsequent amendment, the first three (3) terms mentioned above have been successfully met, and all claims comprising the Matawinie Property, including those originally designated by 3457265 (Blocks "F", "G", "H", and "I"), are now fully owned by NMG. Furthermore, as per the third (3) term mentioned above, NMG issued a total of 1,000,000 common shares (900,000 shares to 3457265 and 100,000 shares to Éric Desaulniers) of its share capital in August of 2016 following the filing of the positive PEA (see Press Release dated August 10th, 2016). The filing of this FS will trigger a cash payment, or the issuance of common shares as stipulated in the fourth (4) term mentioned above.

The author has relied on information provided by NMG regarding land tenure, underlying agreements and technical information, and all those sources appear to be of sound quality. The author has not sought a formal legal opinion about the ownership status of the claims comprising the property and has relied on materials presented on the GESTIM website (https://gestim.mines.gouv.qc.ca) and from NMG for all aspects of tenure.

4.4 Permits and Environmental Liabilities

To the best of NMG's and the author's knowledge, NMG is not responsible for any environmental or physical hazards or liabilities within the Tony Block. Subsequent to the field programs carried out since 2014, all trenches were either backfilled or properly graded to prevent possible injuries to land users including local wildlife. NMG has not encountered, nor has it been responsible for any spills or the spread of contaminants during the course of its Project.

Permits needed for the exploration, geotechnical and hydrogeological work completed to date consists of tree clearing permits, provided by the Ministry of Forests, Wildlife and Parks (or "**MFFP**" from the French "*Ministère des Forêts, de la Faune et des Parcs*"). In order to obtain the tree clearing permits, a Certificate of Conformity from the Municipality of Saint-Michel-des-Saints is required. Permits and authorizations were also obtained for NMG's demonstration plant including the ore extraction pit and tailings facilities located on the West Zone. This plant uses the ore from the West Zone Deposit to create natural graphite flakes concentrate (for more details, see Press Releases dated May 24th, 2018 and September 18th, 2018). These permits consist of tree clearing permits as well as a Certificates of Authorizations, delivered by the Ministry of Sustainable Development and the Fight Against Climate Change (or "**MDDELCC**" from the French "*Ministère du développement durable et de la lutte contre le changement climatique*"). Table 4.1 below lists the permits and authorizations obtained to date for work completed on the Tony Claim Block.

Table 4.1 – Permits and Authorizations Acquired for Work on the Tony Block to Date

Permit Type	Activity	Authority*	Permit #	Effective Date	Deadline
Certificate of Conformity	Drilling	SMDS	N/A	15/04/23	N/A
Site access construction authorization	Drilling	MERN	68216200000	15/06/12	16/06/12
Intervention permit for mining activities (tree clearing)	Drilling	MFFP	3017317	15/06/15	16/03/31
Certificate of Conformity	Drilling	SMDS	N/A	15/07/13	N/A
Site access construction authorization	Drilling	MERN	68219100000	15/08/10	16/08/10
Intervention permit for mining activities (tree clearing)	Drilling	MFFP	3017760	15/08/21	16/03/31
Certificate of Conformity	Drilling & Trenching	SMDS	N/A	16/06/10	N/A
Intervention permit for mining activities (tree clearing)	Drilling & Trenching	MFFP	3019212	16/06/28	17/03/31
Certificate of Conformity	Drilling	SMDS	N/A	17/05/09	N/A
Intervention permit for mining activities (tree clearing)	Drilling	MFFP	3020919	17/05/19	18/03/31
Certificate of Conformity	Drilling	SMDS	N/A	17/07/07	N/A
Intervention permit for mining activities (tree clearing)	Drilling	MFFP	3021342	17/07/17	18/03/31
Certificate of Conformity	Demo Plant	SMDS	N/A	17/09/08	N/A
Certificate of Conformity	Drilling	SMDS	N/A	17/10/04	N/A
Intervention permit for mining activities (tree clearing)	Drilling	MFFP	3021967	17/10/20	18/03/31
Restauration Plan Approval	Demo Plant Phase 1**	MERN	8341-0316	17/10/20	N/A
Certificate of Conformity	Drilling	SMDS	N/A	17/10/23	N/A
Intervention permit for mining activities (tree clearing)	Drilling	MFFP	3021999	17/10/26	18/03/31
Certificate of Authorization	Demo Plant Phase 1**	MDDELCC	7610-14-01-05653-10-4011613748	17/10/30	N/A
Intervention permit for mining activities (tree clearing)	Demo Plant Phase 1**	MFFP	3022034	17/11/02	18/03/31
Certificate of Conformity	Demo Plant Phase 2***	SMDS	N/A	17/11/21	N/A
Intervention permit for mining activities (tree clearing)	Demo Plant Phase 1**	MFFP	3022272	18/01/18	18/03/31

Permit Type	Activity	Authority*	Permit #	Effective Date	Deadline
Certificate of Authorization (Modification)	Demo Plant Phase 1**	MDDELCC	7610-14-01-05653-10-4011613748	18/01/19	N/A
Intervention permit for mining activities (tree clearing)	Drilling	MFFP	3022400	18/03/15	18/03/31
Restauration Plan Approval	Demo Plant Phase 2***	MERN	N/A	18/04/27	N/A
Bulk Sample Request	Demo Plant Phase 2***	MERN	N/A	18/05/01	20/05/01
Tailings Location Approval	Demo Plant Phase 2***	MERN	N/A	18/05/01	N/A
Certificate of Authorization	Demo Plant Phase 2***	MDDELCC	7610-14-01-05653-11-401640198	18/07/13	N/A
Intervention permit for mining activities (tree clearing)	Demo Plant Phase 2***	MFFP	3023236	18/07/16	19/03/31
Land Lease	Demo Plant Phase 2***	MERN	39418914	18/07/16	N/A
Land Lease	Demo Plant Phase 2***	MERN	27817914	18/07/16	N/A

* SMDS: Municipality of Saint-Michel-des-Saints
* MERN: Ministry of Energy and Natural Resources
* MFFP: Ministry of Forests, Wildlife and Parks
* MDDELCC: Ministry of Sustainable Development and the Fight Against Climate Change
** Overburden stripping over the demonstration plant ore extraction zone.
***Demonstration plant, tailings and water management facilities.

The permits needed to conduct the work proposed for the Property, listed in Section 26.0, consists of additional tree clearing permits which are provided by the MFFP as well as authorizations, in the form of Certificates of Conformity, by the municipality. The expected delay for these types of permits is usually about three (3) weeks following the submission of the tree-clearing request form.

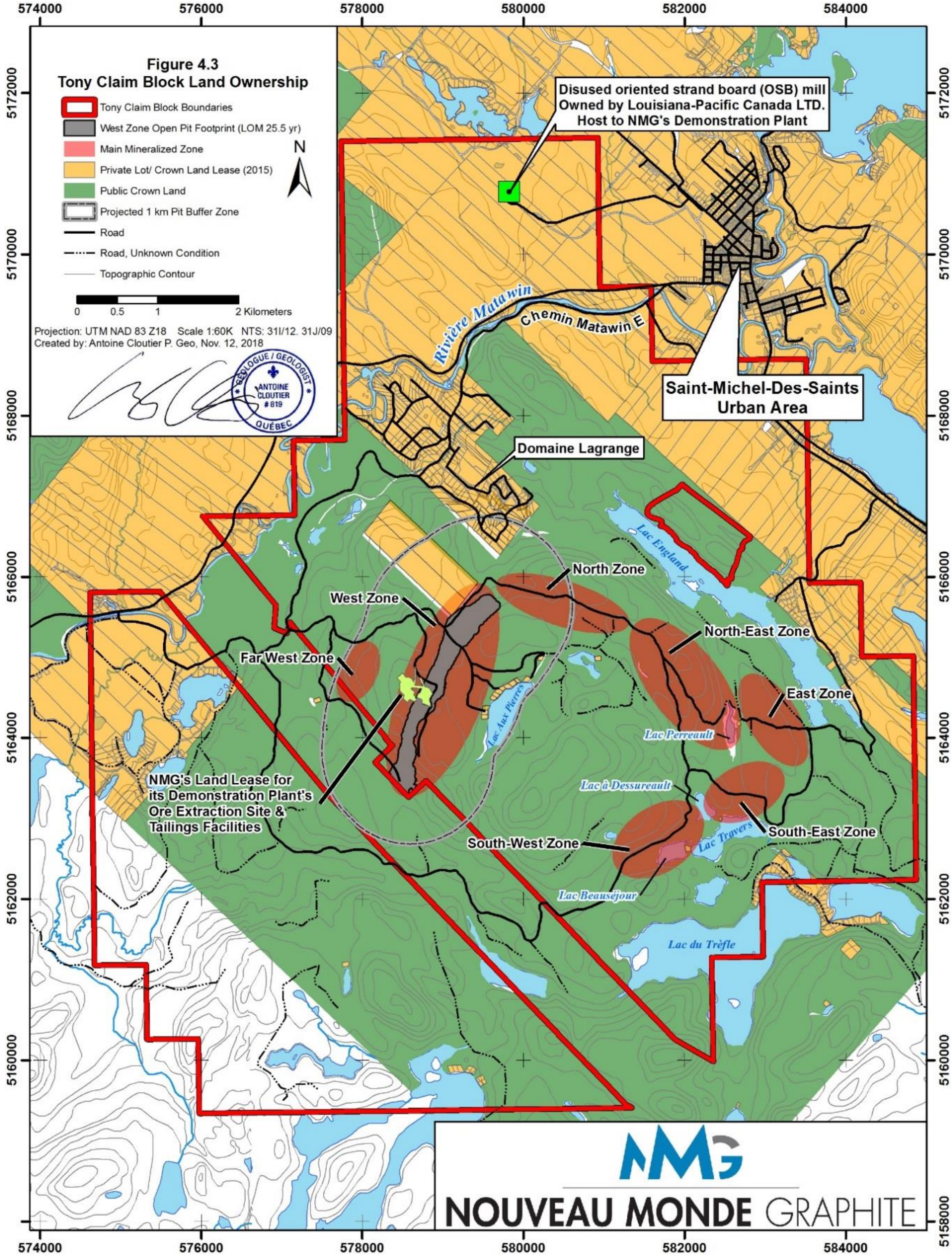
4.5 Significant Factors, Risks, and Other Relevant Information

Certain areas of the province are defined as “restricted zones” where it is either not permitted to “stake” a claim, or claims (or parts of claims) are subject to specific laws and regulations. These zones are available for viewing on the GESTIM system. Specific information relative to the restrictions is also available on the GESTIM online viewer and is illustrated in Figure 4.3. Such zones usually refer to native reserves, biological reserves, parks and urban areas. The Tony Block is truncated in the middle by a restricted zone where the designation of claims is temporarily suspended due to the current addition of transmission lines by Hydro-Québec, a government-owned Public Utility Company. Since claim parcels within the Tony Block extrude from this zone, the portions within the restricted zone will automatically be allocated to NMG if and when the temporary suspension is lifted.

Information provided by the municipality cadaster database from late 2015 reveals that the mineralized zones covers mostly crown land. The Tony Block also covers private properties, although these are located some distance from the targeted mineralization with the exception of two (2) private lots, one of which overlaps part of the West Zone Deposit Mineral Reserve pit shell (Figure 4.3). Additional information on surface rights is available in Section 5.5.

For more details on social, environmental and permitting issues, see Section 19.1.

Figure 4.3 – Tony Block Main Mineralized Zones and Land Use



5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Accessibility

All mineralized zones located on the Tony Block are within four (4) km, as the crow flies, from the centre of the Tony block and 11 km to 18 km driving distance from the community of Saint-Michel-des-Saints using the current road system. The town itself is accessible from Montréal using the Province of Quebec's paved Route 131, the trip represents a distance of approximately 160 km. The main mineralized zones are all accessible using logging roads of varying grades, these however, are not maintained by any organization nor are they cleared during the winter months. The use of an All-Terrain Vehicle ("**ATV**") or Four-Wheel-Drive ("**4X4**") vehicle is strongly recommended to access the mineralized zones, especially in wet and slippery conditions, although the West Zone is easily accessible using high clearance two-wheel-drive vehicles in dry weather conditions.

5.2 Physiography

The topography of the Project area and surrounding region is typical of the Laurentian Highlands, characterized by a series of rounded elongated hills and valleys carved by the passage of the Laurentide Ice Sheet during the Quaternary Period. Summits usually reach 100 m to 150 m above the bottom of adjacent valleys. The valleys themselves vary considerably in width and are often occupied by marshes and small streams. The lakes in the Project area are formed by larger basins, most of which are probably structurally controlled. Elevation on the Property varies between 360 m to 625 m above sea level.

Studies of Pleistocene and recent quaternary deposits, as well as the author's observations, indicate that hilltops and elevated areas are generally covered by a thin veneer of undifferentiated glacial till, usually about one (1) m to five (5) m thick although sometimes exceeding 25 m as demonstrated by drilling in the northern portion of the West Zone.

Adjacent valleys generally include considerable accumulated organic matter, more or less decomposed and derived from sphagnum, mosses, and forest litter. Fluvioglacial and fluvial deposits are also present within the area; they can be distinguished by their mostly homogeneous grain size, the lack of clay and silt size particles and the presence of rounded cobbles and boulders. These deposits seem to dominate the valley host to the Matawin River. Most of the mineralized zones seem to be covered by till, with the exception of the South-East Zone, where fluvioglacial material was encountered during a trenching program.

The area is located in the maple-yellow birch bioclimatic domain. The potential vegetation on mesic sites is maple-yellow birch stands (mid-slope) and balsam fir-yellow birch stands (top of slope). Well-drained sites are colonized by the potential vegetation of black spruce, lichen-American green alder stands. Balsam fir-red spruce stands are located on less well-drained benches. The growing season is of moderate length, varying from 160 to 170 days (Robitaille and Saucier 1997). More specifically, the Study area is dominated by deciduous stands, which consist mainly of yellow birch, maple and poplar. Mixed stands come second and are composed of the same deciduous and coniferous species such as fir, tamarack or cedar. Coniferous stands are less extensive and consist mainly of fir, tamarack, cedar and pine.

5.3 Climate

The Project area is under the influence of a temperate continental climate and receives a moderate amount of precipitation. There are no climate related obstacles preventing a year-round mining operation.

The mean annual temperature is 3.1 °C based on data recorded at Environment Canada's station No. 7077570, which is located in Saint-Michel-des-Saints (Environment Canada, 2015). According to the 1981-2010 statistics (station No. 7077570), July is the warmest month with an average daily maximum temperature of 24.2 °C, whereas January is the coldest month with an average daily minimum temperature of -20.4 °C. These statistics also show that the average annual rainfall is 731.1 mm with quantities culminating in June and July, and the average annual snowfall is 208.5 cm with significant precipitations in December, January and March. Snowfall occurs typically from October until April. Few snowfall events are possible in September and May. On average, a snow cover of 20 cm or more is present 98.1 days/year in the study area (Environment Canada, 2015). The permanent snow cover period varies from year to year but usually occurs around mid-November until mid to end of April. Non-maintained secondary and logging roads can typically be accessed by snowmobile between mid-December and early April.

5.4 Local Resources and Infrastructure

The Tony Block mineralization is located within a few kilometers of major infrastructure. Electrical power and lumber supply stores are available in the town of Saint-Michel-des-Saints as well as other common amenities such as running water, maintained public road system, lodging, restaurants and grocery stores. Communication towers provide partial cellular communication coverage to most of the main mineralized zones. According to the 2016 federal census, the population center of Saint-Michel-des-Saints reaches 1,131 and the Saint-Michel-des-Saint municipality counts a population of 2,359.

The nearest hospital or CLSC (from the French "*Centre local de services communautaires*"), a free clinic run and maintained by the provincial government, is located in the town of Saint-Michel-des-Saints and a larger hospital is located some 100 km south in the town of Joliette. A 735 kV power line passes through the Project area with an additional 735 kV power line presently in construction scheduled to be fully operational by the end of 2019.

Local resources on the Tony Block consist of an abundance of fresh water and mixed deciduous and coniferous trees. Sand and gravel have also been observed on the Tony Block during field work, although the available volume and quality of the material is unknown. Geotechnical tests are being conducted on the till covering the deposit to validate its usefulness for the construction of infrastructure. The general area has excellent road coverage, with many logging roads leading far into the hills.

The region offers an abundant skilled workforce, such as forestry workers, mechanics and heavy equipment operators. It is important to note that NMG has leased part of a large disused manufacturing plant near the community of Saint-Michel-des-Saints in order to host its demonstration plant with a capacity to produce 1,000 tonnes of graphite concentrate annually (Figure 4.3). Additional information about this demonstration plant is detailed in Press Releases from NMG dated May 24th, 2018 and September 18th, 2018.

5.5 Surface Rights

The main mineralized zones located on the Tony Block are mostly located on public crown land although some private land and crown land leaseholders are located nearby. The only identified mineralized zone not completely located on public crown land is the West Zone to which the planned open pit, main subject of this FS, encroaches about 7,250 square metres in an undeveloped private lot according to a public land use database, acquired from the MRC in 2015 (Figure 4.3). It is important to note that the open pit will not reach this portion of private land before Year 16 of mine operation. Although none of the infrastructure on the proposed mine site, with the exception of that portion of the open pit mentioned previously, is located on private or leased land, some of the infrastructure, such as the mill, is located in close proximity (about 30 m) of government land leases on which cottages are built on the shores of *Lac aux Pierres* (Figure 18.1). Further details about the possible acquisition of these land leases and nearby private lots are available in Section 19.1.

6.0 HISTORY

The Tony Block is located in an area that has mostly been ignored in terms of its mineral potential. No mention of work in the Tony Block by other mineral exploration companies has been found in the literature. At a more regional scale, the SIGEOM mineral occurrence database indicates a few mineralized showings in the general area, including an old mica mine and closed quartz (silica) quarries (Figure 6.1). The MERN and the Geological Survey of Canada ("**GSC**") completed geological mapping in the area in the 1960s (Figure 6.2). The provincial government also carried out a recent lake bottom sediment sampling campaign. Additional information on this survey is available in Section 6.1.

6.1 Regional Government Surveys

The historical information used for the preparation of this section was obtained from the SIGEOM and EXAMINE systems, both managed by the MERN[1], and from Natural Resources Canada ("**NRCAN**")[2]. The only relevant historical work performed on the Tony Block, other than that done by NMG and 3457265 Canada Inc., consists of geological mapping by both the provincial and federal government as well as a recent lake bottom sediment sampling campaign. The MERN lake bottom geochemical survey was carried out in 2012 mostly over the Grenville geological Province. A report summarizing the results was only published on March 1st, 2018 (Solgadi, F.,2018, DP 2018-03). The Report focusses on the following elements: As, Cu, La, Li, Ni, Pb, Y, and Zn. Out of the 5,779 samples collected during the survey, six (6) are located on the Tony Claim Block. One of these sample returned Li values within the top 1 %. A list of reports describing this geoscientific work is available in Table 6.1.

Table 6.1 – Historical Geoscientific Reports Concerning the Tony Block

Report ID	Year of Publication	Type of Report and Comments
RP 552[1]	1966	Geological mapping at the 1:63,360 scale of the Saint-Michel-des-Saints region (western part) as well as the Joliette, Berthier and the Maskinongé County.
*108485[2]	1966	Geological mapping at the 1:253,440 scale of the Mont Laurier and Kempt Lake Map Areas (NTS sheet 31J and 31O)
CGSIGEOM31I[1]	2010	Geological map compilation at the 1:50,000 scale covering NTS sheet 31I
CGSIGEOM31J[1]	2010	Geological map compilation at the 1:50,000 scale covering NTS sheet 31J
DP 2018-03[1]	2018	Lake bottom geochemical survey covering the southern portion of the Grenville Province

[1] available on the following website: http://sigeom.mines.gouv.qc.ca/signet/classes/I1102_indexAccueil?l=a
[2] available on the following website: http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/geoscan_e.web

6.2 Mineral Exploration Work

No mention of work in the Tony Block by mineral exploration companies, other than NMG, has been found in the literature.

Figure 6.1 – Tony Block Regional Geology

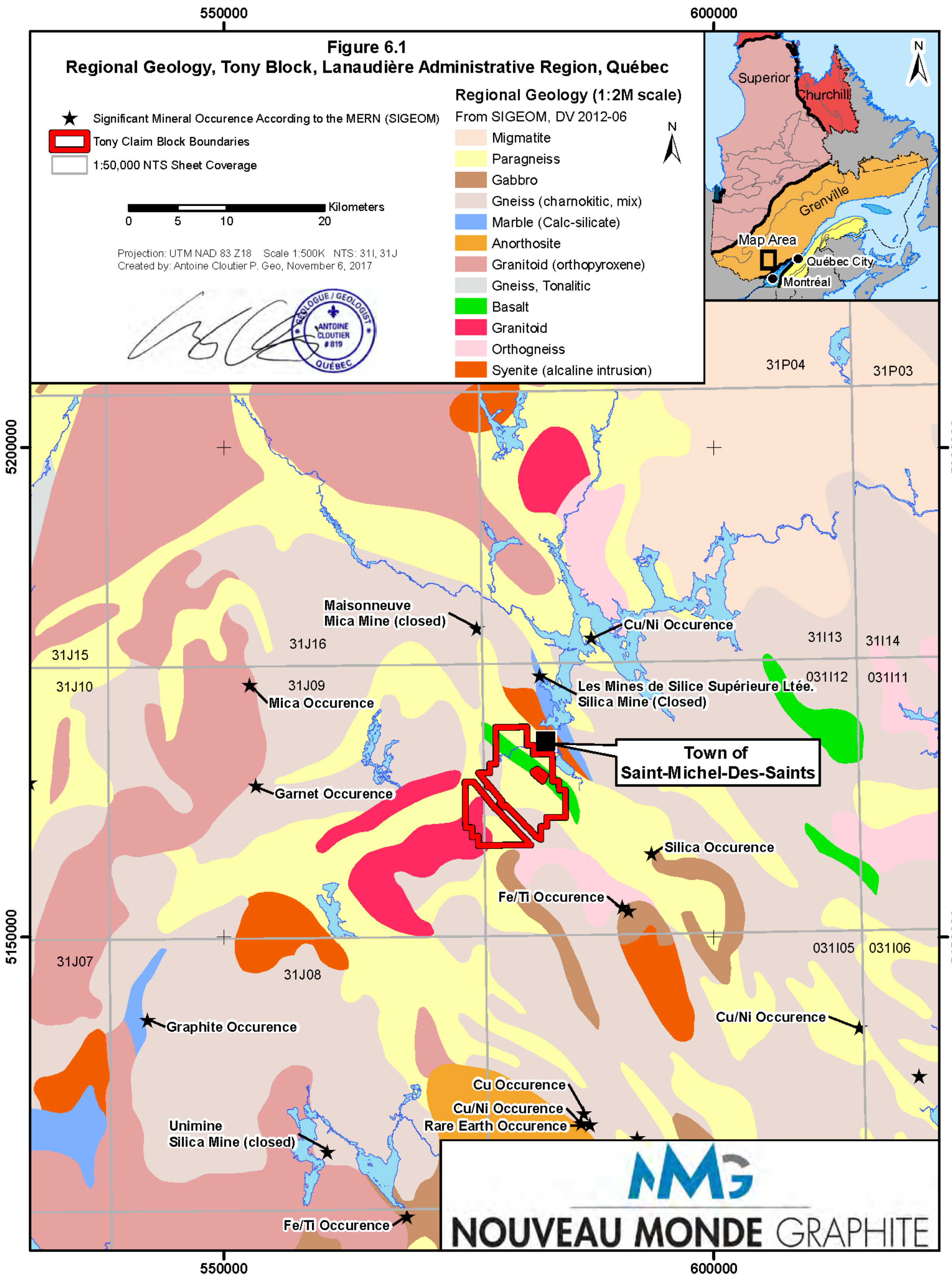
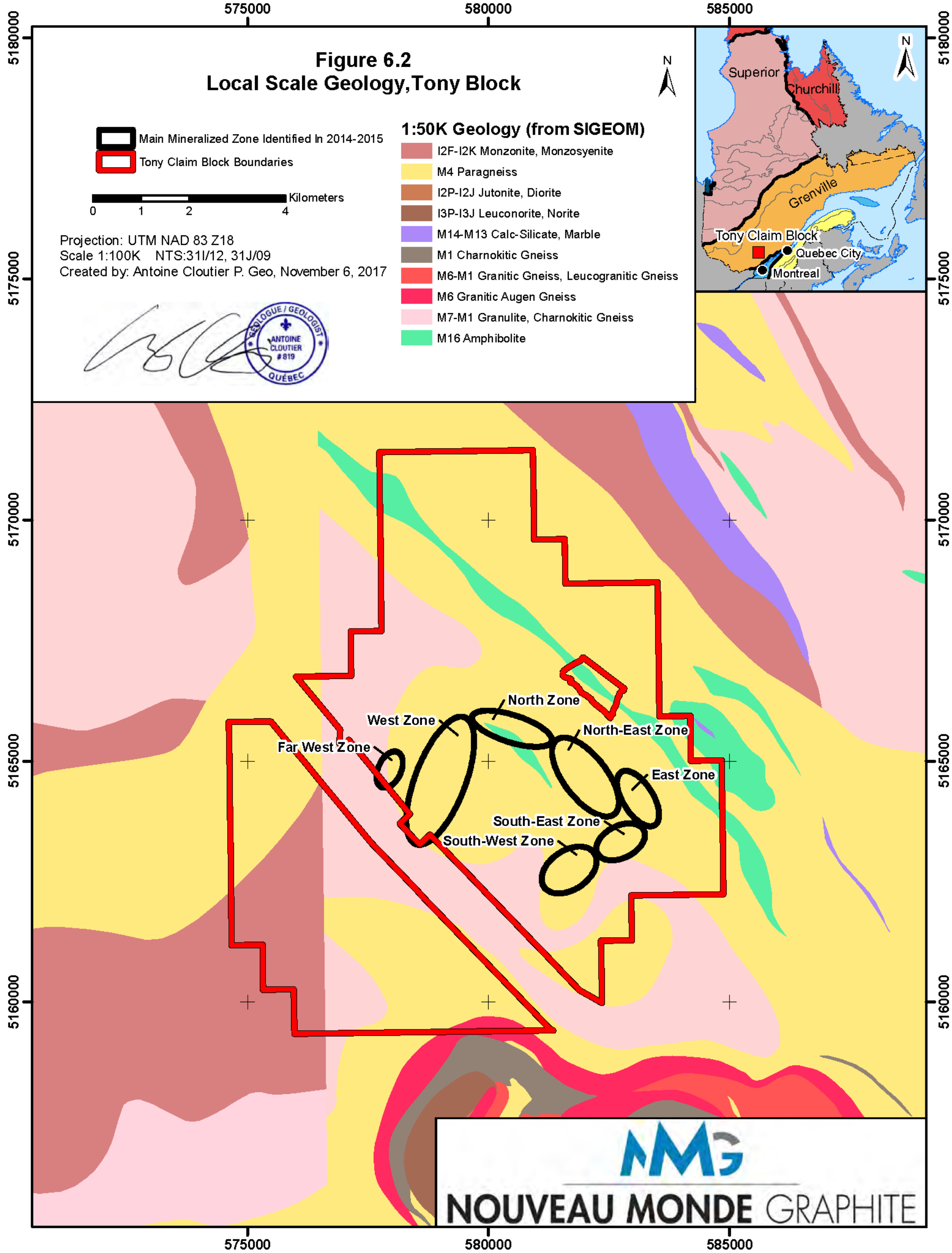


Figure 6.2 – Tony Block Local Geology



7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Tony Block is located in the southwestern portion of the Grenville geological Province. The Grenville Province is composed of imbricated terranes, or large crustal blocks, each one dipping eastward below successively younger ones due to the pushing and adding of new terranes during distinct phases of orogenic activity. These terranes, or fault bounded crustal blocks, are exposed over a 300 to 500 km wide belt that extends from southwestern Ontario and northern New York State to Labrador (Figure 7.1). Rivers et al. (1989) divided the Grenville into the Autochthonous, Parautochthonous and Allochthonous tectonic belts. Intense ductile deformation occurred during the Grenvillian orogenic cycle (1160-970 Ma; Rivers et al., 1989). During this cycle, the different terranes were thrust up and over each other (Figure 7.2).

Figure 7.1 – Tectonic Subdivisions of the Grenville Province

Modified from Carr et al., 2000 and according to Rivers et al. 1989.

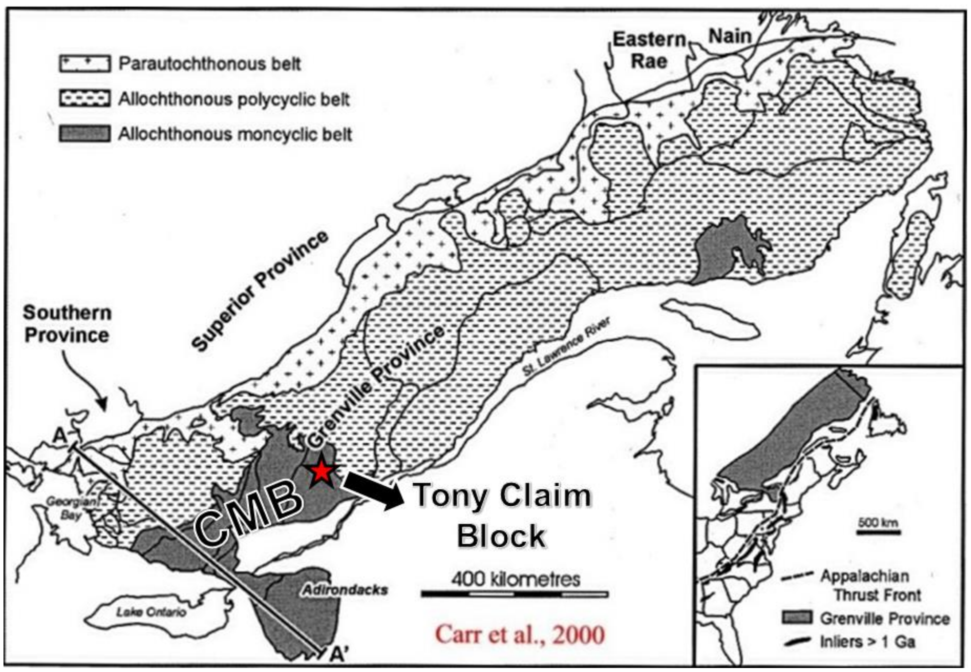
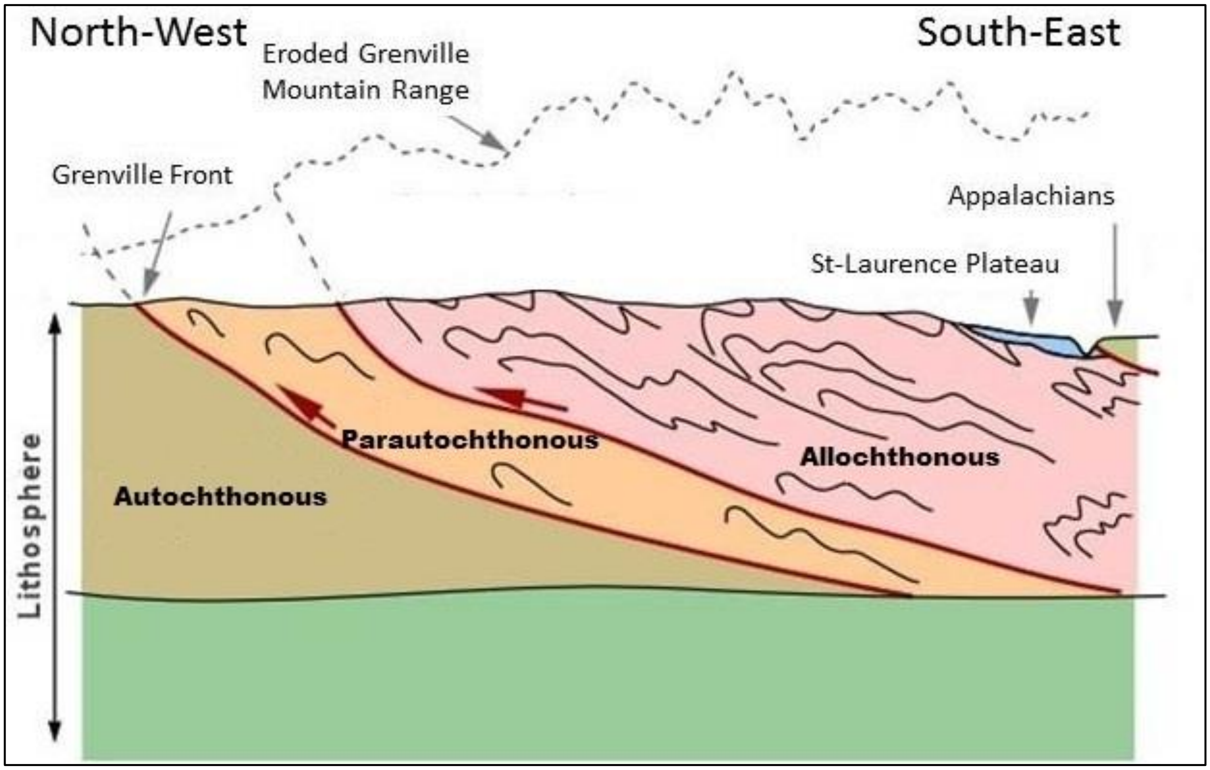


Figure 7.2 – Grenville Orogeny Thrusting

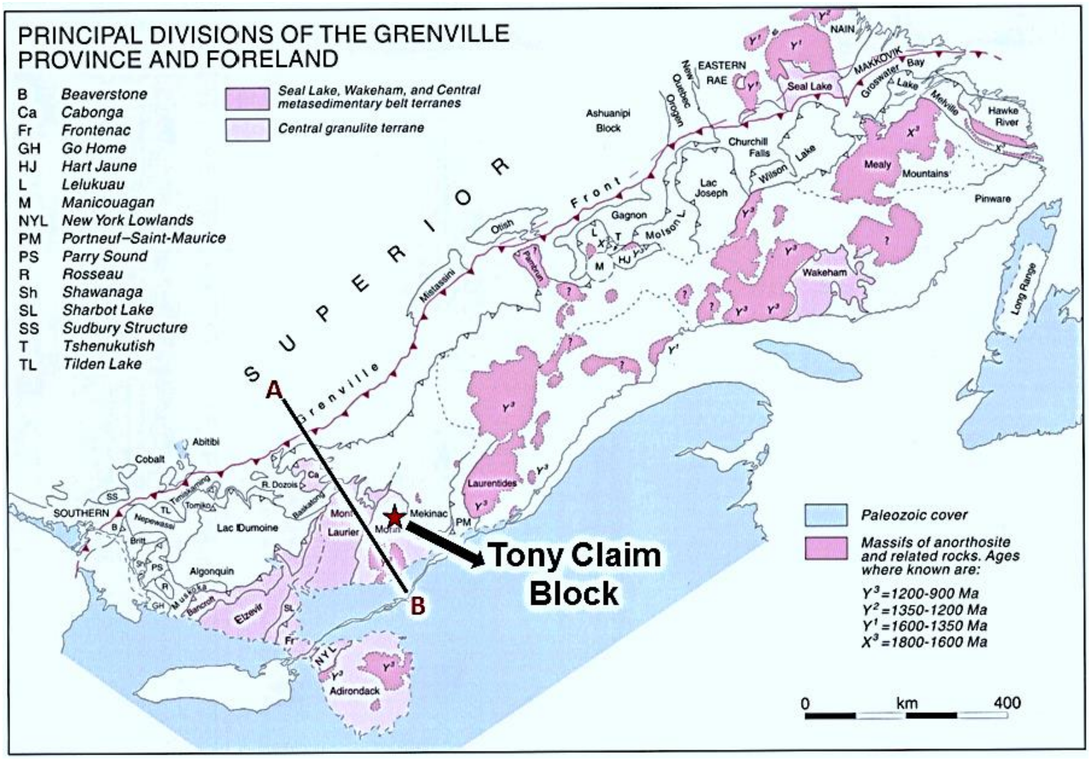


From http://www2.ggl.ulaval.ca/personnel/bourque/intro.pt/planete_terre.html [modified from Hocq et al. 1994 (MM 94-01)].

The Tony Block is more specifically located within the Morin Terrane ("**MT**"), part of the deformed and transported Allochthonous monocyclic belt of the Grenville geological Province (Figure 7.1 and Figure 7.3). It should be noted that the Allochthonous monocyclic belt present in the western part of the Grenville Province has long been referred to as the Central Metasedimentary Belt ("**CMB**"). The CMB overlaps several regions in Quebec, Ontario and northern New York State. It is composed of lithologies belonging to the Grenville Supergroup (marble, metasediments, metavolcanics, quartzite, etc.) metamorphosed from the Greenschist Facies through the Amphibolite Facies to the Granulite Facies, depending upon the region.

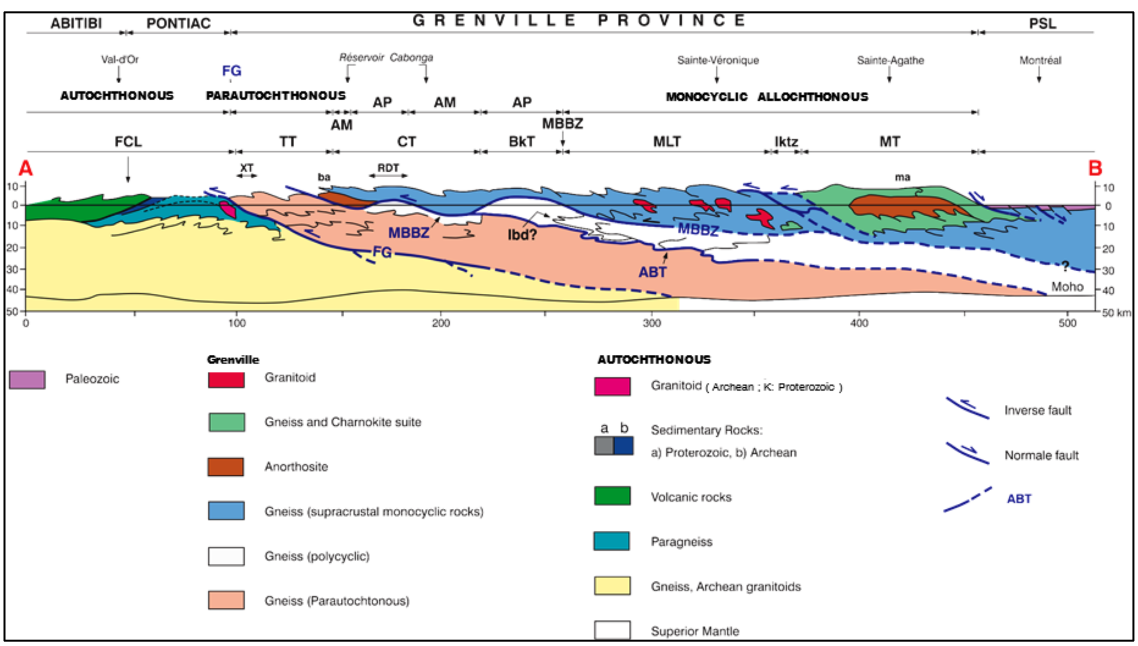
The volcano-sedimentary Morin Terrane is bounded to the West by the Mont-Laurier Terrane ("**MLT**"), which is also part of the Allochthonous monocyclic belt. Both terranes are separated by a large inverse fault known as the Labelle-Kinonge Shear Zone ("**LKTZ**") (Figure 7.4 and Figure 7.5). The MT is mostly metamorphosed at the Granulite Facies, while the MLT displays mostly Amphibolite Facies metamorphism (Hocq *et al*, 1994, MM-94-01). The MT straddles the Mékinac-Taureau Domaine, part of the Allochthonous polycyclic belt. This domain bounds the MT to the east (Figure 7.5). A normal fault separates the MT and the Paleozoic sedimentary rocks to the south. The northern boundary of the MT is still imprecise and has not yet been properly mapped.

Figure 7.3 – Principal Divisions of the Grenville Province and Location of the Tony Block



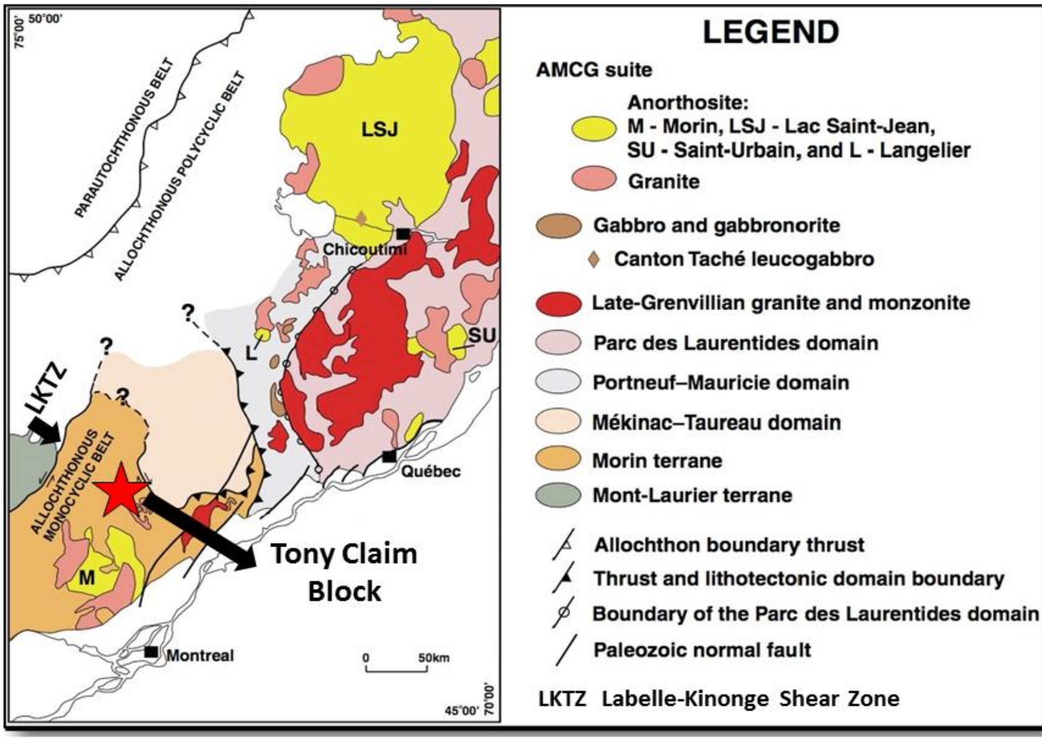
Modified from Davidson et al.1998.

Figure 7.4 – Cross Section of the Grenville Province Centered Over the Morin Terrane



Modified from Hocq et al.1994 (MM 94-01)

Figure 7.5 – Terranes Adjacent to the Tony Block



The MT is centered over a large anorthosite body dated at about 1,160 Ma. It is also composed of paragneiss, amphibolite and orthogneiss cut by charnockite intrusions associated with the Grenville Orogeny. The region displays numerous deformation events made evident by the polyphased foliation observed locally within the paragneiss sequences (Marcil, GM 60206). According to calcite-graphite thermometry work performed by Peck, W. H *et al* (2005), marbles within the MT yield metamorphic temperatures of 755 ± 38 °C. Peck, W. H *et al* concludes that the peak metamorphic conditions and cooling paths in the MT are similar to the 1.07 Ga Ottawan orogeny.

The regional geology, as characterized by the geological map compilation at a 1: 2,000,000 scale in the MERN EXAMINE document DV 2012-06, is illustrated in Figure 6.1. More detailed geological maps, based on work from Wynn-Edwards (1966) and Schryver, K., (1966, RP 552), are also available in the literature, and are illustrated in Figure 6.2. It is important to note that the lithological data available from SIGEOM and EXAMINE has not been mapped at a property scale and that due to the complexity of the Grenville geology, other lithologies may be present on the Tony Block, and lithological boundaries are approximate.

The MERN database suggests that a large portion of the Tony Block, especially the eastern section, is composed of paragneiss. This was confirmed during prospecting activities in 2014 and 2015. A few large slivers of amphibolite units were mapped in the central part of the Property, and a charnockite orthogneiss unit wraps around the northwestern and southeastern portion of the main mineralized zones. The late 2013 and early 2015 geophysical airborne surveys suggest a large circular conductor located in the central part of the Tony Block, as well as weaker conductors scattered within the Tony Block (Figure 9.2). The main circular conductor, which has proven to display graphite mineralization, was the focus of ground exploration work by NMG since 2014.

7.2 Property Geology

The majority of the lithologies present on the Tony Block are the typical metasedimentary rocks, which were assigned to being part of the "Grenville Series" of Logan (1863). The term Grenville Series was redefined as the "Grenville Supergroup" by Wynne-Edwards (1972). The principal lithologies diagnostic of the Grenville Supergroup are; aluminous paragneisses (garnet, sillimanite, biotite, graphite), marble (crystalline limestone), quartzite, amphibolite, and related rocks. All these lithologies occupy a large area in Quebec, Ontario, and northern New York State, which is referred to as the Central Metasedimentary Belt; Mont-Laurier Basin; Monocyclic Belt, etc. Thus, the Tony Block lies within this Central Metasedimentary Belt ("**CMB**") (Figure 7.1). The following paragraphs summarize the various lithologies encountered during work performed by NMG on the Tony Block.

7.2.1 Paragneisses – Migmatites – Mobilizate

The aluminous paragneiss is the most abundant rock type encountered in the area and is also host to the graphite mineralization observed on the Tony Claim Block. These paragneisses are derived from the metamorphism and deformation of the original pelitic sedimentary rocks that took place during the Grenville Orogeny. Paragneisses are visually identified by the alternating centimetre to decimetre scale light to dark banding as well as their mineral assemblages. The leucocratic minerals comprising the paragneisses located on the Tony Claim Block are mostly quartz, plagioclase and potassic feldspar (orthoclase, microcline). The most common mafic mineral found in the paragneisses is biotite. The other common minerals observed in the paragneisses are: graphite, garnet, sillimanite, cordierite, sulphides (pyrrhotite, pyrite), pyroxenes, muscovite and magnetite. The accessory minerals observed in thin sections include apatite, zircon and monazite.

The paragneisses enriched in graphite usually contain a comparable but lower amount of disseminated sulphides (pyrrhotite and, to a lesser extent, pyrite) as provided by comparing the analysis results of graphitic carbon and sulphur content which returns approximately a one (1) to 0.75 ratio. The surficial alteration of the sulphides imparts a rusty colouration commonly observed in the paragneiss outcrops. Garnet-rich paragneisses in the area usually contain less than one (1) % graphite. They are also more leucocratic in appearance and only display slight surface alteration in outcrops.

Petrographic studies have helped to determine the chronology of the development and growth of the different minerals observed in the paragneisses of the Tony Block:

- Biotite and graphite show intimate growths;
- Sillimanite may contain inclusions of both biotite and graphite;
- Cordierite may contain inclusions of biotite, graphite and sillimanite;
- Garnet may contain inclusions of sillimanite, biotite, and/or graphite.

The mineralogical assemblage observed in these paragneisses, and particularly the development of sillimanite, indicates that these rocks were subjected to a very high grade of metamorphism of the upper amphibolite facies. In addition, the textural and structural relationships of the minerals present indicate that these rocks are the product of very strong syntectonic deformation. This is made further evident by the strong foliation and tectonic banding shown by the preferred orientation of the biotite, graphite, sillimanite, elongate quartz lenses and ribbons present in the rock.

During such a high grade of metamorphism, the paragneisses start to undergo partial melting (anatexis) to different degrees, resulting in the formation of migmatites. The migmatites, in which the product of partial melting and segregation is present in the form of lit-par-lit layers and bands parallel to the foliation in the paragneiss, are designated as metatexites.

During anatexis, the migration and subsequent crystallization of a melt within the source rock produces in-source leucosomes, also called mobilizate. This material is leucocratic, generally white to very pale pink in colour, and granitic in composition. It can form centimetre to metric-size units. The presence of garnet in the mobilizate distinguishes it from common granite and/or pegmatite intrusions.

7.2.2 Marble and Calc-Silicate Rocks

The calc-silicate rocks, containing a larger proportion of carbonate minerals, accompanied by a smaller proportion of calc-silicate minerals, in fact represent somewhat impure crystalline limestone (marble) in the CMB. The recrystallization of carbonate minerals and the development of calc-silicate minerals took place during the deformation and metamorphism event of the Grenville Orogeny.

The presence of calc-silicate units with thickness ranging from centimetre to metric scale was observed and recorded during drill core logging. Some of these units are also useful as key horizons that can be correlated in different drill holes, especially for the South Zones. These units can be identified by an effervescent reaction to diluted hydrochloric (HCl) acid. They are usually pale in color with green specks or light green with white specks and display a gradational contact into paragneiss units.

The calc-silicate rocks are generally medium to coarse grained where the granoblastic carbonate minerals predominate. In addition, there is common development of diopside and scapolite, in large and small grains, well distributed in the rock. The rock may contain very minor grains of sphene observed in thin sections. In some cases, the presence of tourmaline, blue-green in colour, has also been noted.

7.2.3 Metagabbro

Thin units of metagabbro were also observed during drill core logging. Some of these units can be correlated in the drill holes. The metagabbros represent small mafic intrusions in the form of either sills or dykes that have been transposed parallel to the general structure of the surrounding metasedimentary rocks. They are visually identified by their dark green color and mineral assemblage. They also offer a sharp contact which is usually biotite rich.

Metagabbros represent a deformed and metamorphosed gabbro, which has undergone a large degree of recrystallization but still preserved some primary textures, and primary mineral assemblages. The primary preserved minerals include; large plagioclase grains that commonly show good zoning, and large clinopyroxene and orthopyroxene grains.

The effects of deformation and accompanying recrystallization are: smaller broken and recrystallized plagioclase, clinopyroxene, orthopyroxene grains, development of large and small reddish biotite flakes showing good preferred orientation. This rock can also contain large and small garnet porphyroblasts. The accessory minerals observed in thin section include apatite, magnetite, sulphide and zircon.

7.2.4 Charnockite Granite

Several large and small outcrops of a charnockite granite were observed in the central part of the Tony Block and drill hole intersections are noted mostly in the North-West area of the West Zone. The rock varies in grain size from coarse-grained to medium grained. The rock generally shows a foliation, which in some outcrops is very intense and even mylonitic.

The distinguishing feature of this granitic rock is a good greenish to pink colour in fresh surfaces, and a brownish colour on weathered surfaces which is very characteristic of the charnockite group rocks.

7.2.5 Graphite

It is quite common to observe the presence of flakes of graphite disseminated in the marbles and rusty biotite paragneisses of the Grenville Supergroup in the Central Metasedimentary Belt, in Quebec and in Ontario. These two (2) rock types are considered favourable for the large economic concentrations of graphite.

The observations of the graphite bearing biotite paragneisses, in the field, in drill core, and in thin-sections, clearly indicate that the graphite flakes and the associated biotite flakes are strongly lepidoblastic, and define the strong foliation. In thin-section, biotite and graphite show an intimate relationship, indicating that their development took place quite early, followed by the development of sillimanite and garnet, respectively. The presence of sillimanite in the paragneisses, and the common evidence of partial melting of the paragneisses indicate that the development and growth of graphite and all the associated minerals is syntectonic, and under the metamorphic conditions which are equivalent to the upper amphibolite facies.

7.2.6 West Zone Geological Model

A simplified 3D geological model of the West Zone Mineral Reserve pit-shell was created by SGS Canada Inc. - Geostat (Blainville, Quebec) using the exploration drill core logs. The model is composed of five (5) main lithologies, some of which are themselves composed of sub-lithologies. To create this geological model, lithologies traced over multiple sections and displaying thicknesses of at least 5 m were used. The main lithologies are as follows:

- Graphitic Paragneiss:

  This unit is comprised of mineralized paragneiss derived from the bloc model created to define the most recent Mineral Resources.

- Mixed Paragneiss:

  This unit, as the name suggests, is composed of various poorly mineralized paragneiss layers and related sub-lithologies such as garnet-rich paragneiss, quartzite, mobilizate and calc-silicates, which are intermixed and observed in thicknesses varying from centimetre to metre scale. Although the variation of individual sub-lithologies prevents tracing them individually throughout multiple sections, a grouping of these lithologies seem to be coherent within the Mineral Resource pit-shell.

- Charnockite:

  This easily identifiable unit is mostly present in the North-East and North-West part of the Mineral Resource pit-shell.

- Biotite Paragneiss:

  This unit is differentiated from the biotite rich paragneiss layers observed in the Mixed Paragneiss unit by the lack of associated pyrrhotite. It can be mapped throughout a few drill holes and over a few sections.

- Metagabbro:

  This unit is differentiated from the other units by its intrusive origins, particular dark green colour and gabbroic texture.

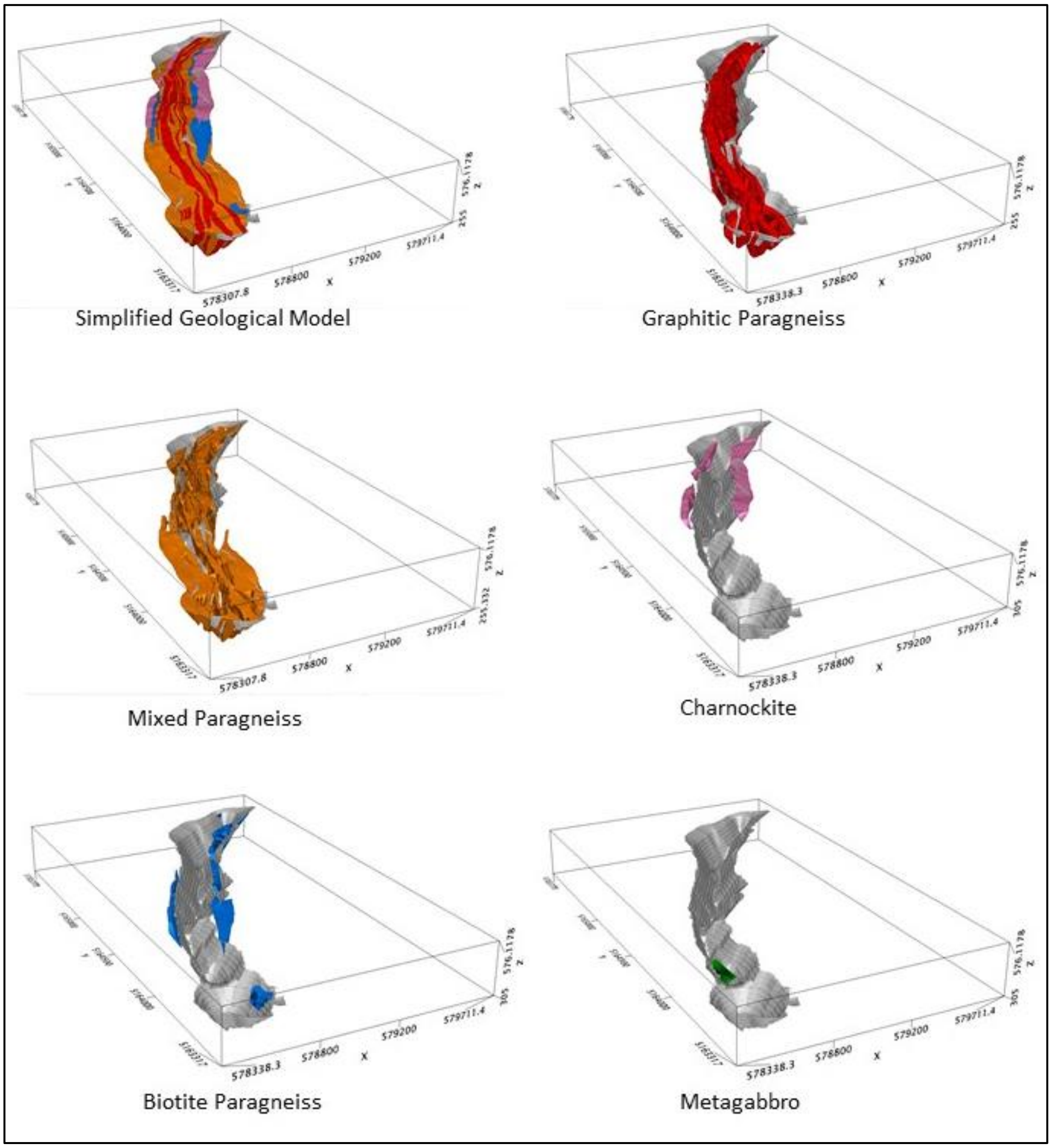
A three-dimension representation of the geological model, including the Mineral Reserve pit-shell is illustrated in Figure 7.6 and estimated tonnage in the Mineral Reserve pit-shell per main lithology is available in Table 7.1.

Table 7.1 – Main Lithological Units within the Mineral Reserve Pit-Shell

Simplified Lithologies	Density	Volume (Mm^3)*	Tonnes (Mt)*
Graphitic Paragneiss (mostly ore)	2.76	22.71	62.69
Mixed Paragneiss	2.8	13.76	38.53
Charnokite	2.7	2.19	5.91
Biotite-Rich Paragneiss	2.84	1.12	3.17
Meta-Gabbro	2.84	0.06	0.17

* Volume and tonnage within the Mineral Reserve pit shell.

Figure 7.6 – Simplified Geological Model of the West Zone



7.3 Mineralization

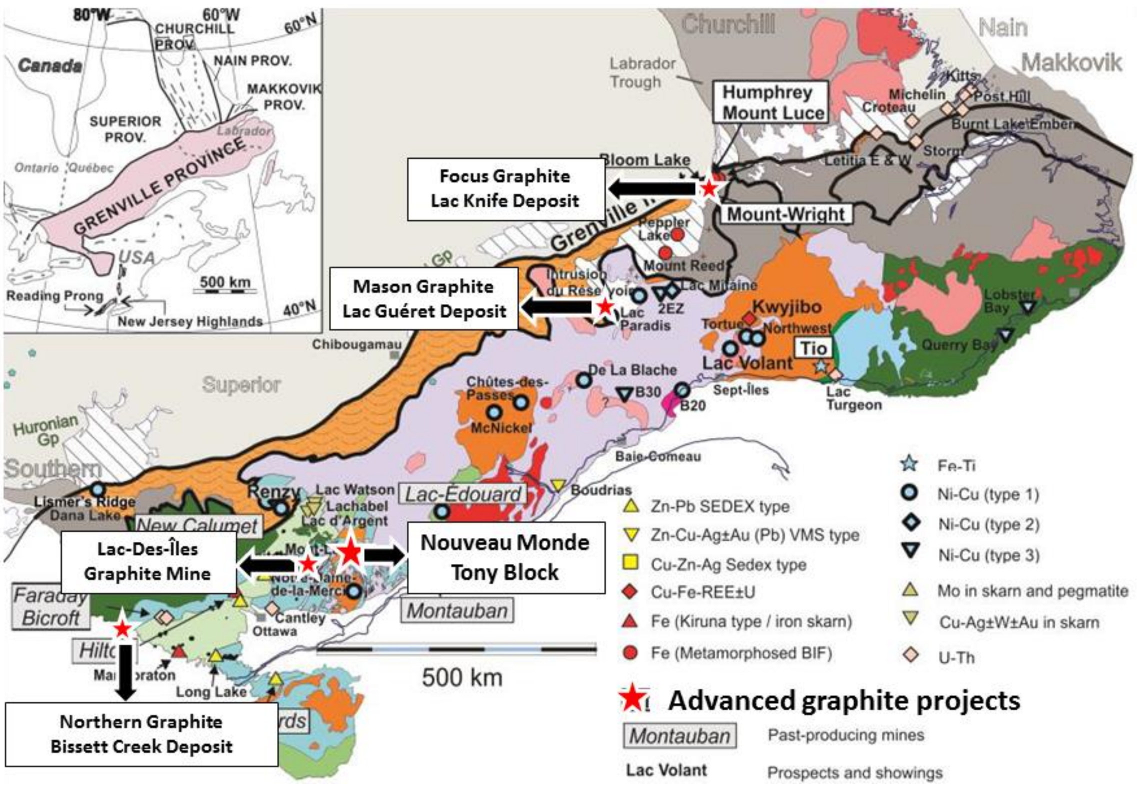
7.3.1 Regional Mineralization

The Grenville geological province is well known for its extensive anorthosite intrusives quarried for dimensional stone, its industrial minerals, and its iron and titanium deposits. The province also includes numerous Ni-Cu, Mo, Zn-Pb, Zn-Cu-Ag, REE and U-Th deposits, as illustrated in Figure 7.7. More information concerning the mineral deposits and mineralization found in the Grenville Province can be obtained from Avramtchev and Piché, 1981 (DPV 809), as well as in Avramtchev and LeBel-Drolet, 1981 (DVP 744).

The Grenville Province is also host to the only presently active crystalline flake graphite mine in North America, the Lac-Des-Îles mine, owned by Imerys Graphite and Carbon S.A., a French multinational company. It is located near the community of Lac-Des-Îles, Province of Quebec (Figure 7.7).

The more immediate area outside of the Tony Block includes a few mineralized occurrences (Figure 6.1). Some, like mica and garnet, may not be of much interest now, but at one time, extensive effort was devoted to finding and extracting these minerals. Molybdenite, rare earth elements, uranium-thorium minerals, base metals and other minerals have been sought in the general area in the past and remain the subject of limited interest here.

Figure 7.7 – Geology and Major Mineral Deposits of the Grenville Province



Modified from Corriveau et al., 2007

7.3.2 Tony Block Graphite Mineralization

Crystalline flake graphite mineralization was first discovered on the Tony Block in mid-2014. Prospecting work, performed as a follow-up to the late 2013 airborne survey (Dubé, 2014, GM 69067), resulted in the collection of nine (9) grab samples that returned values in excess of 5 % C(g) (Cloutier, 2015, GM 69069). Subsequent to this discovery, a short ground TDEM survey was conducted over four (4) areas where the 2013 airborne survey displayed strong conductors. Trenching was then performed in each of these areas, resulting in the discovery of graphitic paragneiss horizons displaying thicknesses of over 20 metres. The best intersections were provided by trenches TO-14-TR-2 and TO-14-TR-4, which returned 5.7 % C(g) over 22 m and 5.1 % C(g) over 25.8 m, respectively.

Thrilled by these results, NMG proceeded with another TDEM airborne survey in early 2015, thus completing coverage of the main conductors in the area. Drill programs were then devised to test the significant conductors, now totaling over 12 km in strike length and separated into seven (7) zones: Far-West, West, North, North-East, East, South-East, and South-West (Figure 9.2).

The drilling and trenching of all the mineralized zones located on the Tony Block, including the West Zone, revealed that the mineralized graphitic paragneiss units vary from a few centimetres to tens of metres in thickness. Overall, a stacking of these beds, or horizons, has shown to provide fairly homogeneous and continuous mineralization. The foliation, or gneissosity, of graphitic paragneiss horizons seems to be dipping mostly outwards from the main circular conductive anomaly seen in Figure 9.2 with the exception of the West Zone**,** whose mineralized horizons dip at about 60 to 70 degrees towards the South-East (or the interior of the anomaly) at the northern extremity and incrementally dips steeper going South where it becomes sub-vertical at the southern extremity. Overall, the dip of the other mineralized horizons varies from 30 degrees to sub vertical. The main graphitic horizons pinch and swell from four (4) m to around 80 m in width along strike, and drilling suggests that they are mostly open at depths greater than 200 m from surface. The thickness and extent of the mineralization found to date on the Tony Block is illustrated and further discussed in Section 10.0 of this Report.

The graphitic horizons are interbedded with garnet paragneiss units displaying low graphite content and ranging from a few centimetres to tens of metres in width. Both the graphitic and the garnet paragneiss horizons can contain very little to high percentages of leucocratic mobilizate, thought to be the product of partial melting. The paragneiss is given the name of metatexite when the mobilizate layers of varying thickness are common, and are distributed in a lit-par-lit manner parallel to the foliation. These units are usually sub-parallel to the main foliation and often border the mineralized zones. All mineralized zones, with the exception of the West Zone, are limited by unmineralized to poorly mineralized paragneiss and sometimes metatexite. The Mineralization of the West Zone is usually bounded to the West by metatexite or charnockite and to the East by unmineralized paragneiss and further outside of the mineralization (usually less than 100 m), by charnockite.

The crystalline graphite flakes are mostly aligned parallel to the main foliation and they are disseminated fairly homogeneously within the mineralized horizons. Graphite mineralization is often found in the presence of sulphides, or in the case of the Tony Block, mainly pyrrhotite. This is made further evident by the correlation between the mineralized intersections and a strong magnetic field measured using a magnetic susceptibility meter (MPP probe by Instrumentation GDD Inc.) over the drill core.

8.0 DEPOSIT TYPES

Crystalline flake graphite mineralization has been the focus of exploration by NMG on its Matawinie Property, including the Tony Block.

The deposit type described in this Section is used as an indication of what could be found on the Tony Block, which contains similar geological environments and settings. The reader should also note that resources of this deposit type may not reflect the mineralization and/or results that might occur on the Tony Block.

8.1 Crystalline Flake Graphite Deposit Type

Crystalline flake graphite deposits are usually sedimentary in origin. They occur when carbon-rich organic content accumulated during sedimentation is transformed into graphitic carbon crystals, or flakes, during metamorphism. They are commonly stratabound and hosted by porphyroblastic and granoblastic paragneiss, marbles, and quartzites (Harben and Kuzvart, 1996). Alumina-rich paragneiss and marble units in upper amphibolite or granulite grade metamorphic terranes are the most favourable host rocks. When present, flake graphite usually occurs in thin, centimeter to metre wide bands. In favourable conditions, wider coalescing bands in fold crests can provide sufficient volume needed for an economic deposit.

Economically significant deposits are several metres to tens of metres thick and hundreds of metres in strike length. The economic quantifiers in flake graphite deposits are mostly graphite flake size, quantity and purity. According to Simandl, G.J. and Kenan, W.M. (1997), "Grade and tonnage of producing mines and developed prospects varies substantially. The median grade and size is 9.0 % C(g) and 2.4 M tonnes respectively (Bliss and Sutphin, 1992). Depending on market conditions, large deposits containing high proportions of coarse flakes, which can be easily liberated, may be economic with grades as low as 4 %".

The Lac-Des-Îles mine, owned by Imerys Graphite and Carbon and located near the town of Lac-Des-Îles, Quebec, is the only presently active crystalline flake graphite producer in Quebec and is an archetypal example of this type of deposit. This deposit is located some 125 km to the WSW of the Tony Block. Focus Graphite's Lac Knife deposit and Mason Graphite's Lac Guéret deposit, both located in Northern Quebec, as well as Northern Graphite's Bissett Creek deposit in Ontario, are three (3) other known significant crystalline graphite flake deposits found in eastern Canada and within the Grenville geological Province (Figure 7.7).

8.2 Exploration Methods

Graphite is a very conductive mineral and electromagnetic detection methods can therefore be successfully used to explore for high-grade crystalline flake graphite deposits.

Such methods include Time Domain Electromagnetic ("**TDEM**"), Frequency Domain Electromagnetic ("**FDEM**"), Induced Polarization ("**IP**"), self-potential and other types of Electromagnetic ("**EM**") surveys.

In a report detailing the 2012-2013 exploration work on the Matawinie Property (Cloutier, 2015, GM 68856), Cloutier proposes the following exploration steps for crystalline flake graphite exploration in Canada:

- Identification of an area with known organic-bearing metasediments in amphibolite to granulite terrane;
- Conducting of a regional airborne TDEM survey at a one (1) km spacing to discriminate large-scale conductive targets. These can then be flown in more detail at a 100-m spacing to provide better resolution of significant targets;
- Ground follow-up of targets can be performed using a portable conductor detector such as the Beep Mat from GDD Instrumentations (according to the manufacturer, it can detect conductive material at a maximum depth of three (3) m, although field tests indicate a useful scanning depth of one (1) m for graphite exploration). Visual observation is also very effective; graphite is easily identifiable by its silver metallic sheen, softness and dark-grey to black streak. The goal of the follow-up is to identify mineralization with values in excess of 5 % C(g) with a potential for being over five (5) m thick and hundreds of metres long;
- Mineralization showing potential economic grade and volume should be sampled and processed to test its crystalline flake size distribution and carbon purity. Trenching could be performed to confirm the potential size of the mineralization. Trench location can be optimized by using a portable ground TDEM system such as the PhiSpy, which detects conductors to a depth of 10 to 15 m in real time;
- Subject to favourable metallurgical results, and potential for adequate volume, further assessment of a showing can be performed by additional ground EM surveying, trenching and ultimately, core drilling.

9.0 EXPLORATION

Exploration work on the Tony Block was first initiated by 3457265 Canada Inc., in late 2013, when a detailed airborne geophysical survey was performed in the area. The 2013 survey was executed following positive results from a regional survey by 3457265 Canada Inc. that covered over 2,100 km^2 pursuant to the instructions provided by NMG's technical staff (confidential internal documents). Subsequent work was then conducted by NMG and includes ground follow-up prospecting, ground geophysics, trenching, scoping level metallurgical testing and core drilling.

Section 9.1 summarizes the reports pertaining to the historical work mentioned above and Section 0 summarizes the main exploration methods and protocols used by NMG during the course of its exploration programs.

9.1 Exploration History

A list of reports describing the relevant exploration work performed by NMG on the Tony Block is presented in Table 9.1. The exploration reports are listed in chronological order, starting with the earliest reports. In addition to the reports available on the EXAMINE system, a technical report detailing a Preliminary Economic Assessment concerning the Tony Block, prepared by Norda Stelo, (Pierre H., Terreault et al., 2016) and completed in accordance with National Instrument ("**NI**") 43-101 guidelines, was published on SEDAR ((http://www.sedar.com) on August 5th, 2016. Also, reports entitled "NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project" (MC-DRA, 2017) and "NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project" (MC-DRA, 2018) were published on December 8th, 2017 and August 10th, 2018 respectively. Both reports are available on SEDAR.

Table 9.1 – Previous Exploration Reports for Work Performed on the Tony Block

Report	Type of Report and Comments
GM 69067*	Late 2013 Heliported Magnetic and TDEM surveys totalling 1,006 line-km over four (4) blocks composing the Matawinie graphite Property. The survey covers part of the Tony Claim Block.
GM 69069*	2014 Prospecting and trenching on the Matawinie Property by NMG.
GM 69560*	2015 Heliported Magnetic and TDEM surveys on the southern and western part of the Tony Block totalling 299 line-km.
GM 69561*	2014-2015 Ground TDEM PhiSpy Surveys on the Tony Block totalling 100.6 line-km.
SEDAR**	Technical Report detailing the Mineral Resource Estimate of the South-East and South-West Zones on the Tony Block. (this report was superseded by the updated report below)

Report	Type of Report and Comments
GM 69562* + SEDAR**	Technical Report detailing the updated Mineral Resource Estimate of the South-East, South-West and West Zones on the Tony Block (this report was superseded by the updated report below).
SEDAR**	Preliminary Economic Assessment Report detailing the Mineral Resource Estimate of the West Zone
SEDAR**	Pre-Feasibility Report concerning an open pit mining operation on the Matawinie Graphite Property
SEDAR**	Updated Pre-Feasibility Report concerning an open pit mining operation on the Matawinie Graphite Property

* Available on the following website: http://sigeom.mines.gouv.qc.ca/signet/classes/I1102_indexAccueil?l=a
** Currently available on SEDAR

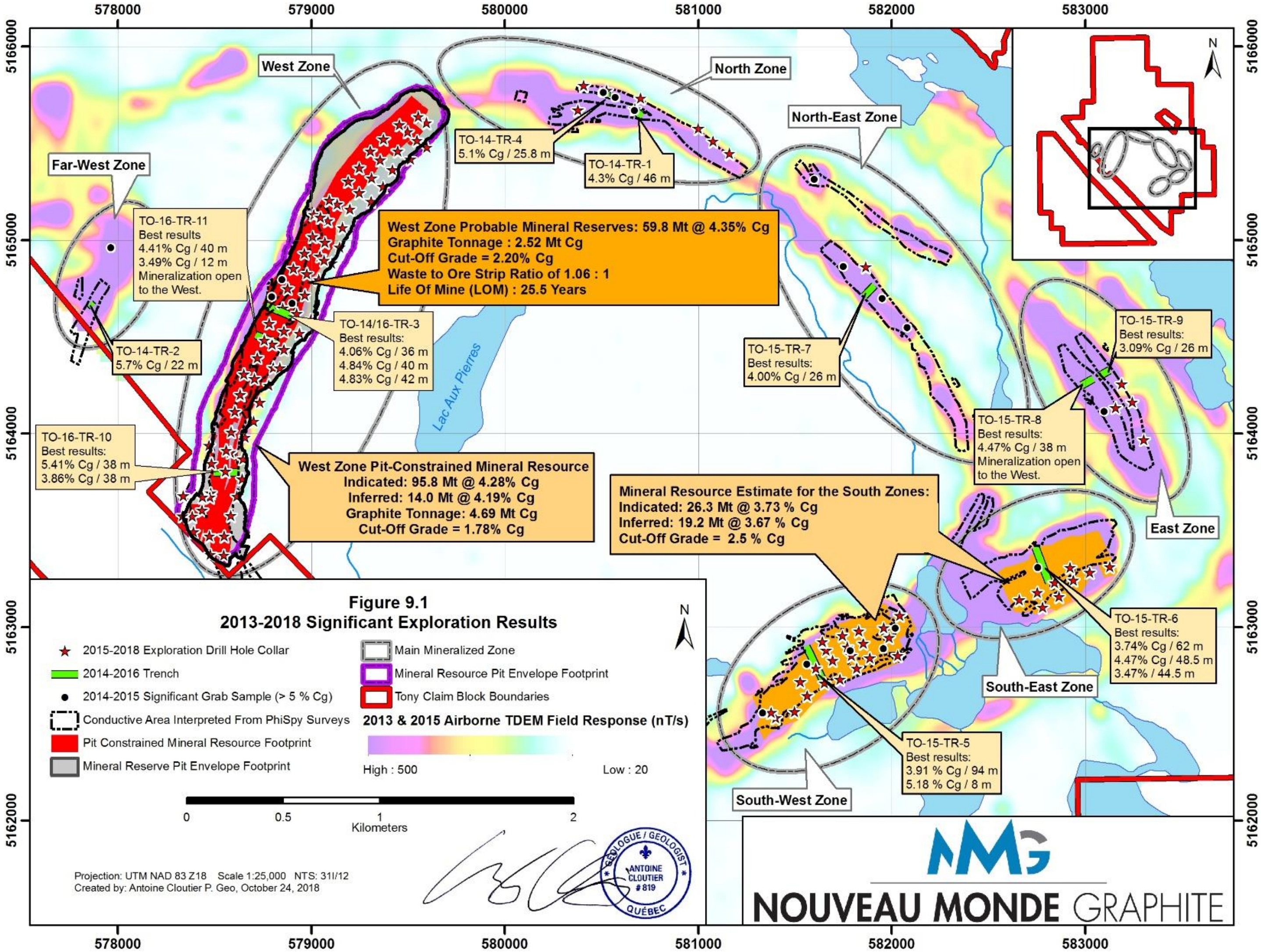
9.2 Exploration Methodology and Results

NMG's field programs on the Tony Block focused on graphite exploration consisting of:

- Airborne TDEM surveys (2013 and 2015);
- Ground prospecting of conductive targets identified by the airborne surveys (2014-2015);
- Ground geophysical surveying using a portable TDEM system (2014-2017);
- Trenching and channel sampling of the main conductors (2014 to 2016);
- Drilling of the main mineralized zones (2015-2018) (further discussed in Section 10.0);
- Metallurgical testing on surface and drill core samples (further discussed in Section 13.0).

An overview of the significant 2013 to 2018 exploration results are summarized in Figure 9.1 with the exception of the metallurgical test results, which are discussed in Section 13.0.

Figure 9.1 – Significant 2013-2018 Exploration Results



9.2.1 Airborne Geophysical Surveying

Graphitic mineralization is conductive whether it is in amorphous or crystalline form. This physical property enables the detection of graphite using remote electromagnetic surveying methods. Its detection is enhanced by proper connectivity between grains and quantity or volume of graphite present. The regional survey performed by 3457265 Canada Inc. aimed to detect graphite mineralization in the area and used a time domain electromagnetic sensor to do so.

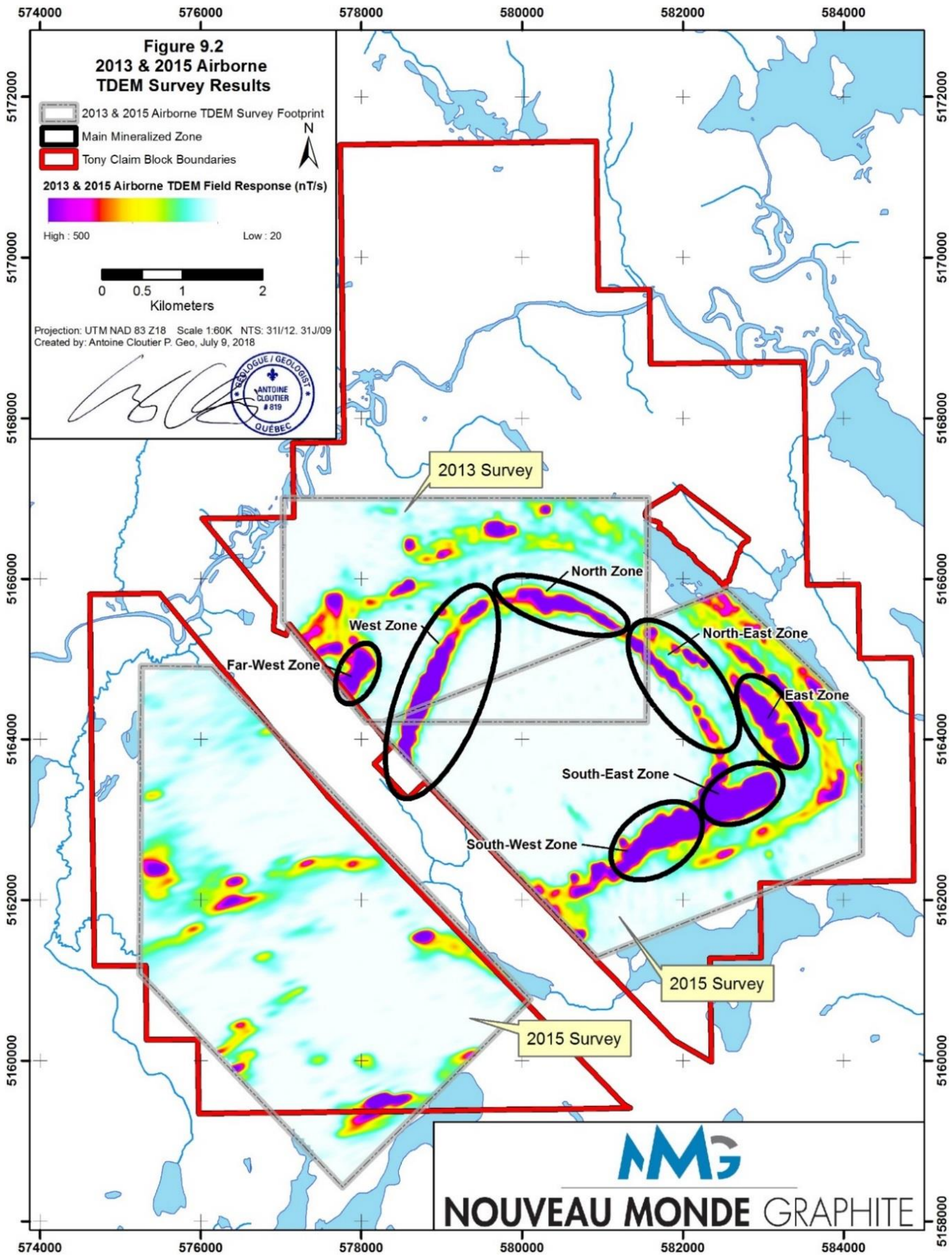
A heliborne regional geophysical survey was first completed in the area, under the guidance of NMG consultants. This survey, covering 2,100 km^2, was flown by Prospectair Inc. (based in Gatineau, Quebec) using one (1) km line spacing and detected large conductors, including part of the main circular conductor present over the Tony Claim Block. Two (2) detailed heliborne surveys were then performed, one (1) in late 2013 and a second in early 2015, to provide better accuracy and to delineate the extent of the conductors (Figure 9.2).

These detailed surveys were flown at 100-m spacing and delivered targets for ground follow-up prospecting. A magnetometer was also used during the heliborne TDEM surveys to provide additional geophysical measurements. Results indicated that the circular conductive anomaly also demonstrated a positive magnetic contrast compared to the regional average. Samples from future ground work (prospecting, trenching and drilling), established that the graphite mineralization is associated with a sufficient amount of magnetic pyrrhotite to provide positive magnetic anomalies. It is important to note that due to the interference caused by the presence of high voltage power lines in the middle of the Tony Claim Block, the airborne TDEM surveys did not cover that area.

9.2.2 Prospecting

The 2014 and 2015 prospecting programs targeted strong conductors identified earlier by the airborne TDEM surveys. Outcrops in the conductive areas were visually inspected and sampled where graphite mineralization was observed. The use of a Beep Mat, a portable device capable of detecting conductors to depth of up one (1) m, was instrumental during prospecting to scan for soil-covered shallow conductors. Generally, a grab sample, about one (1) to three (3) kg in size, was collected if the outcrop displayed above-background conductivity using the Beep Mat (readings usually over 100 in the High Frequency or HFR channel). Most conductors identified using the Beep Mat were covered by a thin till veneer (< 1 m) that had to be cleared manually using a hand shovel.

Figure 9.2 – 2013 and 2015 Airborne TDEM Survey Results



Significant grab sample results are defined as those greater than five (5) % C(g). The collection of 19 samples grading above five (5) % C(g) confirmed the potential for the 12 linear kilometres of continuous TDEM anomalies, displaying a circular geometry surrounding *Lac aux Pierres*, to host sizeable mineralization. Significant grab sample locations from the 2014 and 2015 prospecting programs are illustrated in Figure 9.1.

Grab samples were initially described in the field. Information such as rock type, mineralization and coordinates (UTM) were recorded. Samples were hand cleaned using stream water and placed in individual plastic bags. These were bundled and sent in 20 L plastic pails by courier to the ALS Minerals facilities in Val-d'Or, Quebec, for processing, weighing, crushing and pulverizing. The resulting powders were then sent to ALS Minerals' North Vancouver facilities for analysis. Analytical packages were chosen to test for graphite ["**C(g)**", package C-IR18], total carbon ["**C(t)**", package C-IR07] and sulphur ("**S**", package S-IR08).

No quality control samples were inserted by NMG during the course of these prospecting programs. Additional information on the analytical packages is available on the ALS Minerals website (http://www.alsglobal.com/en/Our-Services/Minerals/Geochemistry).

9.2.3 PhiSpy Surveying

From 2014 to 2017, ground PhiSpy TDEM surveys were carried out by Dynamic Discovery Geoscience Inc., based in Ottawa, Ontario. These surveys, now totalling about 110 line-kilometres, were mostly performed perpendicular to the main circular airborne anomaly following encouraging grab sample results. Surveys used a grid of cut lines covering the main airborne anomaly with spacing varying from 25 m to 100 m to enable remote mapping of the mineralization (Figure 9.3). The survey results were used to plan for trenching and diamond drilling operations. The PhiSpy apparatus, carried by a two (2) man team, has demonstrated a capacity to detect conductors to a depth of approximately ten (10) to 15 m. The lack of conductors identified by the PhiSpy over the northern portion of the West Zone is explained by the presence of thick overburden (> 15 m).

9.2.4 Trenching and Channel Sampling Program

The 2014 to 2017 ground TDEM surveys delineated wide conductive areas over each of the targeted mineralized zones. A trenching program was initiated on the widest part of the conductive areas identified over these zones. As a result, four (4) trenches were excavated in 2014, five (5) in 2015 and three (3) in 2016. Antoine Cloutier, P. Geo., supervised all trenching and channel sampling operations to date on the Tony Block. Trenches were oriented roughly perpendicular to the foliation of the paragneiss units and mineralized horizons when possible. Table 9.2 displays trench coordinates, as well as other useful information regarding the trenching programs.

Figure 9.3 – 2014-2017 PhiSpy Survey Results

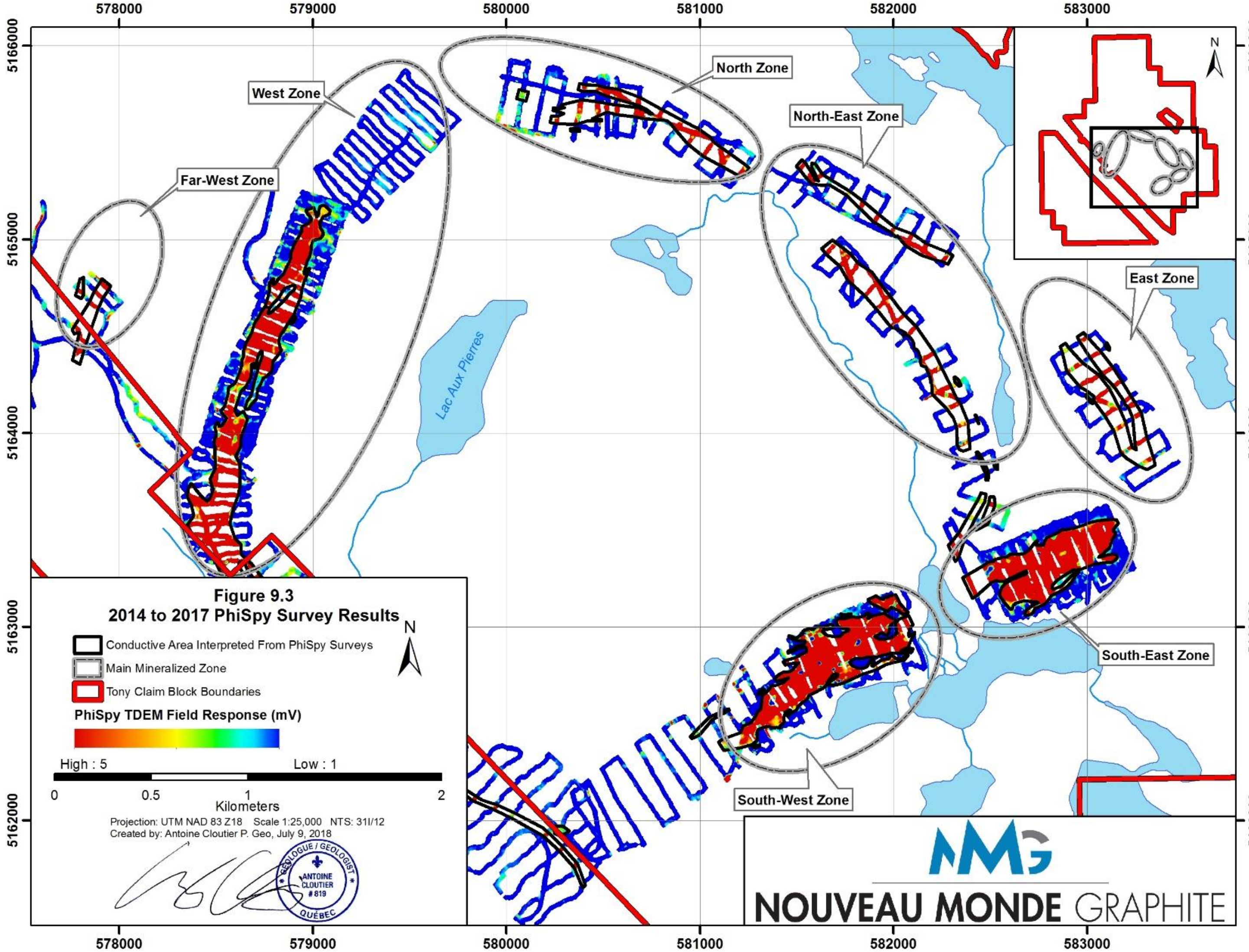


Table 9.2 – Trench Location and Relevant Information

Trench ID	Mineralized* Zone	Grid Line	Trench Start **		Trench End **		GPS** Length (m)	Measured Length (m)	Azimuth (deg)	Total Samples
			Easting	Northing	Easting	Northing				
TO-14-TR-1	North	NA	580673	5165671	580704	5165642	42.4	48	133	23
TO-14-TR-2	Far-West	NA	577856	5164670	577871	5164656	20.5	22	133	11
TO-14/16-TR-3	West	W+0875	578903	5164603	578757	5164665	158.7	158.55	293	77
TO-14-TR-4	North	N-1000	580525	5165764	580524	5165739	25	25.8	182	14
TO-15-TR-5	South-West	S-1500	581558	5162903	581640	5162733	189	193	154	73
TO-15-TR-6	South-East	S-2800	582813	5163230	582740	5163424	207	198	339	84
TO-15-TR-7	North-East	N-2700	581857	5164711	581910	5164765	76	77	45	35
TO-15-TR-8	East	E-2200	582981	5164250	583041	5164284	69	68	60	33
TO-15-TR-9	East	E-2200	583071	5164297	583126	5164327	63	62	61	31
TO-16-TR-10	West	W+0025	578631	5163800	578496	5163800	135.15	138	270	69
TO-16-TR-11	West	W+0700	578822	5164466	578711	5164511	119.3	120	292	61

* The West Zone is the main subject of this Report as it contains the only Mineral Reserves identified as the Report effective date on the Property.

** Trench coordinates and length was measured using a Garmin GPS model 76 CSX providing about five (5) m of precision with the exception of trenches completed in 2016 which were professionally surveyed and have a precision of 0.05 m.

A summary of significant channel sample results is available in Table 9.3, and trench locations are illustrated in Figure 9.1.

Table 9.3 – Significant 2014 to 2016 Trench Channel Sample Results

Trench ID	Mineralized Zone*	From (m)	To (m)	Grade [% C(g)] **
TO-14-TR-1	North	0	46	46 m @ 4.32 % C(g)
TO-14-TR-2	Far-West	0	22	22 m @ 5.72 % C(g)
TO-14/16-TR-3	West	14	50	36 m @ 4.06 % C(g)
		63	103	40 m @ 4.84 % C(g)
		111	153	42 m @ 4.83 % C(g)
TO-14-TR-4	North	0	25.8	25.8 m @ 5.11 % C(g)
TO-15-TR-5	South-West	61	155	94 m @ 3.91 % C(g)
		185	193	8 m @ 5.18 % C(g)
TO-15-TR-6	South-East	0	62	62 m @ 3.74 % C(g)
		69.5	118	48.5 m @ 4.47 % C(g)
		147.5	192	44.5 m @ 3.47 % C(g)
TO-15-TR-7	North-East	30	56	26 m @ 4.00 % C(g)
TO-15-TR-8	East	0	38	38 m @ 4.47 % C(g)
TO-15-TR-9	East	20	46	26 m @ 3.09 % C(g)
TO-16-TR-10	West	6	42	36 m @ 3.86 % C(g)
		90	128	38 m @ 5.41 % C(g)
TO-16-TR-11	West	16	28	12 m @ 3.49 % C(g)
		80	120	40 m @ 4.41 % C(g)

* The West Zone is the main subject of this Report as it contains the only Mineral Reserves identified as the Report effective date on the Property.

** Interval length does not represent true width. All analyses were performed by ALS Minerals Laboratories and delivered as graphitic carbon [C(g)], internal analytical code C-IR18.

Trench locations were mostly chosen based on the results of ground PhiSpy surveys. In 2014, the trenching program aimed at sampling only mineralized material along the trenches in order to determine the potential of the mineralization while in 2015 and 2016, channel sampling usually started two (2) or four (4) m [one (1) to two (2) sample lengths] outside the visible mineralized area and were collected in a continuous manner as to prevent any sample bias. In some instances, large boulders, the accumulation of water and prohibitive depth prevented the excavation and/or sampling of portions of the planned trenches.

In 2016, trench TO-14/16-TR-03 was extended to the East and to the West to properly expose the conductive area. Mineralization remains open to the East side of trench TO-14/16-TR-3, on the northern side of trench TO-14-TR-4, the South side of trench TO-15-TR-5, on the South side of trench TO-15-TR-6 on the West side of trench TO-15-TR-8 and on the West side of trench TO-16-TR-11.

Trenching was carried out using a small excavator. Trenches were mostly positioned over cut lines used for the ground TDEM surveys. Trenches were approximately 1.5 m in width and varied from 0 m to four (4) m in depth.

A hand shovel and gas-powered broom were used to clean the outcrop once excavation was completed. Sample lengths were marked and cut perpendicularly to the trench alongside a 30-m long measuring tape. Aluminum tags, numbered according to the samples, were placed in cut marks, usually at the beginning of every sample.

Channel samples were cut with a gas-powered rock saw; most samples were approximately two (2) m in length, four (4) cm in width and ten (10) cm in depth, and weighed between ten (10) kg and 20 kg. Once cut, the channel samples were chiselled out and placed in individual plastic bags. Bags were identified with a sample number and a numbered tag was also inserted into the bag. Trench positions were measured using a handheld Garmin GPSMAP 76CSX unit providing an accuracy of about five (5) metres. The error inherent to the GPS could explain the difference compared to the trench lengths obtained with a measuring tape, shown in Table 9.2. The latter can also be inaccurate, especially in uneven terrain. All Individual West Zone trench sample start and end points were surveyed by a surveying company (Corriveau J. L. & Assoc. Inc, Surveying, Val-d'Or, Quebec). This was necessary as these sample results were to be used for the preparation of an updated Mineral Resource Estimate concerning the West Zone which required greater accuracy than was provided by a commercial handheld GPS.

Channel samples were thoroughly cleaned using a pressure washer. The top weathered crust, usually about one (1) cm thick, was removed to the extent possible using a rock hammer. Samples were then bagged using their original sample number. Samples were placed in locked storage facilities. When a sufficient number of samples were ready for shipping, they were placed in large containers on a flatbed trailer and sent directly to the ALS Minerals' facilities in Val-d'Or, Quebec, for processing, weighing, crushing and pulverizing. The resulting powders were then sent to ALS Minerals' North Vancouver facilities for analysis.

In 2014 and 2016, all samples were analyzed for their graphite, total carbon and sulphur content using the C-IR18, C-IR07 and S-IR08 ALS analytical packages. In 2015, all samples underwent the C-IR18 package and one (1) in every five (5) sample was also tested using package S-IR08. Information on the analytical packages is available in

Section 11.0 and on the ALS Minerals website (http://www.alsglobal.com/en/Our-Services/Minerals/Geochemistry).

The protocols concerning the insertion of quality control samples in 2014 included the insertion of one (1) duplicate sample per trench. In 2015 and 2016, depending on the terrain and ease of sampling, duplicates were collected at roughly every sample number ending in even tens, while a blank sample was added at every odd tens. In 2016, one (1) graphite standard was inserted per trench at every sample ending in "50". The blank material used for quality control purposes was the same as the one used during the drilling program. No bias was introduced during the trenching and channel sampling operations and all quality control samples inserted within the channel sample stream returned within acceptable limits.

One notable field observation is that graphitic mineralization tends to give the water used during the cutting operation a silver sheen. Silver coloured pools and residue in the trenches should not be mistaken for a chemical or oil/fuel spill, as they are rather caused by graphite particles in suspension from the channelling work. The silver residue washes away after a few days of rain.

Trenches completed in 2014 and 2015 were all backfilled with only a few shallow windows left uncovered for posterity. The deeper portions of the 2016 samples were backfilled and trench flanks were graded to a 3-to-1 ratio (horizontal to vertical lengths) when applicable to prevent injuries to curious land users and wandering wildlife.

Figure 9.4 – Trench TO-16-TR-11, Looking to the East

10.0 DRILLING

NMG initiated an extensive exploration drilling program in 2015 following repeated discoveries of high-grade graphite showings coincident with multi-kilometric conductive anomalies on the Tony Block. The objective of the work was to generate a Mineral Resource Estimate using current CIM, Standards on Mineral Resources and Reserves, Definitions and Guidelines. Additional drilling was performed from July to November of 2016 in the West mineralized Zone which has proven to display good economic potential as demonstrated by the results of a PEA (See News Release dated June 22nd, 2016). The 2016 and 2018 drilling aimed at extending and upgrading the Mineral Resources of the West Zone in order to provide the necessary information needed for the FS detailed in this Report.

The following table (Table 10.1) lists exploration and definition drill hole information per mineralized zone.

Table 10.1 – Tony Block Exploration Drilling Summary

Mineralized Zone	Total Drill Holes	Metres Drilled	Amount of Samples and Type of Analysis**						
			C-IR18	C-IR07	S-IR08	ME-MS41	AU-AA23	OA-GRA08	OA-GRA08b
West*	80	13,848.04	4,491	3,093	3,363	597	23	710	97
South-West	22	2,616.60	938	15	205	15	15	0	28
South-East	9	1,551.99	598	8	106	7	8	0	28
East	4	641.70	209	3	49	3	3	0	0
North-East	2	210.28	34	1	9	1	1	0	7
North	6	911.99	212	6	33	6	6	0	0
Total	123	19,780.60	6,482	3,126	3,765	629	56	710	160

* The West Zone is the main subject of this Report as it contains the only Mineral Reserves identified as the Report effective date on the Property.
** All analyses were performed by ALS Minerals Laboratories. See below for a description of each type of analytical package.
C-IR18 [Graphitic carbon or “C(g)” by LECO]
S-IR08 (Sulphur or "S" by LECO)
ME-MS41 (Multi-Element analysis of 51 elements by *Aqua Regia* extraction followed by Mass Spectroscopy)
AU-AA23 (Gold "Au" analysis by fire assay followed by Atomic absorption)
OA-GRA08 (specific gravity by measuring the weight of a core sample in air and in water)
OA-GRA08b (specific gravity by measuring the weight of a displaced solvent by adding three (3) g of a powdered sample)

In 2015, drilling and core sampling operations were supervised by Yvan Bussières, P. Eng., assisted by Bernard-Olivier Martel, P. Geo. In 2016 and 2018, the drilling and sampling program was solely supervised by Bernard-Olivier Martel, P. Geo. All drill hole locations are illustrated in Figure 10.1 to Figure 10.3.

In 2017, ten (10) drill holes, were also supervised and logged by Mr. Martel, were completed on the West Zone as part of a geotechnical investigation program to determine the pit slope parameters. These 200 m long holes, drilled at a dip of 45º, were not sampled for C(g) and thus, are not considered being part of the exploration drilling programs detailed in this Report. The results of this investigation are mentioned in Section 16.1.3. In addition, 14 vertical drill holes were performed in 2017 to survey overburden thickness in the West Zone area. These were used to provide a greater precision for the overburden depth model over the mineral resources. It only penetrated a few metres of bedrock and were not sampled. The overburden survey drilling was not discussed further in this Report. Although the geotechnical and overburden survey drilling were not considered as exploration drill holes in this Report since they were not sampled. However, they did provide invaluable exploration data where none existed.

10.1 Drilling Program Overview

From September to December 2015, NMG drilled 27 holes on the West Zone. These holes are numbered TO-15-36 to TO-15-40 and TO-15-53 to TO-15-74, for a total of 4,546.49 m. An additional 42 holes were drilled in the West Zone in 2016 totalling 7,091.10 m. These were numbered from TO-16-75 to TO-16-116. In January 2018, 11 additional holes, numbered from TO-18-127 to TO-18-137, were drilled for a total of 2,210.45 m. To date, 13,848.04 m in total were drilled in the West Zone for graphite sampling purposes (Figure 10.1).

The reader should note that five (5) drill holes (TO-16-97, TO-16-98, TO-16-99, TO-16-115, and TO-16-116) located in the southern part of the West Zone were at the time located outside of the Property limits and thus, the mineralization intercepted in these holes was not considered in the Mineral Resource Estimate published on March 2nd, 2017. Due to the expansion of the Property limits, the five (5) drill holes are considered in this Report (NMG Press Release dated July 5th, 2017).

From June to October 2015, NMG drilled 31 holes on the South-East and South-West Zones. These holes are numbered TO-15-05 to TO-15-07, TO-15-09 to TO-15-33 and TO-15-41 to TO-15-43, for a total of 4,168.59 m (Figure 10.2).

In October 2015, NMG drilled 12 holes on other graphitic zones consisting of the North, North-East and East Zones. These holes are numbered TO-15-08, TO-15-34 to TO-15-35 and TO-15-44 to TO-15-52, for a total of 1,763.97 m (Figure 10.3).

Figure 10.1 – 2015-2018 Trenching and Drilling Programs, West Zone

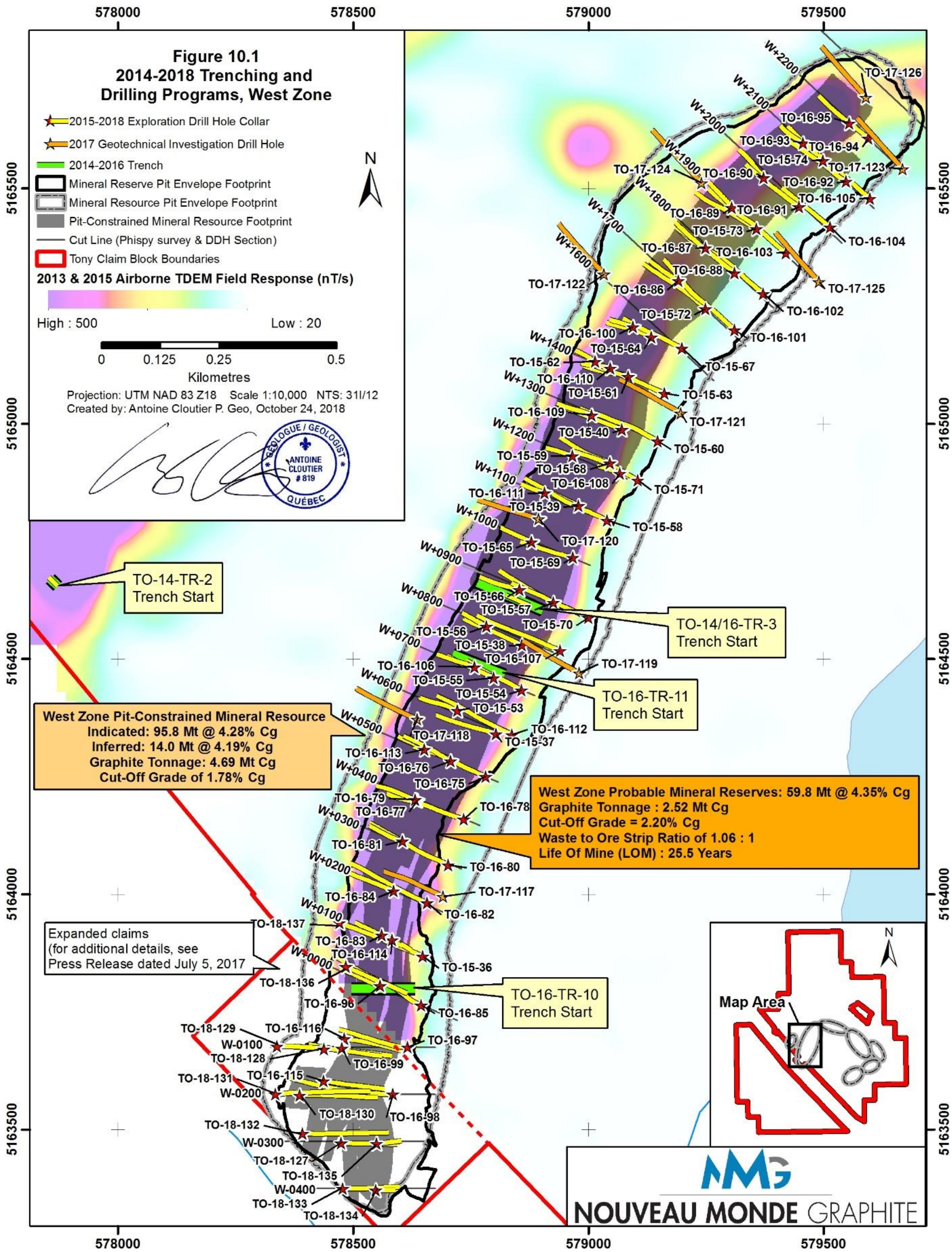


Figure 10.2 – 2015 Trenching and Drilling Program, South-East and South-West Zones

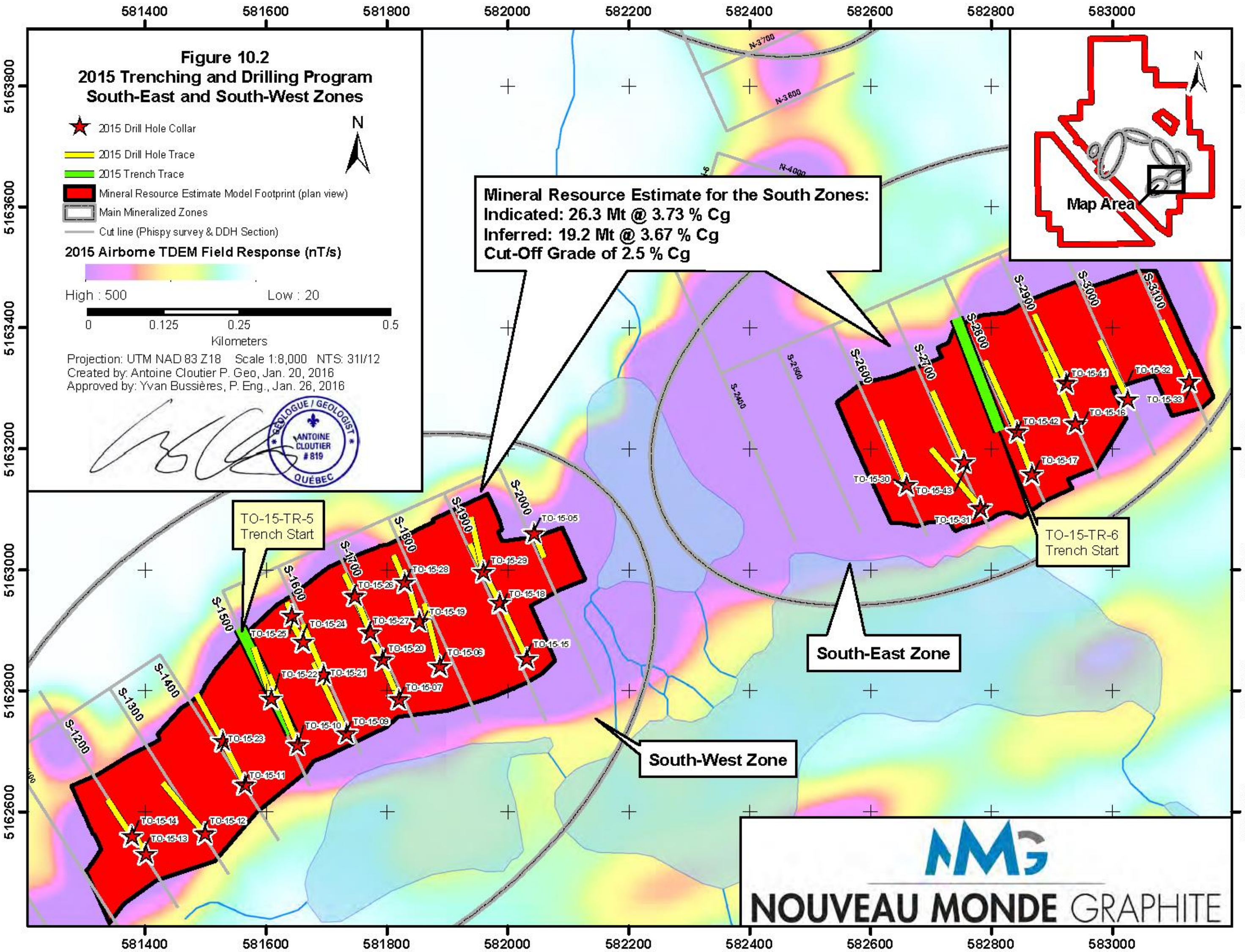
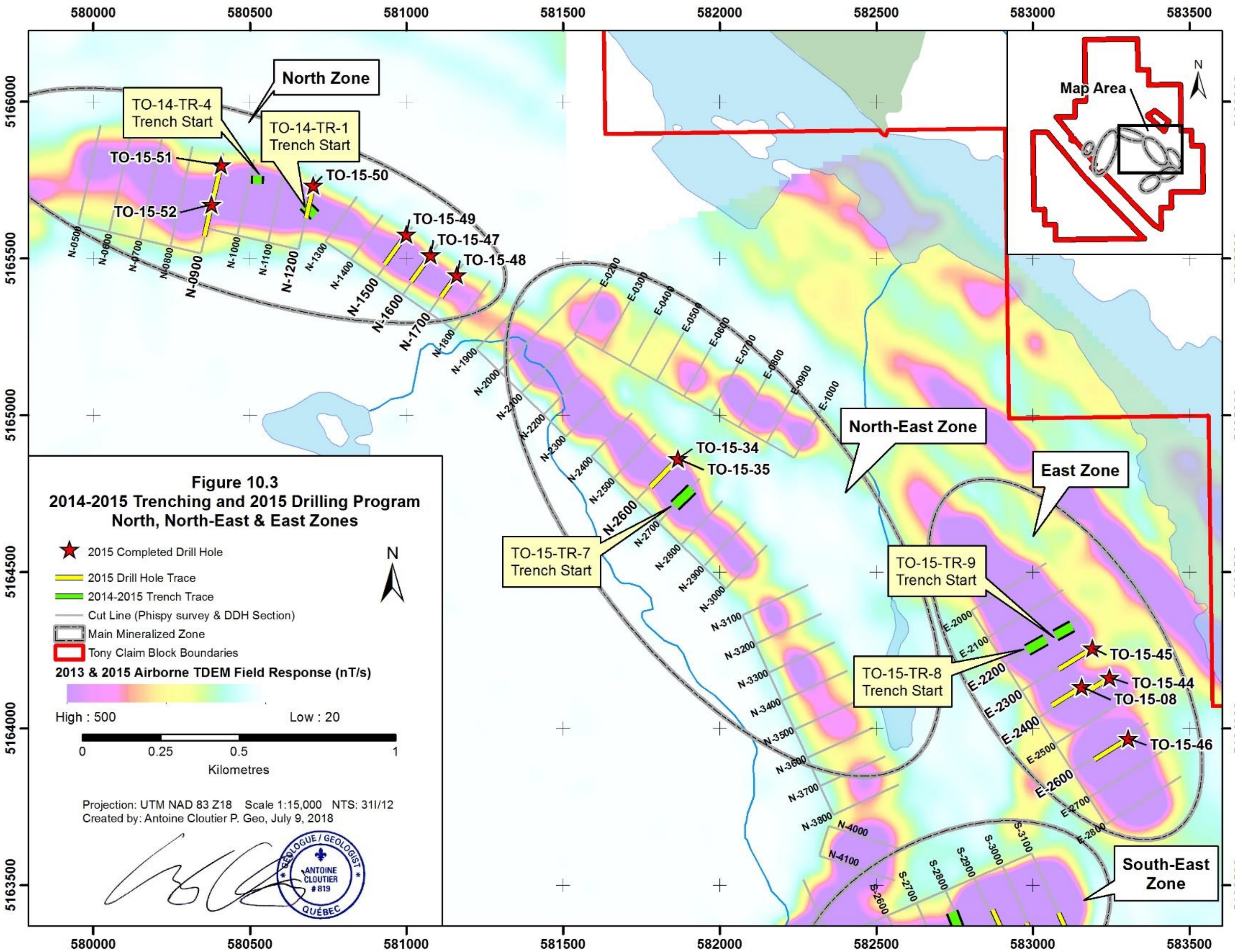


Figure 10.3 – 2014-2015 Trenching and 2015 Drilling Program, North, North-East, and East Zones



The drilling program was initiated on the basis of positive results of the 2014 exploration work as well as the detailed airborne Time Domain Electromagnetic ("**TDEM**") and Magnetic ("**Mag**") surveys performed in the area. The initial planning of the drilling program consisted of one (1) hole per section at 100 m spacing over the most favorable targets. Within the first few drill holes, NMG intercepted graphitic horizons many tens of metres thick indicating potential to delineate good tonnage. The follow-up drilling was planned at more or less 50 m to 80 m spacing between holes on the same section. Due to the good continuity displayed by the graphitic horizons, illustrated by the ground TDEM surveys at 25 m line spacing, drilling on sections spaced at 100 m was considered adequate to delineate the graphite resources.

10.2 Drilling Protocols and Procedures

NMG applied the following drilling operation procedures for the exploration drilling on the Tony Claim Block, part of its Matawinie graphite Property;

10.2.1 Drill Hole Location

Drill hole location was based on:

- The ground TDEM survey (PhiSpy) results, which mapped the potential location of graphitic horizons under an overburden thickness of less than 15 metres. Drill holes were collared at approximately ten (10) m to 30 m behind the interpreted contact to enable the sampling of non-mineralized rock before intersecting the graphitic horizon as well as to provide information at depth;
- The geological information available;
- The trench and channel sample results;
- The interpretation of the geology of the drill hole section;
- Maximization of the graphitic horizon to be intercepted by the drilling;
- Minimization of the number of metres drilled to properly define the mineralized horizons.

Drill sites were located using a handheld GPS and oriented using a handheld compass. In 2015, drilling used mostly BTW size tubing providing a core diameter of 42 mm although some drilling over the West Zone used NQ size tubing providing a core diameter of 47.6 mm. All drilling in 2016 and 2018 used NQ size tubing with the exception of holes TO-16-77, TO-16-79, TO-16-81, TO-16-83, and TO-16-99 which used BQ size tubing. Drilling aimed at identifying the extent of mineralization to a depth of at least 200 m from the surface for the West Zone and to a depth of at least 100 m from surface for the other mineralized zones.

10.2.2 Drilling Supervision

During drilling operations:

- The geologist visited the drill rig at least once per hole to verify its correct position and designation number;
- The drill operator collected one (1) deviation reading for each 50 m of drilling using tools such as the Reflex Easyshot and the Ranger;
- The drill operator carried the full core boxes at the designated secure site (protected by a locked gate and video surveillance) at 480 Rue des Aulnaie, Saint-Michel-des-Saints, at the end of each shift;
- Before completing the drill hole, the geologist determined whether the target has been reached, and if not, the geologist requested that drilling continued.

Once the drill hole was completed:

- The casing was left in place for surveying purposes;
- In 2015, a wooden log was inserted in the casing and a flag was attached to the log. An aluminum tag identified with the number, azimuth, dip and length of the hole was attached to the flag. In 2016 and 2018, metal caps and flags identifying the hole number were bolted on the casings;
- Casing locations were professionally surveyed with a precision of 0.05 m. Surveyors Gilles Dupont, based in Repentigny (Qc), Corriveau J. L. & Assoc. Inc of, Val-d'Or (Qc) and Martin Larocque, based in Laval (Qc), performed surveys at various times on the Tony Block to properly locate the top centre of each casing. The casing dip reading was noted by a geologist or technician. This information was added to Geotic Log, a drill database management software.

10.2.3 Core Handling

Upon reception of the core boxes:

- A technician verified the continuity of the core depth markers in the core box;
- A technician measured and noted the core depth at the end of each core box;
- The technician stapled an aluminum tag on each core box on which the hole number, box number and core depth measurement were identified;
- The technician noted the magnetic susceptibility and conductivity readings provided by an MPP probe (sold by Instrumentation GDD Inc.) at every 0.5 m along the drill core during the 2015 and 2016 drilling campaigns. These readings have been useful for identifying the graphitic horizons. These are more magnetic than the barren or weakly mineralized units since they correlate with magnetic pyrrhotite and magnetite;

- The geologist logged (described) the drill core;
- The technician took a picture of the core boxes once the description and samples were marked in order to show the sample intervals marked by the tags.

10.2.4 Core Sampling

The drill core sample was split into two (2) core quarters and one (1) core half using a rock saw. One (1) of the quarter-core was then bagged and sent for analysis, and the remaining quarter as well as the remaining half was kept as a reference and for possible metallurgical testing. Figure 11.1 shows that a quarter of the drill core is a sufficient amount to be considered representative of the graphitic mineralization.

10.2.5 Sample Quality Assurance and Quality Control Measures

NMG established an extensive quality assurance and quality control ("**QA/QC**") protocol to ensure the accuracy of assays. The protocol consisted of inserting duplicates, blanks and graphite standards. The QA/QC protocol is detailed under Section 11.0.

10.3 Drilling Results

The excellent core recovery (mostly 100 %), consistent quality control sample results and visual observation of the graphite mineralization confirms the accuracy and reliability of core sample results from the drilling performed on the Tony Block to date.

10.3.1 Drilling Results for the West Zone

Exploration drilling in the West Zone (or the "West Deposit") consisted of 80 holes totaling 13,848.04 m. The West Zone is the main subject of this Report as it contains the only Mineral Reserves identified at the Report effective date on the Property.

Drill hole TO-16-77 was abandoned at 36 m in overburden due to the drill's lack of power, all other drill holes in the West Zone were completed as planned.

Mineralization was intercepted 270 times by drilling in the West Zone resulting in the interpretation of a mineralized envelope of 100 m to about 150 m thick from which 19 graphitic horizons, or mineralized volumes, were interpreted. These horizons can be followed, sometimes sporadically, from sections W-0400 to W+2200 (a distance of 2,600 m). An additional feature of the West Zone is that some of the horizons separate and coalesce to form wider mineralized horizons. The longest intersection along drill core returned a graphite content of 4.76 % C(g) over 133.7 m although this intersection is considered as being down-dip. Table 10.2 summarizes the 15 groups of mineralized intervals provided by drilling in the West Zone as well as the longest mineralized drill intercepts. Section 14.0 details the mineralized horizons, referred to as mineralized volumes, interpreted from the drill core and trench channel sample assay results.

Table 10.2 – Longest West Zone Drilling Intercepts per Mineralized Volumes

Mineralized Volume	Longest Mineralized Core Interval*	Section	Drill Hole
W0	44.4 m @ 5.96 % C(g)	W+1700	TO-16-101
W0A	8.9 m @ 2.86 % C(g)	W-0200	TO-18-131
W1A	50.67 m @ 3.63 % C(g)	W+1200	TO-15-59
W1B	133.7 m @ 4.76 % C(g)	W-0200	TO-16-98
W1C	40 m @ 5.69 % C(g)	W+1900	TO-16-103
W1D	56.6 m @ 4.73 % C(g)	W-0300	TO-18-132
W1E	43.5 m @ 4.25 % C(g)	W-0200	TO-16-98
W2	40.45 m @ 4.86 % C(g)	W+1700	TO-16-101
W2A	23.0 m @ 4.76 % C(g)	W+0600	TO-16-112
W3_1	39.8 m @ 5.28 % C(g)	W-0200	TO-18-130
W3_2	12.0 m @ 3.75 % C(g)	W+2000	TO-16-104
W3B	19 m @ 4.14 % C(g)	W+0800	TO-15-38
W4_1	56.05 m @ 4.02 % C(g)	W-0300	TO-18-127
W4_2	10.0 m @ 2.38 % C(g)	W+2000	TO-16-104
W5	3.8 m @ 4.06 % C(g)	W+2100	TO-16-105

* Core interval does not represent true width.

The mineralized horizons of the West Zone dip around 70° ± 10° towards the South East at the northern portion of the West Zone and remains fairly stable heading South to section W+0500. From section W+0400 to section W+0100, the mineralized horizons dips gradually steeper and seem to become sub vertical at section W+0100. The dip of the mineralized horizons also rotates towards the East-South-East when heading South along strike following the large circular conductive anomaly. Continuing South, the dipping trend seems to continue and dipping shifts to the West at a steep angle at section W-0200. Mineralization on the West Zone is open to the North, to the South and at depths greater than 200 m.

Figure 10.4 – West Zone Drill Hole Section W+0200

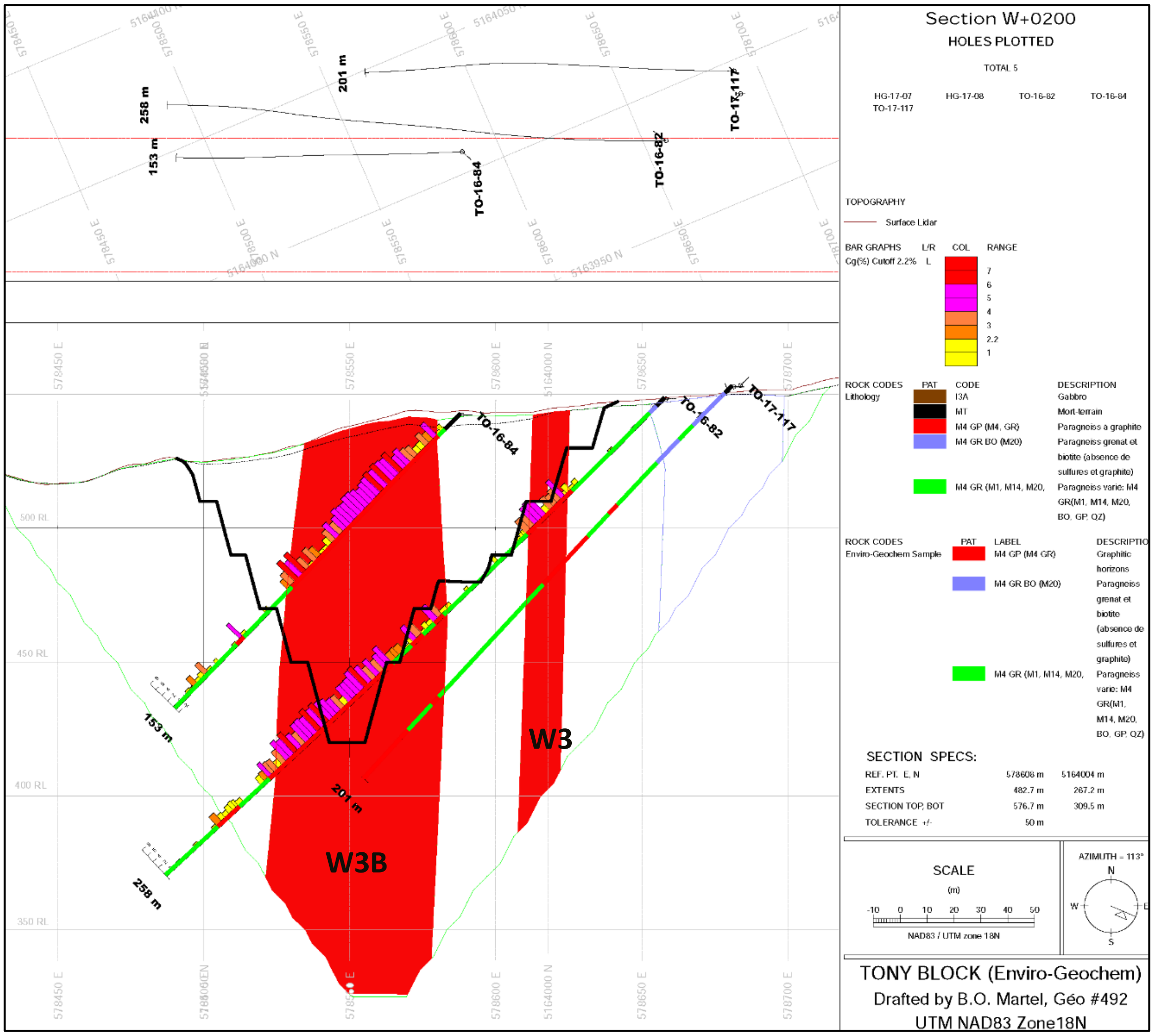


Figure 10.5 – West Zone Drill Hole Section W+0900

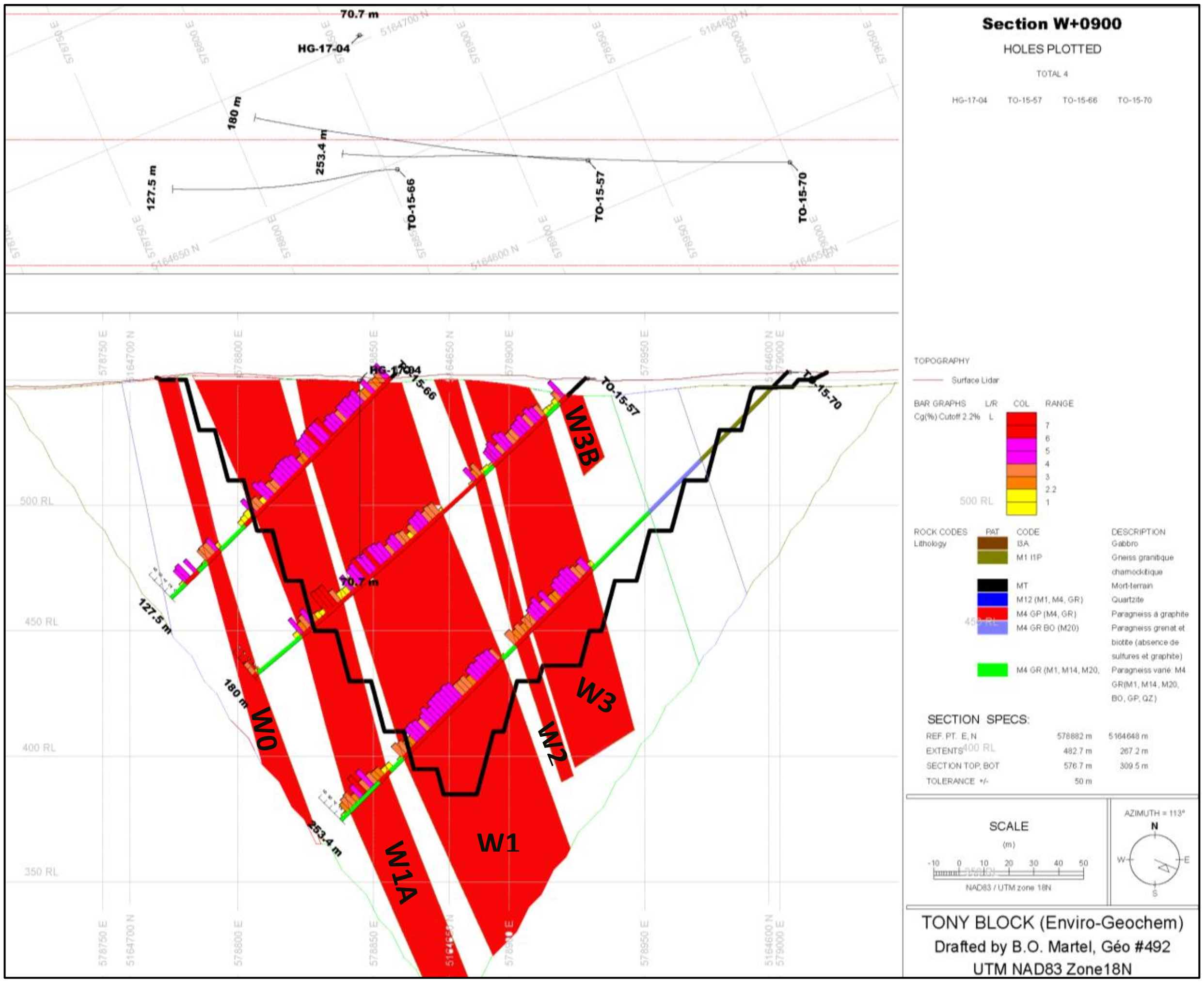
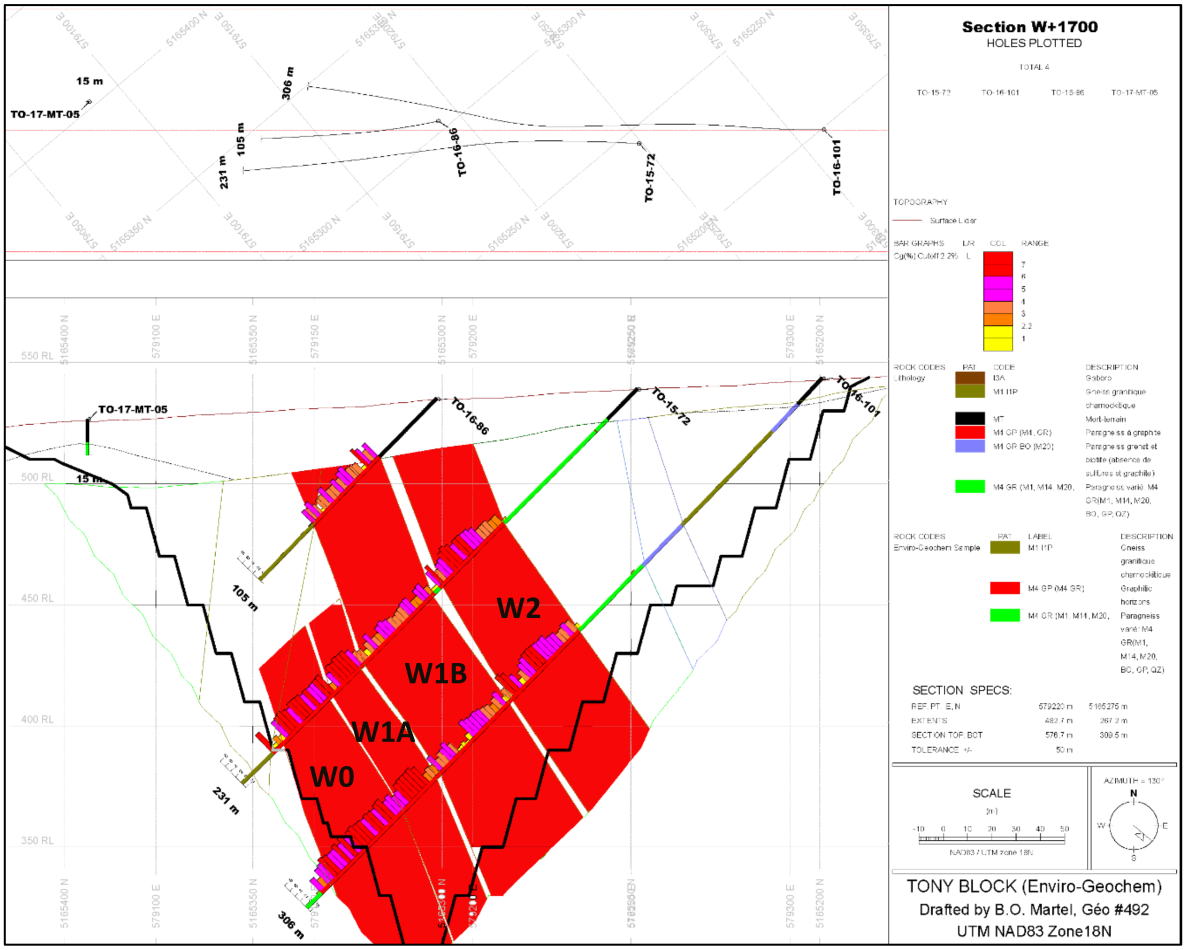


Figure 10.6 – West Zone Drill Hole Section W+1700



10.3.2 Drilling Results for the South-East Zone

The 2015 drilling program on the South-East Zone consisted of nine (9) holes for a total of 1,551.99 m drilled. Mineralization was intercepted by drilling 13 times here resulting in the interpretation that the zone is composed of two (2) main mineralized horizons (S1 and S2). The longest mineralized intercept is interpreted as being 160.1 m at 3.19 % C(g) true width and the smallest mineralized intercept at 8.6 m at 4.65 % C(g) true width.

The highlight of the South-East Zone is the large width of the mineralized horizons. From section S2600 to section S2900 (300 m length), the mineralized horizon ranges from 117 to 160 m true width, with a grade varying from 3.19 % to 3.62 % C(g). As seen on section shown in Figure 10.7 (Section S2900), the drill holes intercepted a wide graphitic horizon (S1 + S2) at least 160 m thick. This horizon dips around 45˚ to the South and strikes at 066°. The drill results suggest that the S1 + S2 horizon narrows to the East between sections S3000 and S3100.

10.3.3 Drilling Results for the South-West Zone

NMG's 2015 drill campaign on the South-West Zone consisted of 22 holes for a total of 2,616.60 m drilled. Mineralization was intercepted 57 times by drilling in this zone resulting in the interpretation that the zone is composed of two (2) main mineralized horizons (S1 and S2). The longest mineralized intercept is interpreted as being 61.8 m at 3.36 % C(g) true width and the smallest mineralized intercept at 3.3 m at 4.58 % C(g) true width.

The highlight of South-West Zone is a first graphitic horizon (S1) about 30 m thick, followed by a mostly barren interval between 25 and 63 m thick, and finally, a second graphitic horizon (S2) around 40 to 50 m thick, with both graphitic horizons varying from 2.79 % to 5.29 % C(g). As seen on the section in Figure 10.8 (Section S1500), the graphitic horizons dip from 45° to 55° South and strike 066°. The drill results indicate that Zones S1 and S2 merge and narrow to the West between sections S1200 and S1400, while PhiSpy ground geophysics indicates that Zones S1 and S2 disappear to the East between sections S1900 and S2000.

10.3.4 Drilling Results on the North, North-East, and East Zones

NMG's 2015 drill campaign on the North, North-East and East Zones consisted of 12 holes for a total of 1,763.97 m drilled. Mineralization was intercepted 29 times by drilling in these zones (see Table 10.3).

The four (4) holes (TO-15-08, TO-15-44, TO-15-45 and TO-15-46) and two (2) trenches (TO-15-TR-8 and TO-15-TR-9) were completed on the East Zone. These intercepted graphitic horizons measuring 10.2 m to 49.4 m wide but often returning a low grade of around 2.5 % C(g). On section E2400 the graphitic horizons plunge sub-vertically on the East side and fold upwards at depth to the West resulting in the horizon dipping around 45° to the East on the West side.

The six (6) holes (TO-15-47 to TO-15-52) completed on the North Zone intercepted graphitic horizons generally measuring 10 to 30 m wide returning respectable grades of three (3) to five (5) % C(g). Section N0900 is typical of the North Zone. The graphitic horizons here are plunging steeply South at the West end, changing to a sub-vertical dip in the middle (section N1500) and steeply plunging North in the eastern portion of this zone (section N1700).

Hole TO-15-35 and trench TO-15-TR-7, completed on the North-East Zone, intercepted graphitic horizons measuring 10 to 26 m wide with grades varying from 2.5 to 4.5 % C(g). On section N2600, which is typical of this area, the graphitic horizons plunge sub-vertically.

Although drilling over the North, North-East and East Zones intercepted decent graphite mineralization, these are considered a lower priority for NMG since they display less potential than the West, South-West, and South-East Zones. Thus, NMG opted to forego the preparation of a Mineral Resource Estimate over these zones for the time being.

Table 10.3 – List of Mineralized Intercepts of the North, North-East, and East Zones

Section	Drill Hole	Mineralized Horizon	From (m)	To (m)	Width (m)	True Width (m)	Grade [% C(g)]
E2200	TO-15-TR-8	EAST	0	42	42	29.7	42 m @ 4.28 %
	TO-15-TR-9	EAST	20	54	34	34	34 m @ 2.81 %
E2300	TO-15-45	EAST	10.9	58.9	48	33.9	48 m @ 1.74 %
		EAST	91	102.5	11.5	10.4	11.5 m @ 2.41 %
E2400	TO-15-08	EAST	4.6	54	49.4	49.4	49.4 m @ 2.73 %
		EAST	97	108.5	11.5	11.5	11.5 m @ 2.49 %
		EAST	143.5	157	13.5	13.5	13.5 m @ 3.49 %
	TO-15-44	EAST	10.5	49.7	39.2	27.7	39.2 m @ 2.38 %
		EAST	79.3	93.1	13.8	13.8	13.8 m @ 2.65 %
E2600	TO-15-46	EAST	6	26.2	20.2	18.3	20.2 m @ 2.68 %
		EAST	46.5	79	32.5	31.4	32.5 m @ 3.39 %
		EAST	90.8	101	10.2	9.9	10.2 m @ 3.37 %
		EAST	164	177.83	13.8	13.3	13.8 m @ 3.77 %
N0900	TO-15-51	NORTH	9.1	32.36	23.3	13.4	23.3 m @ 4.05 %
		NORTH	159.53	174	14.5	8.3	14.5 m @ 4.24 %
	TO-15-52	NORTH	20.2	36	15.8	9.1	15.8 m @ 2.15 %
		NORTH	45	51	6	3.4	6 m @ 3.42 %
N1200	TO-15-50	NORTH	23.54	81.85	58.3	33.4	58.3 m @ 5.11 %
		NORTH	125	144	19	10.9	19 m @ 3.42 %
N1500	TO-15-49	NORTH	39.35	59.7	20.4	16.7	20.4 m @ 5.18 %
		NORTH	71	88.45	17.5	14.3	17.5 m @ 4.61 %
		NORTH	106.34	135.95	29.6	24.2	29.6 m @ 2.89 %
N1600	TO-15-47	NORTH	35.5	59.13	23.6	20.4	23.6 m @ 4.67 %
		NORTH	90.38	108.3	17.9	15.5	17.9 m @ 3.44 %
N1700	TO-15-48	NORTH	16.7	22.75	6.1	5	6.1 m @ 4.13 %
		NORTH	36	51.5	15.5	12.7	15.5 m @ 4.79 %
		NORTH	72.1	88	15.9	13	15.9 m @ 3.05 %
N2600	TO-15-35	NORTH-EAST	53.16	66.59	13.4	10.3	13.4 m @ 4.59 %
		NORTH-EAST	82.3	117	34.7	26.6	34.7 m @ 2.55 %
N2700	TO-15-TR-7	NORTH-EAST	26	44	18	13.8	18 m @ 4.22 %

Figure 10.7 – Drill Hole Section S2900

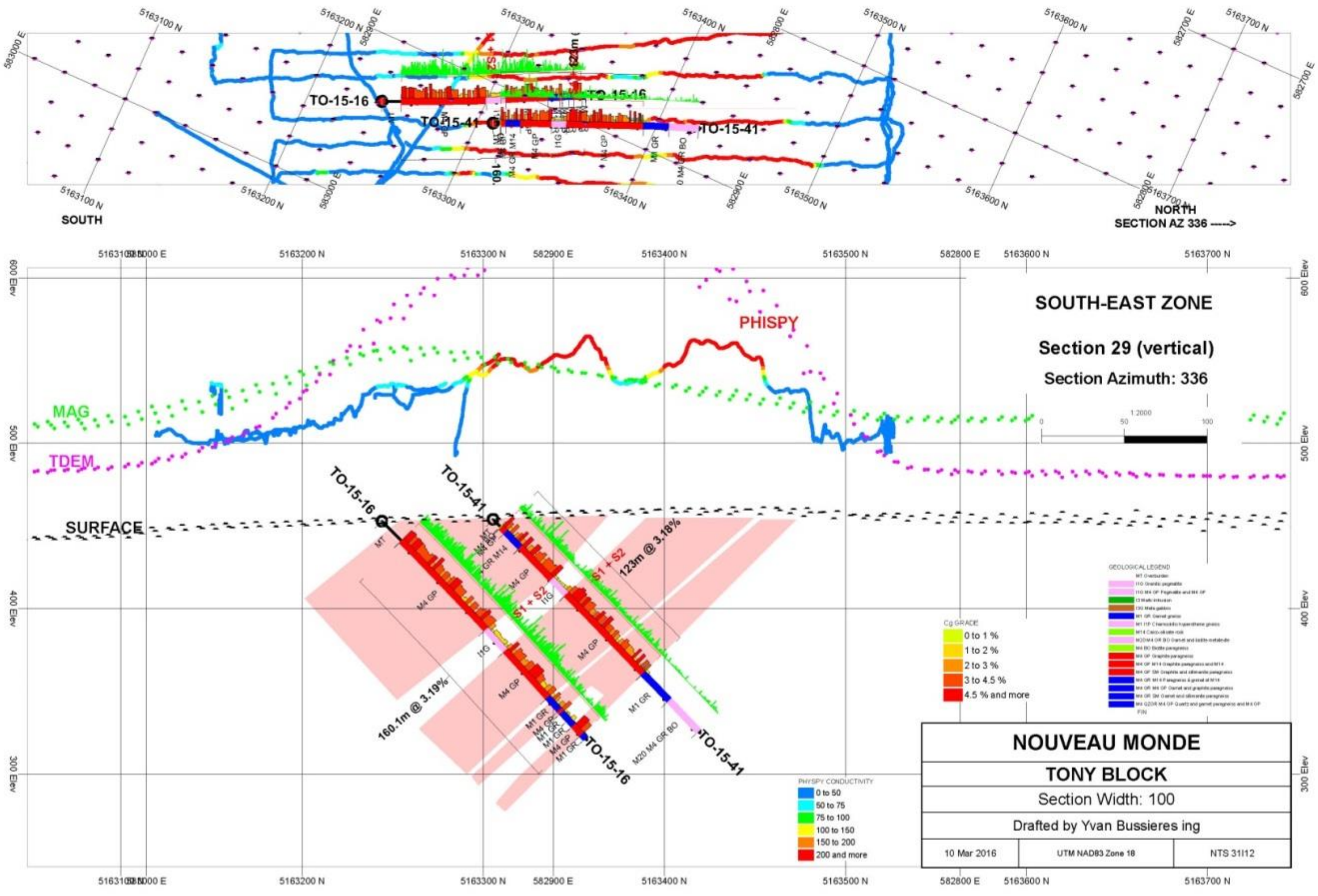
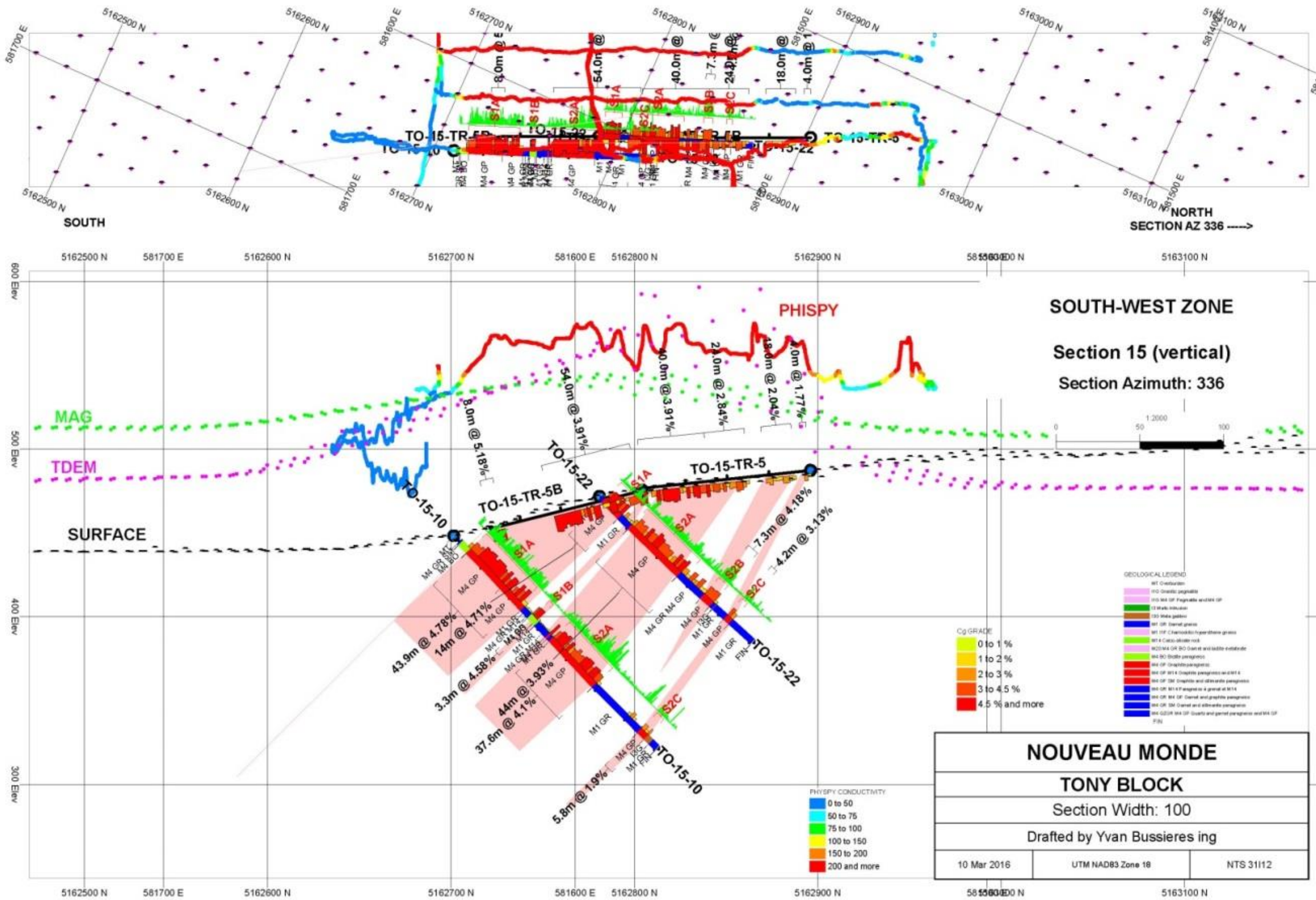


Figure 10.8 – Drill Hole Section S1500



11.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY

The drill program geologists, Yvan Bussières (2015) and Bernard-Olivier Martel (2015-2016, and 2018) determined the sample intervals and supervised the core sampling operations. These were all performed in a secure storage facility located at 480 Rue des Aulnaies in Saint-Michel-des-Saints. The main purpose of the core sampling is to determine the grade of the graphitic horizons which is used to determine the graphite resources.

Samples were sent to the ALS Minerals facilities located in Val d’Or, Quebec, for crushing and pulverizing. The resulting pulps were sent to the ALS Minerals facilities in North Vancouver, British Columbia, for analysis. Blanks, standards and duplicate samples were added to the sample stream by NMG as part of quality control procedures. Some duplicate samples were also sent to Actlabs in Ancaster (On) to validate graphite content results measured by ALS Minerals. The author is of the opinion that there was no sample bias and that the results are representative of the mineralized zones located on the Tony Claim Block.

11.1 Sample Procedure and Sample Security

Drill core sampling was done as follows:

- Drill core samples were selected when the geologist observed above an estimated 1 % C(g) content;
- The geologists choose an additional sample before and after the graphitic interval. These samples confirm the limits of the graphitic horizon, which help to connect the graphitic horizons between holes during the construction of the resource model;
- The typical sample length used for the Project is two (2) metres, however, sample length was adjusted to the lithological contact or when graphite content varies greatly (samples were no longer than 3.95 m and no smaller than 0.1 m during the 2015-2016 and 2018 drilling programs);
- The geologist marked the beginning and end of each sample on the core using a wax pencil;
- The geologist added two (2) water-resistant tags bearing the sample number in the core box. One (1) tag was placed in the sample bag once the core splitting was completed and the other was stapled in the core box at the end of each sample run;
- The drill core sample was split into two (2) core quarters and one (1) core half by a technician using a water-cooled rock saw equipped with a diamond blade. One (1) of the quarter-core was bagged and sent for analysis and the remaining quarter, as well as the remaining half, was kept as reference and for possible metallurgical testing. Figure 11.1 compares graphite content of 19 samples using quarter-core and

its half-core duplicate. This illustrates adequate reproducibility of using quarter-core samples to determine graphite content for the Tony Block mineralization.

Figure 11.1 – Comparison between Quarter-Core and Half-Core C(g) Results

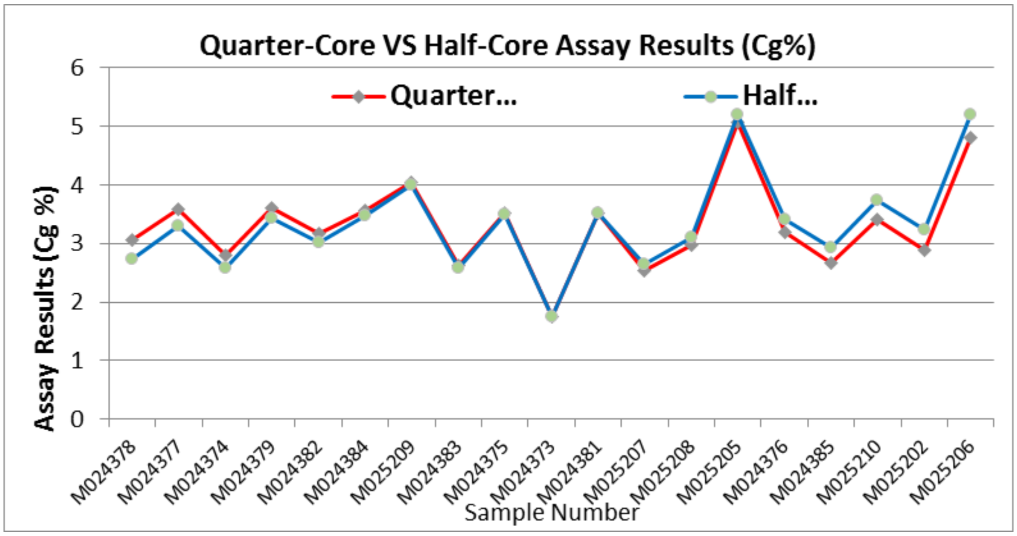


Figure 11.2 – Core Box Picture after Core Splitting and Sampling

11.2 Sample Preparation and Analysis

Samples were sent to ALS Minerals laboratories ("**ALS**"). At the ALS facilities in Val-d'Or, Quebec, samples were entirely crushed to less than two (2) mm, and a 250 gram representative portion of the sample was crushed to less than 75 microns. The resulting pulps were sent for analysis to the ALS facilities in Vancouver, British Columbia. A detailed description of the following analysis methods can be found through this link: http://www.alsglobal.com/en/Our-Services/Minerals/Geochemistry/Service-Schedule.

ALS's Val-d'Or and Vancouver geochemistry laboratories conform with requirements of CAN-P-1579, CAN-P-4E (ISO/IEC 17025:2005) and as such, are regularly audited by the Standard Council of Canada.

All of the 2015-2016 and 2018 drill core samples underwent graphitic carbon [C(g)] analysis by LECO analyzer using ALS's C-IR18 package.

In 2015, approximately one (1) sample per drill section was also analyzed using ALS's C-IR07, ME-MS41 and Au-AA23 packages and one (1) in every five (5) samples was analyzed using the S-IR08 package.

In 2016 and 2018, all samples underwent ALS's C-IR-18, C-IR07 and S-IR08 analysis packages and approximately two (2) samples per mineralized interval was analyzed using the ME-MS41 package, this type of analysis was also performed at each major lithological change along each drill hole.

The number of samples sent for each types of analysis per mineralized zone is presented in Table 10.1.

The C-IR18 package consists of digesting one (1) gram of prepared sample in acid followed by a roasting phase and then by burning in a combustion furnace. The purpose of this method is to remove the carbon associated with carbonate minerals, like calcite, by acid digestion, followed by roasting to eliminate any organic carbon undigested by the acid, and finally, by burning the remaining carbon in the combustion furnace to measure what is considered as graphitic carbon.

The C-IR07 package determines the C(t) content using a LECO analyzer. The difference between the C(t) and the C(g) indicates the amount of carbonated mineral (s). The purpose of this method is to measure the total carbon (organic carbon, carbon within carbonate minerals and graphitic carbon) within the sample.

The S-IR08 package determines the total sulphur content ("**S %**") using a LECO analyzer. The S-IR08 method consists of burning one (1) gram of prepared sample in a combustion furnace.

The ME-MS41 package determines the content of 51 elements in the sample. This was performed in order to determine whether graphitic horizons contained any economic grades of other types of metals and/or minerals as well as elements which could be considered as potential contaminants. To increase the probability of obtaining a greater amount of contaminants, the selected sample was generally one (1) visually displaying higher sulphide content. The ME-MS41 method consists of digesting 0.5 gram of a prepared sample by Aqua Regia extraction followed by an ICP-MS finish.

The Au-AA23 package determines the gold content. This method consists of taking 30 grams of pulverized rock to be treated by the method of lead fusion followed by cupellation and a digestion of the metallic bead in an Aqua Regia solution, followed by an analysis using inductively coupled plasma mass spectrometry (ICP-AES).

Due to the nature of the mineralization, the graphite easily creates a greasy substance that attaches itself to the jaws of the crushers as well as the ring and puck of the pulverizers during sample preparation at the laboratory. Furthermore, the graphite dust also sticks to the jaws, ring and puck, and the standard procedure of using compressed air cleaning between samples is sometimes insufficient to properly clean the equipment. In order to minimize contamination in the laboratory sample preparation process, NMG added ALS methods WSH-21 and WSH-22 to the samples shipped after October 2015. These methods consist of cleaning the crushers with barren material (WSH-21) after every sample and cleaning the pulverizers with barren material (WSH-22) after every sample. Only method WSH-22 was used for the 2018 samples.

11.3 Quality Assurance and Quality Control Procedure

NMG established an extensive quality assurance and quality control ("**QA/QC**") program to ensure a high level of quality control for its exploration work. Table 11.1 summarizes the quality control samples used during the 2015-2016 and 2018 drilling campaigns. These assay controls were:

1. Insertion of graphite standards in order to control laboratory precision and accuracy in reporting C(g) content;
2. Insertion of blank samples to verify for possible laboratory contamination;
3. Insertion of field duplicate samples to verify result reproducibility;
4. Analysis of duplicates at a different laboratory to validate the ALS results.

A total of 7,252 samples were assayed from the 123 drill holes sampled during the 2015-2016 and 2018 drilling programs including quality control samples. A total of 771 control samples were used and therefore represent 11 % of the samples analyzed for the Project.

Table 11.1 – 2015-2016 and 2018 Drill Core Quality Control Samples

Mineralized Zone	Total Samples	Samples Excluding QA/QC	Quality Control Samples Analyzed for C(g) Content							
			Blank	Duplicate	Standard					
					STC	STF	STH	STM	STH-2	CDN-GR-3
West*	4,983	4,491	198	198	7	8	4	12	29	36
South-West	1,067	937	42	73			6	9		
South-East	694	598	22	61			5	8		
East	234	209	10	11			2	2		
North-East	38	34	1	2				1		
North	236	212	11	10			2	1		
Total	**7,252**	**6,481**	**284**	**355**	**7**	**8**	**19**	**33**	**29**	**36**

* The West Zone is the main subject of this Report as it contains the only Mineral Reserves identified as the Report effective date on the Property.

11.4 Analysis Standards

During the 2015 drilling programs, NMG added six (6) different quality control standard samples, each representing different grades, to its sample stream in order to verify the accuracy of C(g) results. Five (5) of these were produced using mineralized rock from NMG's Matawinie Property. Each of these five (5) in-house standard samples was sent to the ALS laboratory to be crushed, homogenized and analyzed ten (10) times for its graphite content. In 2016 and 2018, one (1) in-house standard was used (STH-2) as well as a graphite standard [reference CDN-GR-3, certified value of 2.39 % C(g) ± 0.11] bought from CDN Resource Laboratories Ltd. (ISO-9001:2015), from Langley (B-C). Table 11.2 provides the mean and standard deviation of these ten (10) tests performed on the in-house standards as well as the results of the inserted standard samples in the drill core sample stream. As part of the QA/QC program, one (1) standard sample was inserted for every 50 samples sent to the laboratory.

Table 11.2 – Summary of Standard Sample Results

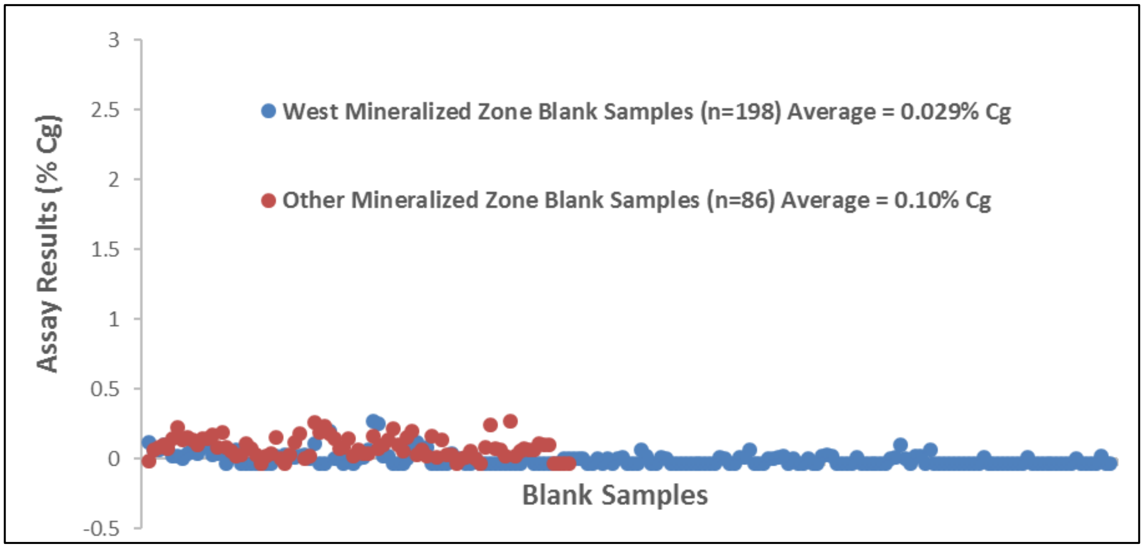
Standard Samples Statistics	In-House Standards % C(g) Results from ALS (C-IR18)				
	STC	**STF**	**STH**	**STM**	**STH-2**
Mean based on 10 rounds of analysis	4.48	5.04	18.29	6.11	5.84
Mean from inserted samples	4.59	5.04	18.06	6.12	5.82
Standard Deviation based on 10 rounds of analysis	0.11	0.07	0.22	0.05	0.06
Standard Deviation from inserted samples	0.12	0.13	0.3	0.22	0.15

The 36 CDN-GR-3 standard samples inserted in the sample stream returned a mean of 2.42 % C(g) and a standard deviation of 0.07. Two (2) of these samples returned values slightly above the certified value of 2.39 % C(g) ± 0.11, samples K437600 and P186100 returned 2.54 and 2.52 % C(g) respectively. One sample (K43690) returned a result outside of the minimum expected range with a value of 2.16 % Cg. The author is of the opinion that overall, the standard sample results are within acceptable limits.

11.5 Analysis Blanks

The blank samples used for QA/QC purposes during the 2015 drilling campaign consisted of approximately one (1) kg of white gravel (bag from Canadian Tire). In 2016 and 2018, blank sample material (quartz) was acquired from IOS Service Geoscientifique of Chicoutimi (Qc) following the recommendations from the PEA report of using a more reliable blank standard. In 2018, four (4) blank sample acquired from Analytical Solutions Ltd from Sudbury (Ontario) were also used in the sample stream. A total of 284 blank samples (198 for the West Zone and 86 for the other mineralized zones), representing a population of 3.9 % of the drill program samples, were inserted within the sample stream. Blank samples were generally inserted at sample numbers ending in odd tens. The 2016 and 2018 blank standard, with an average content of 0.02 % C(g) has proven more suitable as a quality control material then the 2015 material, with an average content of 0.08 % C(g) since test results of the former are closer to the laboratory's detection limit of 0.02 % C(g). Figure 11.3 below shows the C(g) content for the inserted blank samples during the 2015-2016 and 2018 drilling campaigns. The author is of the opinion that the blank sample results are within acceptable limits.

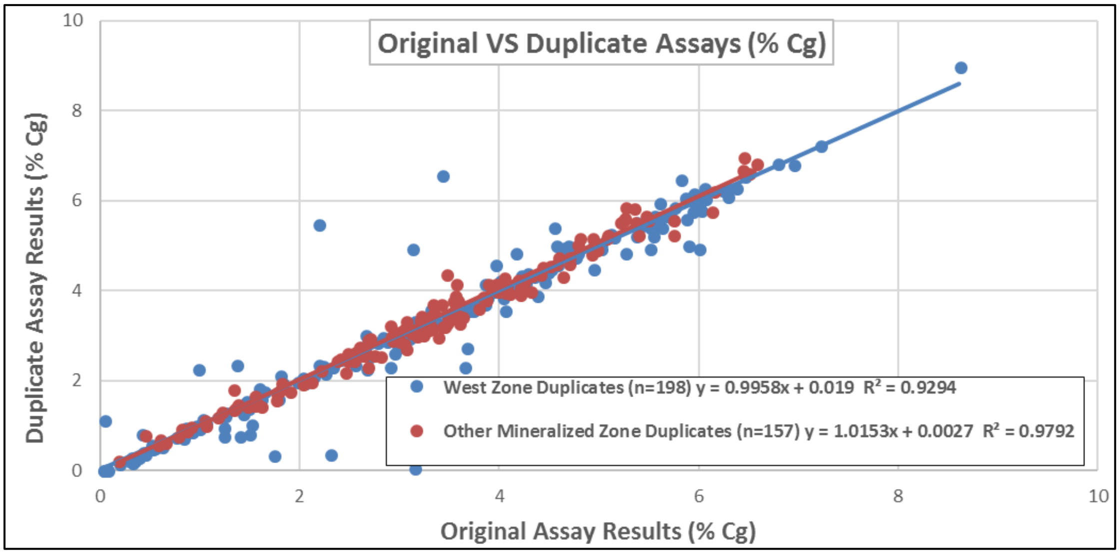
Figure 11.3 – Inserted Blank Sample C(g) Assay Results



11.6 Core Duplicates

During the 2015-2016 and 2018 drilling programs, NMG added duplicate samples to its sample stream to verify assay reproducibility. Duplicate samples were generally inserted at sample numbers ending in even tens. The 2018 duplicate samples consisted in the last 20 cm of the quarter core original sample run as opposed to a complete quarter core samples used for the 2015-2016 quality control program. In all, 355 drill core samples (198 from the West Zone and 157 for the other mineralized zones) were duplicated representing a population of 5 % of the drill program samples (this includes duplicate samples sent to other laboratories for validation). Figure 11.4 below shows the reproducibility of C(g) results provided by the duplicate samples inserted into the 2015-2016 and 2018 core sample stream.

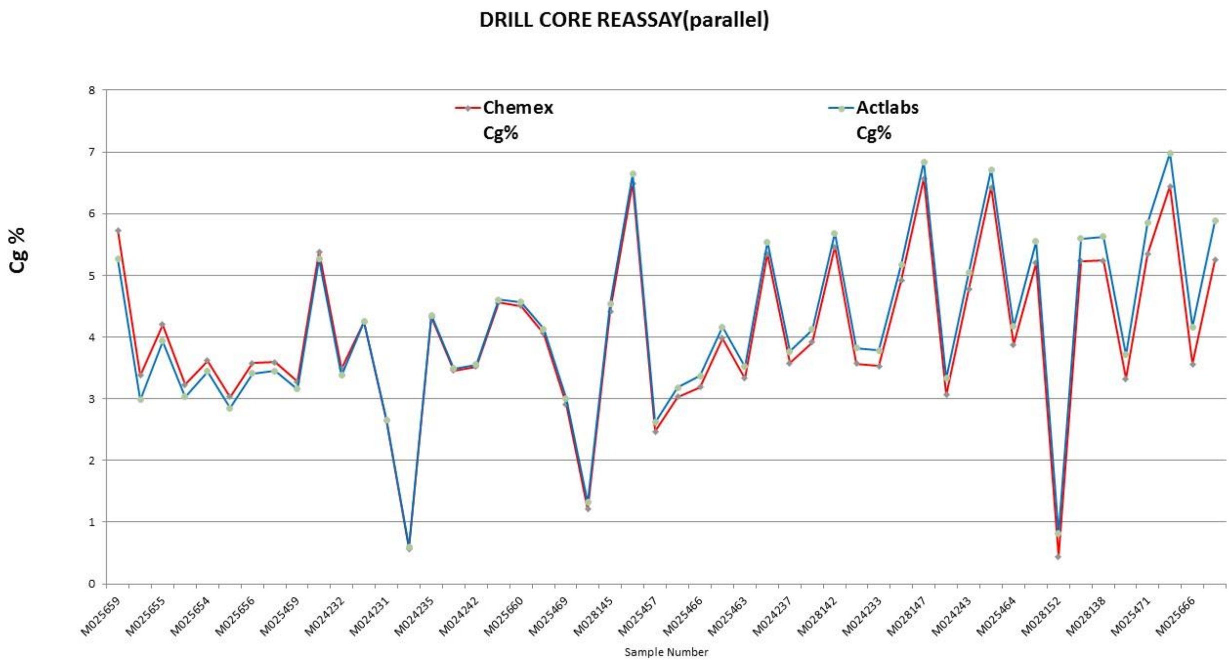
Figure 11.4 – Reproducibility of Duplicate Samples



At the end of the 2015 drilling program, as part of due diligence and quality control, 50 samples were selected and sent to Actlabs Laboratories, located in Ancaster, Ontario, to see whether it could duplicate the results obtained by ALS. Actlabs' Quality System is accredited to international quality standards through the International Organization for Standardization /International Electrotechnical Commission (ISO/IEC) 17025 (ISO/IEC 17025 includes ISO 9001 and ISO 9002 specifications) with CAN-P-1579 (Mineral Analysis) for specific registered tests by the Standards Council of Canada ("**SCC**"). The accreditation program includes ongoing audits which verify the QA/QC system and all applicable registered test methods. Figure 11.5 illustrates a good reproducibility of graphite values between laboratories. The sample re-assays therefore confirmed that:

- The graphite values for ALS can be compared to those of another laboratory;
- The reproducibility of sample values demonstrates that assay value for the quarter-core sample is representative of the graphite content;
- There was no particular bias noted in the verification process.

Figure 11.5 – Drill Core C(g) Assay Comparison Using ALS and Actlabs



11.7 Specific Gravity

In 2015, for each drill section spaced at 100 m, different rock types [usually five (5) to seven (7) samples] were measured using ALS's OA-GRA08b package to determine the specific gravity of the rock types used for the resource calculation. The OA-GRA08b method consists of the following steps:

- A prepared sample (3.0 g) is weighed into an empty pycnometer;
- The pycnometer is filled with a solvent (either methanol or acetone) and then weighed;
- From the weight of the sample and the weight of the solvent displaced by the sample, the specific gravity is calculated.

$$Specific\ Gravity\ = \frac{\text{Weight of sample (g)}}{\text{Weight of solvent displaced (g)}} \times \text{ Specific Gravity of Solvent}$$

In 2016 and 2018, the specific gravity of one (1) out of every six (6) mineralized samples was measured using ALS's OA-GRA08 method and one (1) sample was also measured for each lithologies along the core. Specific gravity measurements were performed on a 30-cm piece of ½ core, representative of its 2-m, ¼ core sample twin. The 30-cm sample was weighed dry on a balance then it was weighed while suspended in water. From the data, the specific gravity is calculated.

$$Specific\ Gravity\ = \frac{\text{Weight of sample (g)}}{\text{Weight in air (g)} - \text{Weight in water (g)}}$$

Both specific gravity measurement methods have a lower and upper reporting limit of 0.01 and 20 respectively.

A total of 870 samples from the 2015-2016 and 2018 drilling campaigns were measured for their specific gravity of which 807 originate from the West mineralized Zone.

11.8 Quality Control Program Conclusions

In summary, based on the study of the results of the QA/QC program, the author concludes that:

- The sampling of a quarter of core is representative of the Tony Block graphite mineralization and can be repeated with an acceptable confidence level;
- The 2015-2016 duplicate samples demonstrated good assay reproducibility. Some of the 2018 duplicate samples demonstrated a high variability due to the fact that only 30-cm along a quarter core of the 2-m length of the original quarter core sample was analyzed. Future drilling programs should revert to the 2015-2016 duplicate sample protocol to optimize assay reproducibility;
- Although blank samples are considered within acceptable limits, C(g) content in 2015 were higher than expected, this was corrected by using different blank material in 2016;
- The in-house 2015 C(g) standards returned acceptable overall results although their standard deviation was considered higher than intended. The 2016 and 2018 standards from CDN Resource Laboratories Ltd. returned acceptable results.

Overall, the author considers that the sample preparation, security and analytical procedures as well as quality control results are adequate and representative of the graphite mineralization on NMG's Tony Claim Block.

12.0 DATA VERIFICATION

The author performed some verification for the previous Pre-Feasibility Study (PFS) in 2016/2017 and additional verifications were made in 2018 for the Updated Pre-Feasibility and Feasibility Study. The following actions were taken to ascertain that the database supporting the estimation of resources is sound and reliable:

- Site visits on November 9th, 2016 and June 21st, 2018;
- Independent sampling (2016);
- Multiple database verifications (2016/2018).

SGS Geostat was mandated by NMG to update the mineral resources for the Matawinie Property. Mr. Yann Camus, P. Eng. oversaw this mandate for SGS Geostat.

12.1 Site Visit

Mr. Yann Camus visited the Matawinie graphite Property on November 9th, 2016 and June 21st, 2018.

On the November 9th, 2016 visit, Mr. Camus met with Mr. Antoine Cloutier (NMG chief geologist) Bernard-Olivier Martel (consulting geologist), Andy Rochette (technician for Explo-Logik Inc.) and René Lelièvre (prospector and technician for Explo-Logik Inc.). Mr. Camus conducted independent duplicate samples (51), verification of some core boxes, measured the location of five (5) drill hole collars with a GPS along with azimuths and dips with a compass. All verifications were satisfactory as reported in the 2017 PFS report.

The following details all pertain to the 2018 site visit. On the June 21st of 2018 visit, Mr. Yann Camus met with Mr. Antoine Cloutier (NMG chief geologist) who led the visit during the entire day.

The author met with Messrs. Jean-Pierre Dubé (Project Manager for NMG), Karl Trudeau (Chief of Operations), Smail Messaoudi (Mining Engineer Junior for NMG) at the Nouveau Monde Graphite office located at 331 Brassard Street, Saint-Michel-des-Saints. Most discussions related to the latest developments regarding the resources, the drilling and the ongoing Feasibility Study.

After meeting at the office, it was decided to visit the West Zone Deposit site to witness the 2018 drill holes. These were all completed in the south-western part of the deposit. The author took pictures and measurements of seven (7) collars including the azimuth and dip using a compass and location using a handheld Garmin etrex Legend HCx GPS. The holes measured are TO-18-127 to TO-18-129, TO-18-131, and TO-18-133 to TO-18-135 (Table 12.1). The comparison between the database information and the field readings reveal a potential problem with the azimuth of the drill holes. Further discussions with Mr. Antoine Cloutier of Nouveau Monde showed that while the deviation readings for the

2018 drill holes (taken with a Flexit instrument) were taken and entered in the database properly; the collar azimuths should have been measured and entered in the database.

The current azimuths presented in the database for the 2018 drill holes are the planned azimuths which were implemented using a DeviSight Surface tool. Recent observations reveal that readings taken with a compass are not entirely reliable due to the presence of magnetic subcropping lithologies creating a local magnetic field capable of altering compass readings. Therefore, it was agreed upon that a proper GPS survey would be a more reliable method to provide proper collar azimuth measurements. Since there is little deviation in all drill holes and azimuths are close to the planned values, the database is considered adequate for the update of the resources.

The visit continued with the future bulk sampling site which is scheduled to be drilled and blasted at approximately every three (3) months, for a total of eight (8) times in the next two (2) years to feed NMG's Demonstration Plant (see Press Releases dated May 24th, 2018 and September 18th, 2018). This site is currently stripped from overburden and some channel samples were taken to provide a good estimation of the local grade of the mineralization. While the future sampling approach was discussed, this topic is irrelevant for the current Report.

Then it was decided to visit the core storage area, look at the 2018 core and discuss the mineralization. The mineralization is mostly similar to the one found on the rest of the deposit. The grades of the samples from the database fit well with the author observation of the core. Like during previous drilling campaigns, only core drilling was used, and all witness core is available from the core storage area. The core storage area and core shack are located together at a self-storage facility right in the community of Saint-Michel-des-Saints at about 12 km driving distance from the Project. While independent sampling of the core was done in 2016 with excellent duplication of results, this exercise was not repeated in 2018. As it was done in 2016, the author acknowledged the procedures for verifying, orienting, collecting RQD measurements, logging, identifying samples, measuring magnetic susceptibility and conductivity, taking photos and finally cutting and sampling the core.

Many subjects were discussed including, but not limited to:

- Structural geology;
- Known mineralized structures and available data;
- Preparation of the drilling campaigns;
- Procedures to put in place for drilling, logging, sampling, QA/QC, etc.;
- Potential extensions.

During the author's visit at the West Zone Deposit site, the following actions were taken:

- Visit and field observation of the new 2018 drill hole collars;
- Observation and measurement of position, azimuth and dip for seven (7) collars of the 2018 drill hole campaign. The verification of collar locations by GPS readings was done with the WAAS function enabled at all times. All drill holes can be found in the field and are well identified with a proper marker. Table 12.1 shows the list of the seven (7) collars. The comparisons with the database revealed that the collar azimuth in the database were the planned azimuths. NMG agrees that these azimuths should be measured in the field and replaced in the database. Due to the presence of magnetic rocks on the Project affecting compass readings, a professional surveyor will have to be used to gather proper measurements, possibly using a high-precision GPS. Some slight corrections, including proper collar azimuth data, will be made during the next few months (with almost no impact possible on the resource). Further comparisons with the Flexit deviation in-hole data confirm that no significant error is present for the 2018 drill hole orientations.

Figure 12.1 – Typical Drill Hole Casing TO-18-129 (Left)
Mr. Cloutier and Mr. Messaoudi close to TO-18-128 (Right)


Table 12.1 – List of Independently Measured Collar Locations and Validation

Hole Name	NMG Database					Measurement by SGS Geostat					Difference			
	Easting	Northing	Elev.	Azimut	Dip	Easting	Northing	Elev.	Azimut	Dip	Easting	Northing	Elev.	Angle
TO-18-127	578,474	5,163,472	481	90	-45	578,471	5,163,477	483	89.5	-42	3	-5	-2	3
TO-18-128	578,439	5,163,672	491	90	-50	578,441	5,163,672	482	80.5	-49	-2	0	9	6
TO-18-129	578,339	5,163,678	479	90	-45	578,339	5,163,678	484	84.5	-43	0	-1	-5	4
TO-18-131	578,335	5,163,576	472	90	-45	578,335	5,163,576	487	76.5	-46	0	0	-14	10
TO-18-133	578,478	5,163,376	472	90	-45	578,478	5,163,373	463	91.5	-46	0	3	9	1
TO-18-134	578,549	5,163,372	480	90	-45	578,553	5,163,373	466	94.5	-45	-4	-1	14	3
TO-18-135	578,550	5,163,471	491	90	-45	578,550	5,163,467	491	76.5	-45	1	4	0	10

12.2 Witness Core Found at the Core Storage Site

The witness core that is present at the core storage site in Saint-Michel-des-Saints is well organized. Most of the core is of NQ size (47.6 mm) and some is also BTW (42 mm). Typically, including for the 2018 drill holes, only a quarter of the core was sampled for the geochemical analysis and therefore a half and a quarter remain in each box. The ¾ of the core is kept by NMG for check sampling and metallurgical tests. Since many samples were used for metallurgical tests, another quarter of core is missing in many boxes. For now, almost all half witness cores are available.

Figure 12.2 – Core Boxes from Diamond Drill Holes

Figure 12.3 – Witness Core for Drill Hole TO-18-130

12.3 Database Verification

Standard verifications were carried out: extreme values, data going beyond hole depth, check of gaps in the information, search of collars inconsistencies. Only minor details needed any changes and the data was deemed acceptable for the resource modelling and estimation.

12.4 Conclusion

The verification of the NMG database is satisfactory for the preparation of the resource estimation. The site visit allowed multiple verifications. Everything corresponded well to the information provided by NMG. The in-depth verifications of the complete drill hole database done multiple times in 2016, 2017 and 2018, confirmed the database information.

The standard database verifications performed by SGS Geostat indicates a sound database, reliable for the estimation of resources.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Six (6) metallurgical test programs were completed up to the pre-feasibility (PFS) stage of the Matawinie Project. The main test program that supported the development of the process design criteria for the PFS consisted of a comprehensive flowsheet development program on a Master composite that represented the complete West Zone mineralization. The results of this and previous test programs are summarized in the following section covering the historic metallurgical results.

The metallurgical test program that was completed in support of the FS was mostly limited to validation testing and the investigation of specific process opportunities and risks. Only limited flowsheet optimization was completed during the FS metallurgical test program.

13.2 Historic Metallurgical Results

Six (6) metallurgical tests programs were completed prior to the commencement of the flotation optimization program that was carried out to enhance the engineering data for the PFS.

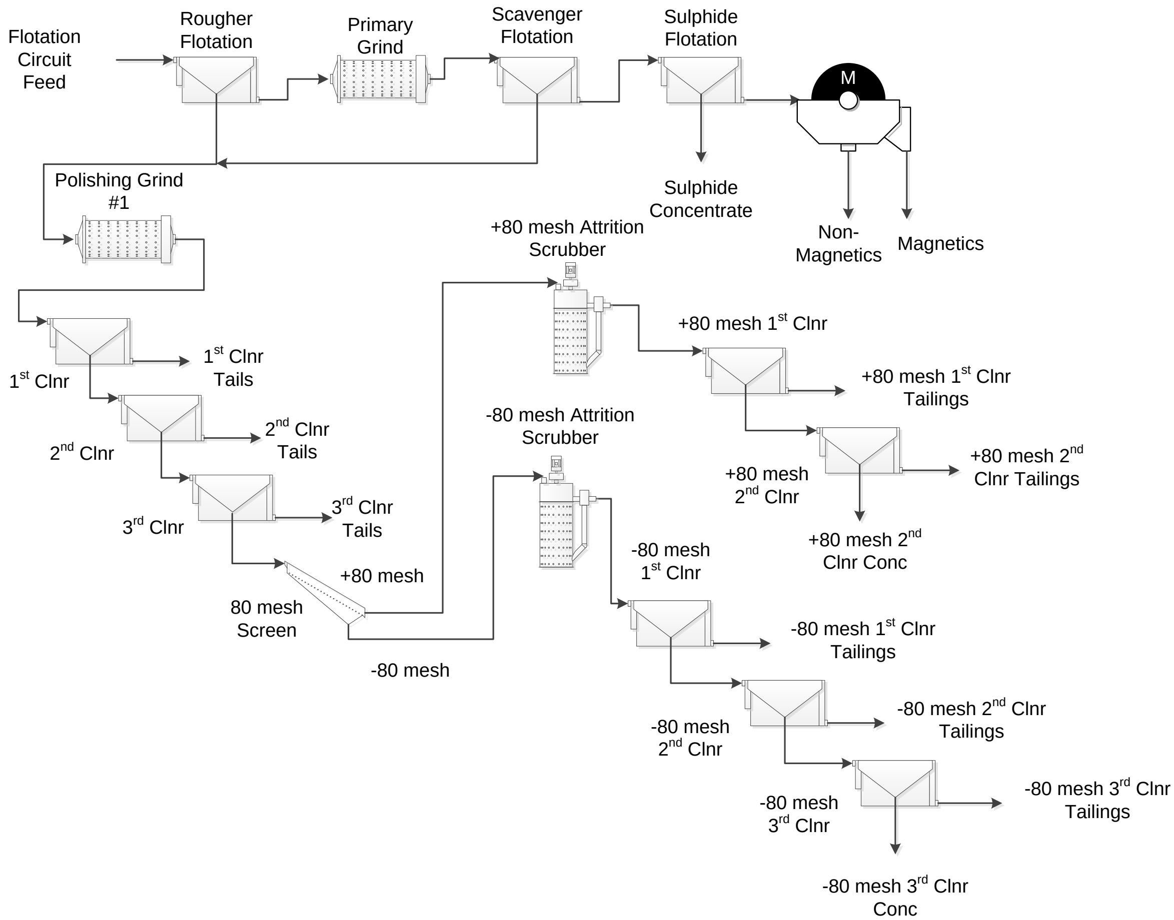
The metallurgical programs started with initial scoping level flotation tests on grab and trench samples and culminated in a scoping level flow sheet development program that supported the preliminary economic assessment (**"PEA"**). The process flow sheet that was developed during this phase of testing is depicted in Figure 13.1.

The robustness of the flow sheet was confirmed in a small variability flotation program, that tested seven (7) different composites from the West and South Zones. The concentrate grades ranged between 94.4 % C(t) and 99.5 % C(t) with open circuit total carbon recoveries of 81.5 % to 88.5 %. No closed-circuit flotation tests were carried out as part of the initial flow sheet development program

The reagent regime comprised of frother methyl isobutyl carbinol ("**MIBC**"), collector diesel, pH modifier lime, sulphide activator copper sulphate ("**$CuSO_4$**"), and sulphide collector potassium amyl xanthate ("**PAX**").

Two (2) bulk concentrate production pilot plant campaign on 12 tonnes and 50 tonnes of mineralized South Zone and West Zone material, respectively, demonstrated the scalability of the proposed process flow sheet and conditions.

Figure 13.1 – Matawinie Process Flow Sheet



The open circuit test results were analyzed and compared with similar projects that published both open and closed-circuit flotation test data. The overall graphite recovery was projected at 89.5 % at a combined concentrate grade of 97.3 % C(t).

The results of the size fraction analysis of the graphite flotation concentrate are presented in Table 13.1. These metallurgical results were used in the Preliminary Economic Assessment ("**PEA**") study that was completed in 2016 prior to the start of the flow sheet optimization program in 2017.

Table 13.1 – Mass and Grade Distribution of Concentrate of Scoping Level Flow Sheet Development Program

Product	Mass (%)	Grade (%) C(t)
+48 mesh	16.1	97.5
+65 mesh	19.8	97.7
+80 mesh	10.0	97.4
+100 mesh	11.1	97.4
+150 mesh	18.8	96.4
+200 mesh	9.8	96.1
+325 mesh	7.6	96.4
+400 mesh	2.1	97.1
-400 mesh	4.6	98.5
Total	**100.0**	**97.3**

The West Zone Master composite that was used in the 2017 process optimization program was generated by combining a total of 125 drill core intervals. The drill core intervals were chosen to duplicate the grade profile of the West Zone mineralization and to provide a full spatial representation of the West Zone.

Eight (8) variability composites were generated by combining 362 drill hole intervals from different locations within the specific sampling zone. The drill hole intervals were selected to ensure a good spatial distribution and a combined head grade that was representative for the specific zone.

13.2.1 Sample Characterization

The West Zone Master composite was subjected to chemical characterization. The results of the carbon speciation and sulphur analysis are presented in Table 13.2.

Table 13.2 – West Zone Master Composite Carbon Speciation and Sulphur Head Grades

Assays (%)			
C(t)	C(g)	CO_3	S
4.84	4.31	0.27	3.49

Eight (8) variability samples were submitted for graphitic and total carbon analysis and the results are presented in Table 13.3.

Table 13.3 – Total and Graphitic Carbon Analysis of Variability Composites

Composite	C(t) (%)	C(g) (%)
Top South Center	4.04	3.78
Top North	4.95	4.58
Bottom South	4.92	4.58
Bottom North	4.91	4.83
Top North Center	4.02	3.77
Top South	3.79	3.52
Bottom North Center	4.12	4.12
Bottom South Center	4.45	4.09

13.2.2 Comminution Testing

A series of comminution tests were carried out on the West Zone Master composite and a Trench sample. The Trench sample was required since the West Master composite consisted of split NQ drill core and, therefore, was unsuitable for JK DropWeight and Low-energy impact testing.

A summary of the results is presented in Table 13.4.

Table 13.4 – Summary of Comminution Tests

Sample Name	Relative Density	JK Parameters				Work Indices (kWh/t)			Ai (g)
		$A \times b^1$	$A \times b^2$	t_a	SCSE	CWi	RWi	BWi	
West Zone Trench Sample	2.68	93.2	78.4	0.49	7.0	8.3	6.7	7.9	0.240
West Zone Master Composite	2.73	-	84.1	0.80	7.3	-	9.0	10.0	0.472

$A \times b^1$: From JKDropWeight Test
$A \times b^2$: From SMC Test

Overall the comminution results for the Matawinie West Zone material are favourable in terms of grinding energy requirements. However, the higher abrasion index will result in elevated liner, lifter, and media wear.

The Trench sample produced comminution results that indicated lower crushing and grinding energy requirements as well as lower abrasiveness. It is postulated that these results may have been driven by the fact that the Trench sample originated from close to surface and has been exposed to a certain degree of oxidation. Hence, the comminution results for the West Zone Master composite are to be considered more representative of the average mill feed.

13.2.3 Flow Sheet Optimization Program

The flow sheet optimization program built upon the results of the PEA metallurgical program. The overall flow sheet was maintained, but the various unit operations were optimized to achieve maximum graphite recovery while maintaining a minimum concentrate grade of 96 % C(t) and minimizing flake degradation.

13.2.3.1 Rougher Kinetics Tests

A total of five (5) rougher kinetics tests were carried out during the PFS program to determine the relationship between secondary grind size and graphite recovery into the combined rougher and scavenger concentrate. Further, the effectiveness of the sulphide rejection circuit was evaluated as a function of the secondary grind size.

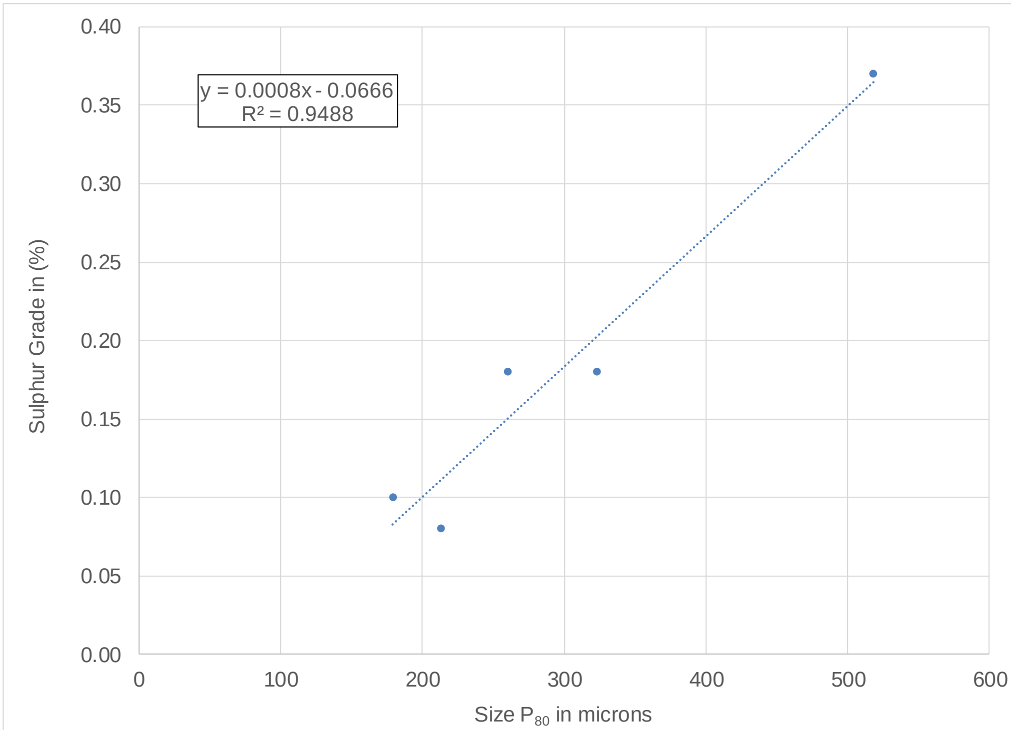
The results confirmed that a finer secondary grind target size reduces the mass recovery into the jumbo flake size category. As the secondary grind target size was lowered P_{80} = 518 microns to P_{80} = 179 microns, the mass recovery into the + 48 mesh size fraction decreased from 30.2 % to only 8.3 %. It should be noted that a reduced mass recovery into the + 48 mesh size fraction for the finer secondary grind size does not necessarily translate into higher losses of jumbo sized graphite flakes. The scavenger concentrate grade is relatively low in the medium and coarse grind sizes and characterized by middlings of graphite flakes and gangue minerals.

A combined rougher and scavenger total carbon recovery versus grind size plot did not reveal a correlation between the two (2) variables within the evaluated size range of P_{80} = 179 microns to P_{80} = 518 microns.

A third factor that impacts the selected secondary grind size is the ability to produce a low-sulphur tailings stream that consists of non-acid generating tailings. The sulphur grade as a function of the secondary grind size is depicted in Figure 13.2. The trendline equation provides a good fit with a R^2 of 0.949. Although a firm threshold value had not been established for the Matawinie West Zone mineralization at that time, the absence of significant quantities of carbonates suggests that a tailings grade of approximately 0.10 % S may be required to render the low-sulphide tailings non-acid generating.

Considering the three (3) factors that impacted the grind size selection, a secondary grind size of P_{80} ~ 210 microns was selected for the remaining tests.

Figure 13.2 – Sulphur Grade as Function of Secondary Grind Size



13.2.3.2 De-Sulphurization Tests

Eight (8) de-sulphurization tests were completed to evaluate the impact of different sulphide activator and collector dosages on the sulphide grade of the low-sulphide tailings stream. The dosages of the sulphide activator copper sulphate ($CuSO_4$) were varied between 0 g/t and 200 g/t. The dosages of the sulphide collector PAX were changed between 75 g/t and 300 g/t. The sulphide recovery into the sulphide rougher concentrate ranged between 76.9 % in test F8 with 0 g/t $CuSO_4$ and 225 g/t PAX and 93.1 % in test F13 with 200 g/t $CuSO_4$ and 300 g/t PAX. Without the addition of copper sulphate, the sulphide recovery decreased with increasing PAX dosage.

The magnetic separation stage recovered between 8.2 % and 19.3 % of the sulphides. The higher recoveries coincide with the tests that produced the lower sulphur recovery into the flotation concentrate.

A PAX dosage of 100 g/t and magnetic separation were chosen for design purposes. The addition of CuSO did not yield lower sulphide grades in the magnetic separation tailings and, therefore, the sulphide activator was removed from the design.

13.2.3.3 *Primary Cleaner Tests*

Eight (8) cleaner flotation tests were carried out to determine suitable conditions for the primary cleaning circuit. The tests evaluated different grinding technologies including conventional polish grinding, attrition scrubbing, and stirred media grinding. The mill discharge was upgraded in four (4) stages of cleaner flotation and the 4th cleaner concentrate was submitted for a size fraction analysis. The mass recovery into the large and jumbo flake categories of + 80 mesh was significantly higher for the three (3) tests that employed polish grinding. Approximately 44 % of the concentrate mass was recovered into this product for all three (3) tests compared to only 14.6 to 34.6 % in the other five (5) tests using alternative grinding technologies.

The combined concentrate grades of the eight (8) tests fell within a narrow range of 96.4 % C(t) to 97.8 % C(t). Since high concentrate grades were obtained for all tests, it suggests that most of the impurities were attached to the surface of the flakes and, therefore, a high-shear environment as provided by the attrition scrubber and stirred media mill is not required to achieve high-grade concentrates for this intermediate graphite product.

Given that the mass recovery into the large and jumbo flake categories was 10-20 % higher for the polishing mill compared to the alternative grinding technologies, a decision was made to select a polishing mill for the primary grinding circuit. The mass recovery into the + 80 mesh size fractions was not visibly affected by the polishing grind time, but a slight grade improvement was noted for the longer grind times. Hence, a polishing grind time of 22 minutes was selected for the primary cleaning circuit.

13.2.3.4 *Secondary Cleaner Optimization*

The secondary cleaner optimization included 19 flotation tests that evaluated different classification sizes, grinding technologies, and grinding media.

Three (3) tests were carried out using a polishing mill with ceramic media after the intermediate concentrate was screened at 80 mesh and 200 mesh. The polish grind times for each size fraction were varied between 8 minutes and 22 minutes and the mill discharges were upgraded in three (3) stages of cleaner flotation.

The total carbon grades of the various size fractions did not improve for flake sizes of 200 mesh and larger since any grade variations fell within the range of analytical measurement uncertainties. Only the three (3) smallest flake sizes yielded an improvement from a second stage of polishing and longer polishing times resulted in increased grade improvements. However, the grades of the two (2) smallest size fractions were still below 94 % C(t). Based on these results, polish grinding was deemed ineffective for the secondary cleaning circuit.

The second block of tests evaluated the impact of different media types in the stirred media mill and the use of an attrition scrubber. The grinding media tested included 6 mm steel balls, 2 mm and 5 mm zirconium silicate beads, as well as 2-3 mm and 4-6 mm zirconia toughened alumina beads.

With regards to mass recovery into the various size fractions, the four (4) tests using the stirred media mill produced comparable results that differed only marginally. The test with the six (6) mm steel balls yielded a slightly lower mass recovery into the + 48 mesh and + 65 mesh size fractions. Further, the smaller non-steel media produced the lowest flake degradation in the same two (2) size fractions. The attrition scrubber test resulted in the finest concentrate product with significantly lower mass recovery into the + 65 mesh and + 48 mesh size fractions.

The attrition mill test produced the highest combined concentrate grade of 97.8 % C(t). However, the grade advantages were obtained primarily in the three (3) finest size fractions. In the + 200 mesh size fractions, the five (5) tests generated comparable results with marginal grade differences. The 2 mm zirconium silicate beads produced slightly lower grades in the various size fractions compared to the other stirred mill grinding media. Given that the 2-3 mm zirconia toughened alumina beads caused the least amount of flake degradation in the two (2) coarsest size fractions, a decision was made to proceed with this media in the following set of tests.

Four (4) additional tests were completed with the 2-3 mm zirconia toughened alumina beads in the stirred media mill. The grind times were increased from 5 minutes in the previous block of tests to 10, 15, 20, and 25 minutes in this test series.

As expected, the mass recovery into the + 48 mesh size fraction gradually decreased with increasing grind times. Although some degradation of the + 48 mesh size fraction was observed, the absolute amount was moderate. At a grind time of 5 minutes a total of 15.6 % of the mass reported to the + 48 mesh size fraction. This number decreased marginally to 13.0 % for the longest grind time of 25 minutes.

As the grind time was increased, the combined concentrate grade improved as well. As the stirred media grind time was increased from 5 minutes to 25 minutes, the combined concentrate improved from 97.6 % to 98.4 % C(t).

In the previous tests, the stirred media mill was operated at the standard speed of 30 Hz (approximately 350 rpm). In order to assess the impact of higher and lower speeds on mineral liberation and flake degradation, one test was carried out at a slower speed setting of 220 rpm and one test at a higher speed setting of 480 rpm.

While the degree of flake degradation was comparable for the low and medium stirred media mill speed, it increased noticeably at the highest speed of 480 rpm. Although the highest mill speed produced the best concentrate grades for 66 % of the size fractions, the grade advantages were 1.0 % C(t) or less except for the – 400 mesh size fraction.

Three (3) tests were completed to assess the impact of a single screening stage at 80 mesh rather than two (2) stages at 80 mesh and 200 mesh. This approach simplifies the circuit and eliminates a challenging wet screening application at 200 mesh. The mass recovery into the various size fractions did not display significant differences within the same size fraction, which would suggest that the additional classification stage does not produce a superior flake size distribution.

The assay results for the size fractions indicated that a single screen benefits the total carbon grades of the size fraction range of – 65 / + 325 mesh as both tests with just a single screen size yielded noticeably better concentrate grades. However, the grades of the + 400 mesh and – 400 mesh size fractions were up to 1.1 % higher in the tests with the two (2) screening stages.

A single screening stage at 80 mesh produced a comparable flake size distribution and slightly better concentrate grades in the medium size flakes, thus warranting a decision to maintain a simple flow sheet with only two (2) secondary cleaning circuits.

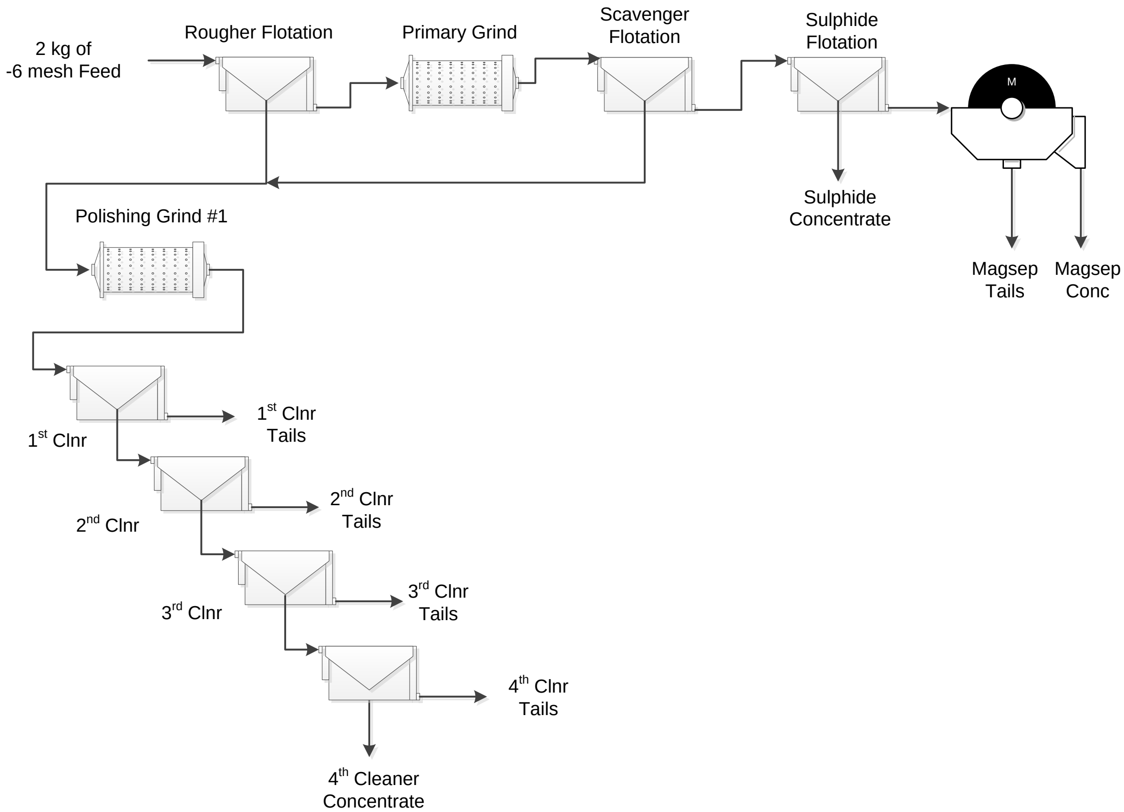
Two (2) tests evaluated the use of coarse sand as grinding media in the attrition scrubber. The mass recovery into the various size fractions was slightly superior for both tests compared to the baseline test F36 with 15 minutes of stirred media milling using 2-3 mm zirconia toughened alumina beads. However, the total carbon grades of the various size fractions were inferior by up to 4 % compared to the baseline test. Further, the recovery of coarse sand in a commercial process would be more challenging.

13.2.3.5 Variability Flotation Testing

The robustness of the proposed flow sheet and conditions was evaluated in variability flotation tests. A total of eight (8) composites representing different areas and depths of the West Zone mineralization and the West Zone Master composite were subjected to the flow sheet that is depicted in Figure 13.3.

This simplified flow sheet was chosen since the grade target at the time of variability flotation testing was 95 % C(t) and was raised to 96.0 % C(t) after the variability tests were completed.

Figure 13.3 – Variability Flotation Test Flow Sheet



The average total carbon grade and recovery were 96.2 % C(t) and 94.5 %, respectively. The concentrate grades ranged between 95.2 % C(t) for the Top South composite and 97.6 % C(t) for the Bottom North Center composite. The relative standard deviation of the concentrate grades was only 1.1 %.

The open circuit total carbon recovery into the 4th cleaner concentrate ranged between 92.4 % for the Bottom North composite and 96.0 % for the Bottom South Center composite. The average total carbon recovery was 96.0 % with a 1.2 % relative standard deviation.

With regards to flake size distribution, the Top-South-Center composite produced the worst results with only 42.1 % of the concentrate mass reporting to the jumbo and large flake categories. The Top-North-Center and Bottom-North composites produced the coarsest graphite concentrate with 52.9 % and 53.5 % of the mass reporting to the jumbo and large flake categories, respectively. The average mass recovery into the + 80 mesh size fractions for all 8 variability tests was 48.4 %.

The total carbon grades of the size fractions displayed slightly more variation. However, the variation was still within a narrow range given that the variability samples originated from entirely different areas within the West Zone mineralization.

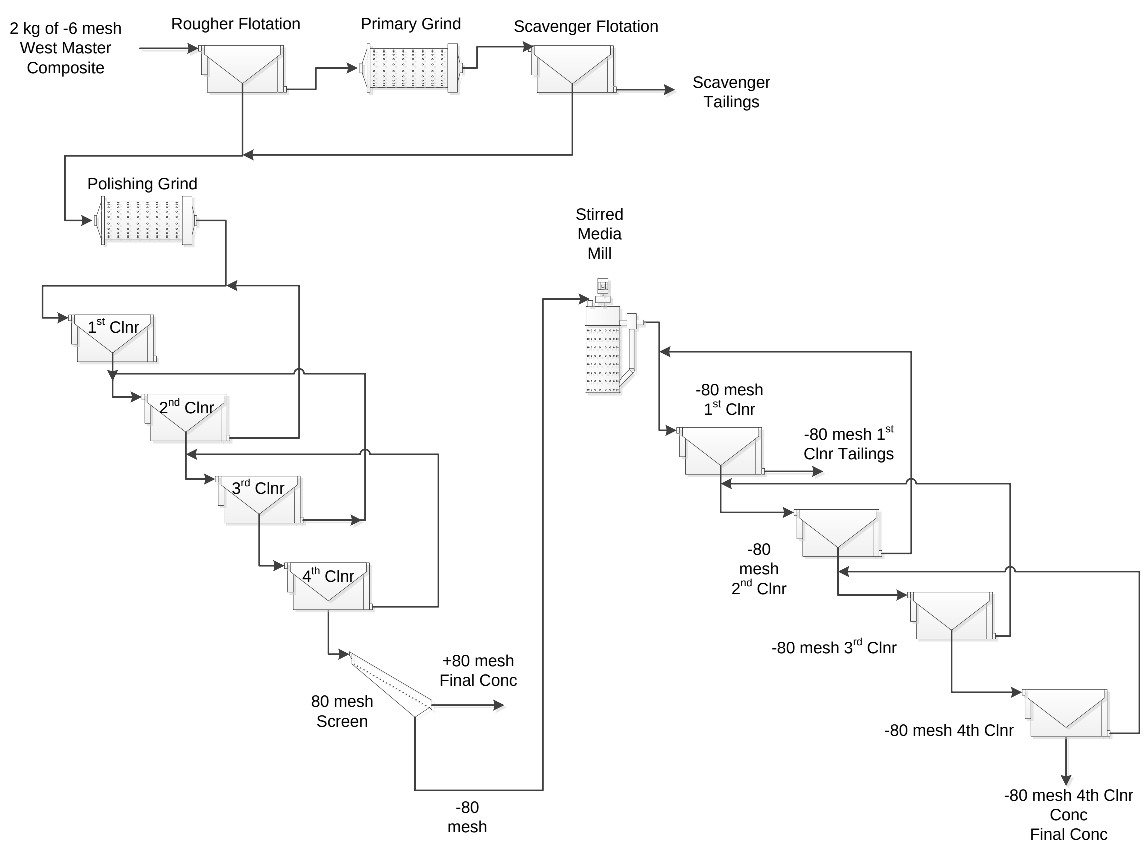
The eight (8) variability flotation tests produced a robust metallurgical response using a simplified West Zone process flow sheet and conditions. The variation may be reduced further with the integration of the secondary cleaning circuit, which has been incorporated into the proposed West Zone process flow sheet.

It should be noted that the variability composites were generated to represent a significant resource area to identify potentially problematic metallurgical challenges on a macroscopic level. More significant variations in the metallurgical response are expected with composites that represent smaller tonnages of the West Zone mineralization.

13.2.3.6 Locked Cycle Testing

Two (2) Locked Cycle flotation Tests ("**LCT**") were carried out as part of the optimization program. The first test LCT-MC replicated the conditions of the variability flotation tests, while the second test LCT-MC2 included a secondary cleaning circuit for the – 80 mesh product after the 4th cleaner concentrate was classified on 80 mesh. The flow sheet for LCT-MC2 is depicted in Figure 13.4.

Figure 13.4 – Locked Cycle Test LCT-MC2 Flow Sheet



A summary of the mass balances for the two (2) LCTs is provided in Table 13.5. Both tests focused on maximizing graphite recovery into the combined concentrate by employing more aggressive froth removal. Test LCT-MC achieved 98 % total carbon recovery into the 4th cleaner concentrate, but the final concentrate grade was only 94.3 % C(t), which was slightly below the 95.0 % C(t) grade target at the time of testing.

The second LCT, which was carried out approximately one month later after a slightly higher concentrate grade target of 96 % C(t) was established, included the secondary cleaning circuit for the 80 mesh screen undersize to increase the final concentrate grade. The total carbon recovery into the graphite flotation concentrate decreased marginally by 0.6 % to 97.4 %, but the concentrate grade of 97 % C(t) easily met the 96 % C(t) target.

The size fraction analysis results of the graphite concentrate from LCT-MC2 is presented in Table 13.6. A total of 16.5 % of the mass reported to the jumbo flake category of > 48 mesh and an additional 31.6 % reported to the large flake category of – 48 / + 80 mesh. The combined mass recovery of 48.1 % into the large and jumbo flake size categories were in good agreement with the open circuit flotation test results.

Considering the metallurgical grade targets and the attempt to minimize the capital cost for the Project, the flow sheet that was employed in the second LCT was selected for design purposes.

Table 13.5 – Summary of Locked Cycle Test Results

Test	Sample ID	Weight (%)	Assays (%) C(t)	% Distr. C(t)
LCT MC	4th Clnr Concentrate	4.55	94.3	98.0
	1st Clnr Tailings	4.45	0.48	0.5
	Sulphide Concentrate	14.0	0.20	0.7
	Magsep Tailings	77.0	0.05	0.9
	Head (calc)	100	4.37	100
LCT MC2	Combined Concentrate	4.44	97.0	97.4
	-80 mesh 1st Clnr Tailings	0.09	16.1	0.3
	1st Clnr Tailings	3.64	1.02	0.8
	Scavenger Tailings	91.8	0.07	1.4
	Head (calc)	100.0	4.42	100.0

Table 13.6 – Size Fraction Analysis of LCT-MC2 Graphite Concentrate

Size Fraction	Weight (%)	Assays % C(t)	Distribution % C(t)
+ 32 mesh	1.6	96.5	1.6
+ 48 mesh	14.9	97.2	14.9
+ 65 mesh	20.4	97.1	20.4
+ 80 mesh	11.2	96.4	11.1
+ 100 mesh	11.6	96.9	11.6
+ 150 mesh	15.2	98.2	15.3
+ 200 mesh	9.1	98.1	9.2
+ 325 mesh	7.2	97.6	7.2
+ 400 mesh	3.0	97.3	3.0
- 400 mesh	5.8	96.2	5.7
Final Concentrate (SA)	**100.0**	**97.3**	**100.0**

13.2.4 Product Characterization

Samples of the graphite flotation concentrate, high-sulphur tailings, and de-sulphurized tailings were submitted for product characterization tests.

13.2.4.1 Solids Liquid Separation Tests

Graphite concentrate, high-sulphur tailings, and de-sulphurized tailings were shipped to Outotec in Sudbury, Ontario for solid-liquid separation evaluation. The test program included flocculant scoping, static settling, vacuum filtration, and pressure filtration testing.

The high-sulphide and de-sulphurized tailings streams produced underflow densities of 72 % w/w and 65 % w/w, respectively. The graphite concentrate underflow density of 35 % w/w is in line with other graphite projects. The two (2) tailings streams produced good solids loading rates of 1.0-1.2 tph/m^2 and the graphite concentrate yielded a solids loading rate of 0.4 t/h/m^2. The number of flocculants were limited to SNF 913 and SNF 923 and the overflow clarity was good for all three (3) product and tailings streams.

Due to insufficient high-sulphur tailings sample mass, pressure filtration tests were only carried out on the graphite concentrate and the de-sulphurized tailings.

The moisture content of the filter cakes from vacuum filtration ranged between 9.3 % w/w for the high-sulphur tailings and 21.9 % w/w for the graphite concentrate. Pressure filtration reduced the moisture content to 15.5 % w/w for the graphite concentrate and 7.9 % w/w for the tailings. Reducing the moisture content to a minimum is critical for graphite concentrate as it is more cost effective to remove the water by means of filtration than in the subsequent drying stage.

13.2.4.2 Self-Heating Tests

The high-sulphur and desulphurized tailings were submitted to NesseTech Consulting Services Inc. for self-heating tests to quantify the Self-Heating Capacities ("**SHC**") of the two (2) tailings streams. Both samples were adjusted to the standard testing moisture content of 6 % w/w to determine the Stage A and B SHC values.

The two (2) samples displayed significantly different self-heating behaviour. In the case of the desulphurizedde-sulphurized tailings, both the Stage A and Stage B, SHC values were 0 J/g, which places the product into risk region 1, which is considered safe. The Stage A and B, SHC values of 51.8 J/g and 52.8 J/g place the high-sulphur tailings into the Risk Region 5, which suggests that preventative action to avoid self-heating of the tailings samples is recommended. The results for the high-sulphur tailings sample were somewhat expected given the calculated pyrrhotite content of 50-55 % based on a sulphur grade of approximately 20 % S.

13.2.5 Geochemical and Characterization

The high-sulphur and de-sulphurized tailings from LCT-MC were submitted for single addition static net acid generation and modified Acid Base Accounting ("**ABA**") tests to quantify the acid generation potential of the two (2) tailings streams.

The modified ABA results suggested that the de-sulphurized tailings were non-acid generating based on the neutralization potential ratio and uncertain based on the net neutralizing potential. The net acid generation results classified the low-sulphur tailings as non-acid forming.

Both the modified ABA and net acid generation tests result classified the high-sulphur tailings as potentially acid generating.

13.3 Feasibility Study Metallurgical Program

13.3.1 Objectives

At the completion of the PFS, several process questions and risks remained. Most of these items were identified as recommendations in the PFS document. The following objectives were established at the beginning of the FS test program to investigate some of the remaining risks and opportunities.

- Completion of a comprehensive comminution program to generate more reliable data for sizing of crushing and grinding equipment;

- Mineralogical examination of samples that represents different areas of the West zone mineralization to determine mineral composition and association of graphite;
- Locked cycle testing using a mine plan composite to confirm that a Master composite that represents the first several years of mining operation provides consistent metallurgical response using the established process flowsheet and conditions;
- Confirmation of the robustness of the flowsheet and conditions with several variability composites that represent specific areas of the mineral resource;
- Optimization of the de-sulphurization circuit to ensure that the low-sulphur tailings stream is non-acid generating;
- Assessment of the impact of circulating process water with residual sulphide collector;
- Simulation of the SkimAir® technology in the primary grinding circuit to determine if a coarser concentrate product can be obtained.

13.3.2 Description of Master and Variability Composites

A total of seven (7) variability composites were generated, which represented different areas within the deposit. A list of the seven (7) variability composites including sample ID, sample location, and pertinent assay results are presented in Table 13.7. Equal sub-samples of the VAR-2 to VAR-8 composites were combined to form the Master composite. The SURF sample was excluded from the Master composite since it only represented a very small percentage of the deposit at a depth of up to 0.5 m. The last column specifies the percentage of sulphide sulphur of the total sulphur. Between 85.3 % and 96.1 % of the total sulphur is associated with sulphides.

Table 13.7 – Master and Variability Composites

Sample ID	Sampling Location	Assays (%)						%
		C(t)	C(g)	TOC	CO_3	S	$S^=$	$S^=$
SURF	Far West - Surface	4.17	3.86	< 0.05	0.19	2.87	2.66	92.7
VAR-2	Far West - Middle	4.27	3.79	< 0.05	0.31	3.04	2.66	87.5
VAR-3	Far West - Bottom	4.82	4.26	< 0.05	0.33	3.26	3.05	93.6
VAR-5	Phase 2 - Middle	4.67	4.16	< 0.05	0.47	3.07	2.75	89.6
VAR-6	Phase 2 - Bottom	4.61	4.12	0.08	0.32	2.91	2.61	89.7
VAR-7	Phase 1 - Combined	4.61	4.16	< 0.05	0.37	3.04	2.92	96.1
VAR-8	Phase 3 & 4 - Combined	4.78	4.15	0.15	0.34	3.07	2.62	85.3
MASTER (calc)		4.63	4.11	0.07	0.36	3.07	2.77	90.3

% S = Total Sulphur; S= = Sulphide Sulphur

The seven (7) composites were submitted for mineralogical characterization using Quantitative Evaluation of Materials by Scanning Electron Microscopy (QEMSCAN) technology. Graphite was calculated at 4 % to 5 % across the samples. Pyrite ranged from 0.5 % to 2.4 %, pyrrhotite from 7.5 % to 10 %, while the remainder was made up of mainly quartz, feldspars, biotite/phlogopite, chlorite, sillimanite, and minor to trace amounts of clays, garnets, Fe-Ti-Oxides and carbonates. X-ray diffraction analysis showed that the pyrrhotite was monoclinic and therefore is magnetic (as opposed to hexagonal pyrrhotite).

13.3.3 Comminution Testing

Several comminution tests were carried out on six (6) VAR composites and a bulk sample that was put aside from a 50 tonnes pilot plant (PP) campaign. Since the drill core that was available for the VAR samples was not suitable for MacPherson, JK DropWeight, and Low-energy impact testing due to its small particle size, the bulk sample from a 50 tonne PP was the only available sample for these tests.

A summary of the comminution tests results is provided in Table 13.8.

Table 13.8 – Summary of Comminution Test Results

Sample	Relative	JK Parameters				MacPherson Test		Work Indices (kWh/t)				AI	UCS
Name	Density	A x b[1]	A x b[2]	t_a[3]	SCSE	(kg/h)	(kWh/t)	AWI	CWI	RWI	BWI	(g)	(MPa)
PP Comp Feed	2.71	67.4	72.1	0.51	7.9	19.7	3.9	8.1	9.7	8.6	9.4	0.428	77.5
VAR 2	2.74	-	59.2	0.56	8.4	-	-	-	-	9.5	9.5	0.498	-
VAR 3	2.76	-	53.3	0.50	8.8	-	-	-	-	9.4	9.5	0.473	-
VAR 5	2.77	-	56.9	0.53	8.6	-	-	-	-	9.8	9.9	0.447	-
VAR 6	2.74	-	54.0	0.51	8.7	-	-	-	-	8.8	9.0	0.468	-
VAR 7	2.74	-	51.6	0.49	8.9	-	-	-	-	9.4	9.3	0.530	-
VAR 8	2.73	-	50.2	0.48	9.0	-	-	-	-	9.2	9.9	0.533	-

[1] A x b from DWT
[2] A x b from SMC
[3] *The t_a value reported as part of the SMC procedure (shown in italics) is an estimate*

The result of the JK DropWeight test classified the PP composite as soft with respect to resistance to impact breakage (A × b) and as medium with respect to resistance to abrasion breakage (ta). With A × b values ranging from 59.2 to 50.2, the variability samples fell in the moderately soft to medium range of hardness. The MacPherson autogenous grindability test on the PP composite sample place the sample into the very soft category with respect to autogenous milling, falling near the 10th percentile of the SGS database in terms of throughput rate, correlated work index and specific energy input.

The Bond low-energy impact test produced an average crusher work index (CWi) of 9.7 kWh/t, which placed the PP composite into the 50th percentile of over 800 samples in the SGS database.

Uncompressive strength testing (UCS) determined a Young's modulus average of 45.005 GPa with a standard deviation of 3 %. The UCS average was 77.5 MPa with a standard deviation of 2 %.

Bond abrasion testing produced Ai values of 0.428 to 0.533, which fell between the 75th to 83rd percentiles of more than 2,000 samples in the SGS database. Hence, the Matawinie ore is considered abrasive to very abrasive.

The seven (7) Matawinie composites were subjected to Bond rod mill grindability testing at a standard grind size of 14 mesh (1,180 microns). The seven (7) composites produced RWi values between 8.6 kWh/t for the pilot plant composite and 9.8 kWh/t for the VAR-5 composite. These results represent the 5th to 10th percentile of more than 2,600 samples in the SGS database, placing the samples in the very soft category.

Bond ball mill grindability testing was completed at a grind size of 300 microns to reflect the graphite scavenger grind size target of P_{80} = 210 microns. The seven (7) composites produced BWi values within a narrow range of 9.0 kWh/t for the VAR-6 composite to 9.9 kWh/t for the VAR-5 composite. These results represent the 6th to 10th percentile of more than 6,100 samples in the SGS database, placing the samples in the very soft range of the SGS database.

13.3.4 Flotation Testing

The flotation program was limited to the investigation of specific process risks and opportunities that have been identified prior to the FS. The following risks and opportunities were evaluated:

- Impact of recirculating process water on the flotation selectivity in the graphite rougher and cleaning circuits;
- Validation of the robustness of the flowsheet and conditions using new mine plan composites;
- Optimization of the de-sulphurization stage;
- Evaluation of the SkimAir® technology the in the primary grinding circuit.

13.3.4.1 Impact of Process Water Recirculation

Two (2) batch cleaner tests were carried out to evaluate the impact of recirculated process water on the flotation selectivity in the graphite rougher and cleaning circuits. The main concern was the activation of sulphides due to residual xanthate in the process water. Some of these sulphides could be recovered into the final graphite concentrate, thus reducing its product quality.

In an attempt to quantify the degree of sulphide activation, two (2) batch cleaner flotation tests were carried out back to back. The first test employed a PAX dosage of 200 g/t in the sulphide rougher stage, which was twice the design dosage to simulate circuit operation during slightly over-collected conditions. The sulphide rougher tailings were subjected to magnetic separation as per the current Matawinie flowsheet and the magnetic separation tailings were filtered. The filtrate was used in the following test for makeup water during grinding and flotation.

The first test with fresh tap water recovered 3.6 % of the sulphide units into the combined graphite rougher and scavenger concentrate at a grade of 1.44 % S. The sulphur recovery increased to 13.4 % in the second test with circulated process water at a grade of 5.19 % S. These results reveal a clear reduction in flotation selectivity against sulphides in the graphite rougher and scavenger flotation stages because of the circulated water.

The cleaning circuit rejected most of the sulphides into the 1st cleaner tailings. In test F1, almost 92 % of the sulphides in the graphite rougher and scavenger concentrate reported to the 1st cleaner tailings in the cleaning circuit after polish grinding. Only 0.2 % of the sulphur in the feed report to the final concentrate at a grade of 0.18 % S.

The 1st cleaner stage of the test with recirculated process water was also very effective in reducing the sulphides. Over 95 % of the sulphides in the combined graphite rougher and scavenger concentrate were rejected to the 1st cleaner tailings. However, the overall sulphide recovery into the final graphite concentrate remained higher at 0.4 % and a grade of 0.31 % S.

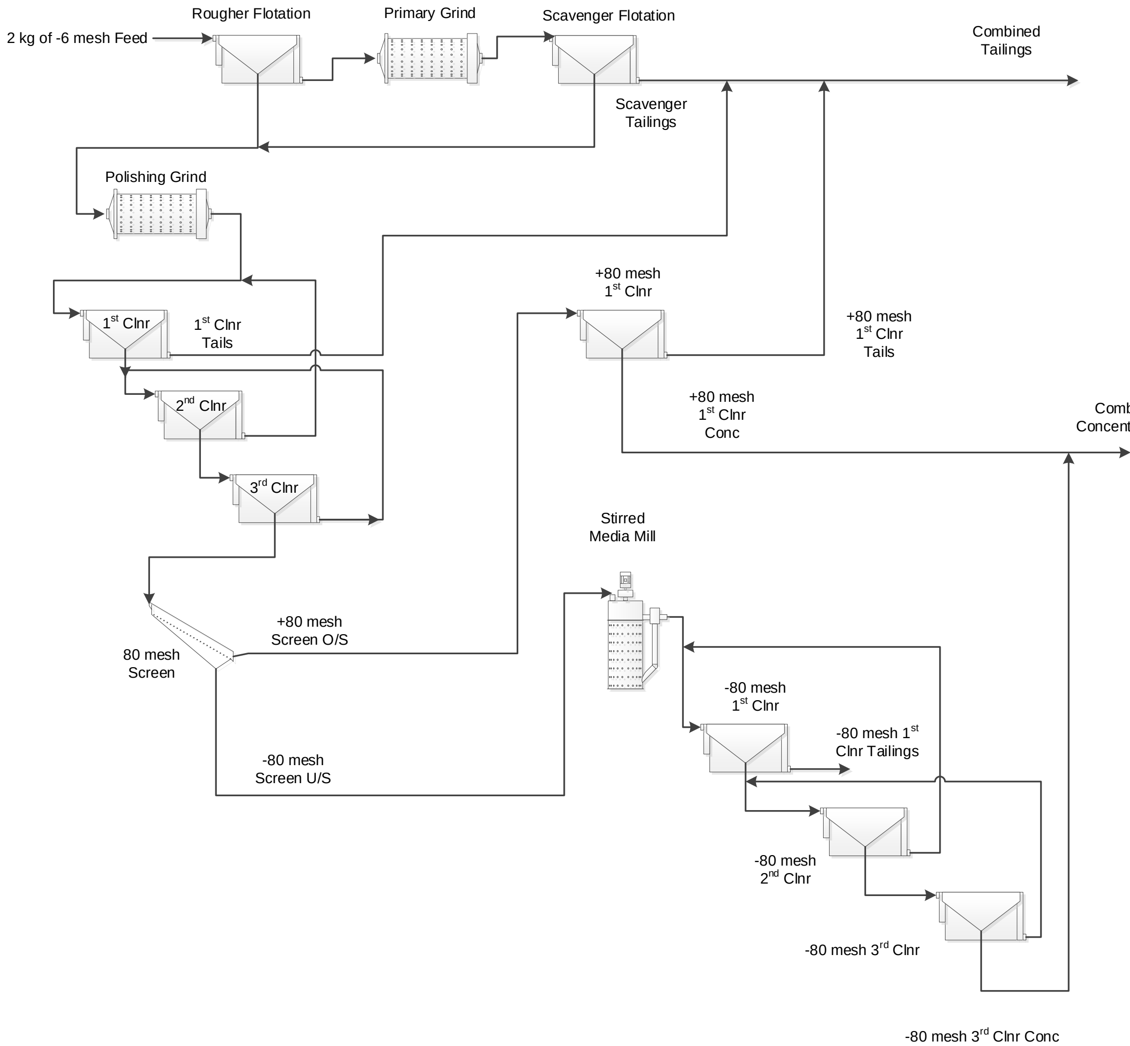
Circulating the process water resulted in an increase of the sulphur grade in the final concentrate of 72 % from 0.18 % S to 0.31 % S. While only a single test with recirculated water was carried out, the grade increase was pronounced enough to conclude a negative impact of residual collector in the process water stream.

13.3.4.2 Validation Flotation Testing

One (1) LCT was carried out using the Master composite to confirm the robustness of the flowsheet and conditions that were developed during the PFS metallurgical program using a new mine plan composite. Further, the seven (7) variability composites were also subjected to open circuit cleaner flotation testing to confirm the metallurgical response. A secondary objective of the tests was to confirm the average flake size distribution of the final concentrate and the expected variation as a function of the location.

The flow sheet of the LCT is depicted in Figure 13.5. The open circuit cleaner tests employed the identical flowsheet, but without circulation of the intermediate tailings streams.

Figure 13.5 – Locked Cycle Test Flow Sheet



The LCT mass balance and results of the size fraction analysis on the final concentrate is presented in Table 13.9 and Table 13.10. The graphite recovery into the final concentrate was 94.3 % at a combined concentrate grade of 97.0 % C(t). These results are in excellent agreement with a 97.0 % C(t) concentrate grade at 94 % carbon recovery, which were selected for the FS to generate the process design criteria and circuit mass balance.

A total of 13.5 % of the concentrate mass reported to the jumbo flake category of +48 mesh (+300 microns) and 43 % into the combined large and jumbo flake categories of +80 mesh (+180 microns).

Table 13.9 – Locked Cycle Test Results

Sample ID	Weight (%)	Assays (%) C(t)	Distr. (%) C(t)
Combined Concentrate	4.30	97.0	94.3
+80 mesh 1st Clnr Concentrate	2.20	96.6	48.1
+80 mesh 1st Clnr Tailings	0.01	50.0	0.1
-80 mesh 3rd Clnr Concentrate	2.10	97.4	46.2
-80 mesh 1st Clnr Tailings	0.13	28.3	0.8
1st Clnr Tailings	3.59	1.95	1.6
Scavenger Tailings	92.1	0.15	3.2
Combined Tailings	95.8	0.26	5.7
Head (calc)	100.1	4.42	100.0

Table 13.10 – LCT Graphite Concentrate Size Fraction Analysis

Size Fraction	Weight (%)	Assays (%) C(t)	Distribution (%) C(t)
+32 mesh	1.0	97.2	1.0
+48 mesh	12.5	97.6	12.5
+65 mesh	18.1	96.8	18.0
+80 mesh	11.4	96.6	11.3
+100 mesh	13.5	96.9	13.4
+150 mesh	13.5	98.4	13.7
+200 mesh	9.8	98.3	9.9
+325 mesh	9.1	97.8	9.1
+400 mesh	2.8	97.3	2.8
-400 mesh	8.2	97.2	8.2
Final Concentrate (SA)	**100.0**	**97.4**	**100.0**

Variability flotation tests on the seven (7) variability concentrates produced consistent results with regards to graphite concentrate grades. The combined concentrate grade of the seven (7) tests ranged between 96.2 % C(t) for the SURF composite and 98.5 % C(t) for the VAR-8 composite. The grades were above the minimum grade target of 96.0 % C(t) for all tests and the average grade was close to the 97.0 % C(t) that was obtained in the LCT. The open circuit total carbon recovery ranged between 89.1 % for the VAR-8 composite and 93.8 % for the SURF composite. Since rougher and scavenger total carbon recoveries were at least 95.3 %, it is expected that the average closed-circuit performance will be in line with the LCT results.

The flake size distribution was the coarsest for the VAR-8 composite with a P_{80} = 296 microns. The finest product with a P_{80} = 249 microns was obtained for the VAR-2 composite. The average combined concentrate of all seven (7) test produced a P_{80} of 271 microns. The mass recovery into the +80 mesh size fractions varied between 40.8 % for the VAR-2 composite and 51.4 % for the VAR-8 composite.

The variability composites represented larger areas to cover the proposed mine plan. Higher variation in the flake size distribution is expected on a smaller scale, which may affect the product basket of the processing plant on a day-by-day basis.

13.3.4.3 De-Sulphurization Tests

Seventeen (17) sulphide rougher kinetics tests were carried out to determine the conditions that achieve the highest sulphide recovery into a low-mass high-sulphide stream to render the remaining tailings non-acid generating.

The first block of seven (7) tests evaluated the impact of PAX dosage, addition of copper sulphate, flotation time, and magnetic separation. Magnetic separation was deemed essential to achieve low sulphide grades in the low-sulphide tailings. This agrees well with the mineralogical characterization that identified monoclinic pyrrhotite in the Matawinie mineralization. Monoclinic pyrrhotite is often characterized by slow flotation kinetics and incomplete recoverability by means of sulphide flotation, thus requiring magnetic separation. Copper sulphate failed to increase sulphide recoveries above those achieved with PAX and magnetic separation.

While the efficiency of the magnetic separation improved gradually with increased field strength between the tested range of 1,000 Gauss to 10,000 Gauss, the maximum field strength of a commercially available permanent magnet is approximately 7,000 Gauss. Hence, the PAX dosage optimization tests were carried out at this field strength. Dosages of 50 g/t, 150 g/t, and 300 g/t were evaluated. Increasing the PAX dosage from 50 g/t to 150 g/t resulted in a statistically significant reduction of the sulphides in the magnetic separation tailings. However, increasing the dosage further to 300 g/t PAX did not produce a lower concentrate grade.

A PAX dosage of 150 g/t and magnetic separation at 7,000 Gauss was able to achieve a low-sulphide tailings grade of approximately 0.10 % S.

13.3.4.4 SkimAir® Evaluation

The SkimAir® technology has been developed by Outotec for flash flotation and flash roughing applications. The advantage of the equipment is the removal of coarse liberated graphite before it overground in the mill. Other benefits claimed by Outotec are improved overall recovery, increased mill throughput, and improved dewatering. In the Matawinie flow sheet the recovery of graphite flakes as early as possible is the primary motivator to consider a SkimAir® flotation cell.

While it's difficult to evaluate the technology in small-scale batch flotation tests, the underlying principle can be applied on a laboratory scale. The SkimAir® flotation cell is typically installed on the hydrocyclone underflow stream to capture any sufficiently liberated, fast floating particles. Assuming a typical circulating load in the mill, the coarse material will circulate several times from the mill to the classification cyclone and then through the cyclone underflow back to the mill. Hence, the 10 minutes of grinding time in the ball mill was broken into four (4) intervals (2, 2, 3, and 3 minutes) followed by rougher flotation after each grinding step.

The overall flotation response in terms of final concentrate grade was almost identical for the SkimAir® tests and the baseline test F1 at 97.7 % C(t) and 97.4 % C(t), respectively. The open circuit graphite recovery for the SkimAir® test at 94.1 % was slightly higher compared to 90.2 % in test F1.

The main reason for the SkimAir® simulation tests was to investigate the possibility of a coarser final concentrate product. A comparison of the SkimAir® test with the results obtained in the baseline test F1 did not provide a clear grade and/or flake size advantage that could serve as evidence that this technology will help to produce a superior graphite concentrate.

14.0 MINERAL RESOURCE ESTIMATES

Mineral Resources on the West Zone Deposit were estimated with an effective date of July 10th, 2018. These numbers have been publicly disclosed in the June 27th, 2018 Press Release entitled: "Nouveau Monde Increases its Indicated Resources to 95.8 Mt at a Grade of 4.28 % Cg for its West Zone Graphite Deposit – Matawinie Property". This Report explains additional details about this updated Resource Estimate. This Report also presents resources for the South Zones that namely separates into the South-East and South-West Zones.

The increase in resources of the West Zone Deposit is mostly due to the newly acquired land package, in which the mineralization extends, some new geotechnical data and hydrogeological modelling and also the future market outlook. The results presented here were already presented in the Updated Pre-Feasibility Study dated August 10th, 2018 and serve as the basis for this Feasibility Study.

14.1 Drill Hole Database

NMG provided SGS Geostat with the digital version of the drilling database. The data was imported into a Geobase format emphasizing on the collar identifications, deviations, lithologies, and assay results (see Table 14.1).

Table 14.1 – Summary of Database Entries Used for the Estimates

Field	Number of Entries	Length (m)
Drill holes collars (DDH)	104	16,100.95
Sampled trenches	3	418.55
Deviation measurements	936	
Lithologies	1,080	
Assays (excluding trench samples)	4,491	8,784.93
Assays (trenches only)	207	418.51

While the complete database also covers other areas of the Tony Claim Block, and contains some hydrogeological and geotechnical drilling, Table 14.1 only presents the drill holes used to model the resource and to model the overburden surface used to constrain the resources. This table includes 80 exploration drill holes, 10 drill holes used for geotechnical measurements and 14 drill holes used for overburden thickness survey. Table 14.1. summarizes drilling used for the resource estimate which totals 16,100.95 m. Holes were surveyed using a Reflex or a Ranger downhole orientation instrument and appear to be sampled consistently every 50 m or less down the hole. Trench samples were surveyed at approximately every 2-m. Drill holes and trenches are surveyed using the UTM projection, NAD83 CSRS Zone 18.

The database contains 4,698 assay results for graphitic carbon, sulphur and total carbon. A total of 4,491 assays are from diamond drill core and represent 8,784.93 metres and 207 assays come from trench channel sampling and represent 418.55 trenched metres (Table 14.1).

Assays were made into mineralized intervals ("**MI**"). A modelling cut-off grade of 2.0 % C(g) was used to delineate mineralized volumes. There are 295 MIs including 270 from core drilling and 25 from surface trench channel samples. The total length for the MIs is of 6,552.24 m. The shortest MI created is of 0.47 m. The longest MI created is of 133.7 m and is in the W1B mineralized zone.

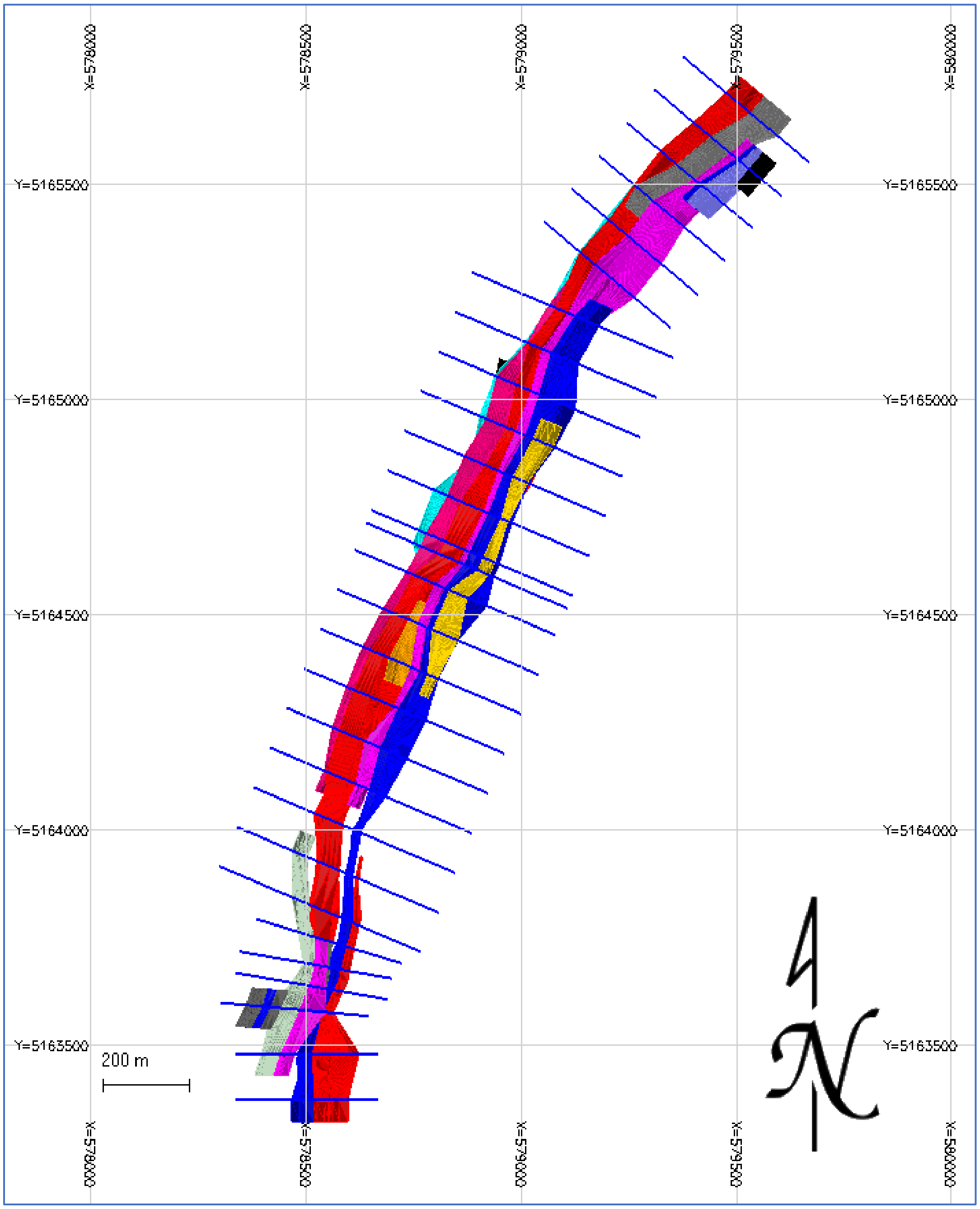
14.2 Mineralized Volumes

The mineralized volumes were prepared using the Genesis© mining software. The mineralized volumes were modelled over the MIs. The process involved the creation of closed polygons on section views. The sections are not always on a regular grid as the drilling is not always on a standard azimuth and the drill holes spacing is not perfectly even. There are 180 polygons that were interpreted on 29 sections. There are currently 19 mineralized volumes in the West Zone. Out of these 19 volumes, 3 of them are a continuity of each other: W1B, W1B_2 and W1B_3. W0 and W0_1 are not touching but are in the same alignment so MIs are all tagged W0. W0A and W0A_1 are not touching but are in the same alignment so MIs are all tagged W0A. Therefore, there are 15 groups of MIs that were used independently for the estimation. The volumes under topography are listed in Table 14.2 along with the number of mineralized intervals that pierce these volumes.

Table 14.2 – List of the Mineralized Volumes and the Count of Mineralized Intervals

Mineralized Volumes	Volume (m^3)	Mineralized Intervals
W4	2,297,000	19
W1A	5,686,000	38
W1B	20,212,875	84
W3B	431,875	12
W31	5,487,125	42
W2	3,326,625	34
W0	3,754,250	25
W0A	142,125	4
W2A	459,750	7
W1C	1,373,625	6
W32	175,625	4
W42	151,625	4
W1D	1,486,375	11
W1E	549,750	3
W5	31,875	2
TOTAL	**45,566,500**	**295**

Figure 14.1 – Sections (Blue) and Mineralized Volumes (Multiple Colours)



14.3 Composite Data

To prepare a reliable estimation, it is important to use data that has comparable weight. Therefore, the author needs to produce some composites using a chosen methodology. In the case of the West Zone Deposit, the assays are already very even in length. The author has chosen to use the original assay as composites. Composites have been created inside MIs. Out of the 3,308 composites, 2,688 (81 %) are between 1.9 and 2.1 m in length. Also 3,288 (99.4 %) are between 1.0 and 3.0 m in length. The smallest composite is 0.4 m and the longest is 3.58 m long. After verifications for possible outliers, the author decided to cap the three (3) highest composites to 8 % Cg. This translates in a loss of less than 0.1 % of the Cg in the deposit. The resulting 3,308 composites have a length between 0.4 m and 3.58 m.

There are 3,308 composites in total. The composites were prepared in the Genesis software. Composites were divided into 15 separate sets to prepare the estimation for the 19 volumes. Tables 14.3 and 14.4 show the composite statistics by zone. The attribution of the 15 separate sets that correspond to the 19 mineralized volumes are presented in Table 14.5.

Table 14.3 – Statistics on the Composites [C(g) %] for the West Zone

Before Capping		After Capping	
Count	3,308	Count	3,308
Min	0.02	Min	0.02
Max	14.4	Max	8.0
Mean	4.267	Mean	4.264
Median	4.35	Median	4.35
Standard Deviation	1.44	Standard Deviation	1.43

Table 14.4 – Statistics on the Capped Composites [C(g) %] for Each Mineralized Volume

	W0	W0A	W1A	W1B	W1C	W1D	W1E	W2	W2A	W31	W32	W3B	W4	W42	W5	Total
Count	223	14	401	1,551	102	84	41	213	45	358	15	48	195	14	4	3,308
Mean % C(g)	4.10	2.86	4.01	4.44	4.81	4.06	4.28	4.38	4.52	4.06	3.04	3.93	3.99	2.68	4.06	4.26
Max % C(g)	7.18	3.67	8.00	8.00	7.60	7.21	7.02	8.00	6.05	7.27	6.17	6.13	7.42	3.93	4.67	8.00
Min % C(g)	0.02	2.19	0.24	0.03	0.16	0.02	0.02	0.09	2.15	0.38	1.30	2.14	0.03	1.19	3.51	0.02
StDev % C(g)	1.56	0.49	1.36	1.41	1.53	1.57	1.58	1.35	0.94	1.34	1.25	1.03	1.47	0.70	0.55	1.43

Table 14.5 – List of Volumes and Corresponding Composite Sets

Volume		Composite Set	
Number	**Name**	**Number**	**Name**
1	W1B	1	W1B
2	W1B_3	1	W1B
3	W1B_2	1	W1B
4	W0	2	W0
5	W0_1	2	W0
6	W0A	3	W0A
7	W0A_1	3	W0A
8	W3_1	4	W31
9	W3B	5	W3B
10	W2	6	W2
11	W2A	7	W2A
12	W1A	8	W1A
13	W4	9	W4
14	W5	10	W5
15	W1D	11	W1D
16	W4_2	12	W42
17	W3_2	13	W32
18	W1C	14	W1C
19	W1E	15	W1E

14.4 Capping

A capping study was carried out and the conclusion is that capping is not required. For the form, the author decided to cap three (3) composites at 8 % C(g) but it has an insignificant impact on the average grade. The capping at a grade of 8 % C(g) reduced the global graphitic carbon content of the resource by less than 0.1 % with the average grade going from 4.267 to 4.264 % C(g).

14.5 Density

A density of 2.76 t/m^3 was set to the whole West Zone Deposit.

This density average comes from the density database prepared by NMG. This database consists of a total of 242 density measurements. These measurements are from 2015 (61), 2016 (86) and from 2018 (95). The statistical T-test on populations cannot confirm that any of the better-informed zones have significantly different densities (W0, W1A, W1B, W2, W31 and W4). From this observation, it was decided to use a single density for the whole resource estimation. Also, the coefficient of variation for the complete density database is of 3 % which is low. The statistics for the density is detailed in Table 14.6 by zone and in total.

Table 14.6 – Density Statistics for the 15 Composite Sets

	Count	Min	Mean	Median	Max	SD	COV
W0	19	2.67	2.75	2.73	3.01	0.07	3 %
W0A	1	2.80	2.80	2.80	2.80	NA	NA
W1A	23	2.64	2.74	2.73	2.97	0.07	3 %
W1B	88	2.61	2.75	2.74	3.25	0.08	3 %
W1C	1	2.74	2.74	2.74	2.74	NA	NA
W1D	11	2.70	2.77	2.75	3.04	0.10	3 %
W1E	3	2.67	2.71	2.69	2.77	0.05	2 %
W2	19	2.67	2.77	2.74	3.00	0.10	4 %
W2A	3	2.74	2.86	2.80	3.04	0.16	6 %
W31	41	2.66	2.76	2.75	2.95	0.06	2 %
W32	1	2.77	2.77	2.77	2.77	NA	NA
W3B	1	2.88	2.88	2.88	2.88	NA	NA
W4	28	2.68	2.77	2.75	3.05	0.07	2 %
W42	2	2.73	2.79	2.79	2.84	0.08	3 %
W5	1	2.69	2.69	2.69	2.69	NA	NA
Total	**242**	**2.61**	**2.76**	**2.74**	**3.25**	**0.08**	**3 %**

14.6 Resource Block Modelling

The resource was estimated using a block model. The block model was prepared, estimated and classified in the Genesis© mining software. The block model origin is (x, y, z) → (578,900 – 5,162,650 – 597.5) with block size of 5 m × 5 m × 5 m. The number of indices is of (x, y, z) → (740, 300, 77). These coordinates are the center of the blocks. There is also a rotation to the block model of -67 degrees (counterclockwise rotation). Full blocks were used that means that if the center of the block falls inside the volume, it is counted at 100 %, if the center of the block falls outside the volume, it is counted at 0 %. One (1) large block model was created using those parameters inside of 19 mineralized volumes, and each volume was tagged in the block model and estimated separately.

Table 14.7 – Block Model Settings – Origin and Size

Grid	X	Y	Z
Origin (Center of Block)	578,900	5,162,650	597.5
Size	5	5	-5
Discretization	2	2	2
Starting Coordinate	578,900	5,162,650	597.5
Starting Block Index	1	1	1
Ending Block Index	740	300	77

14.6.1 Variography

Some variography has been done and an estimation by kriging also. The kriged model is globally the same as the Inverse Distance Squared ("**IDS**") model. The kriged model was not retained as the final estimation for this Report.

The variograms were done in June 2018 with all composites. The author used a normal variogram, with no normalization of the data. It is presented in Figure 14.2 and in Table 14.8. For the final long-range variogram, the author manipulated the composites in several ways to improve the calculated variograms (like rotations and unfolding) it was found successful.

It is interesting to note that no nugget effect was found.

Figure 14.2 – Variogram Model

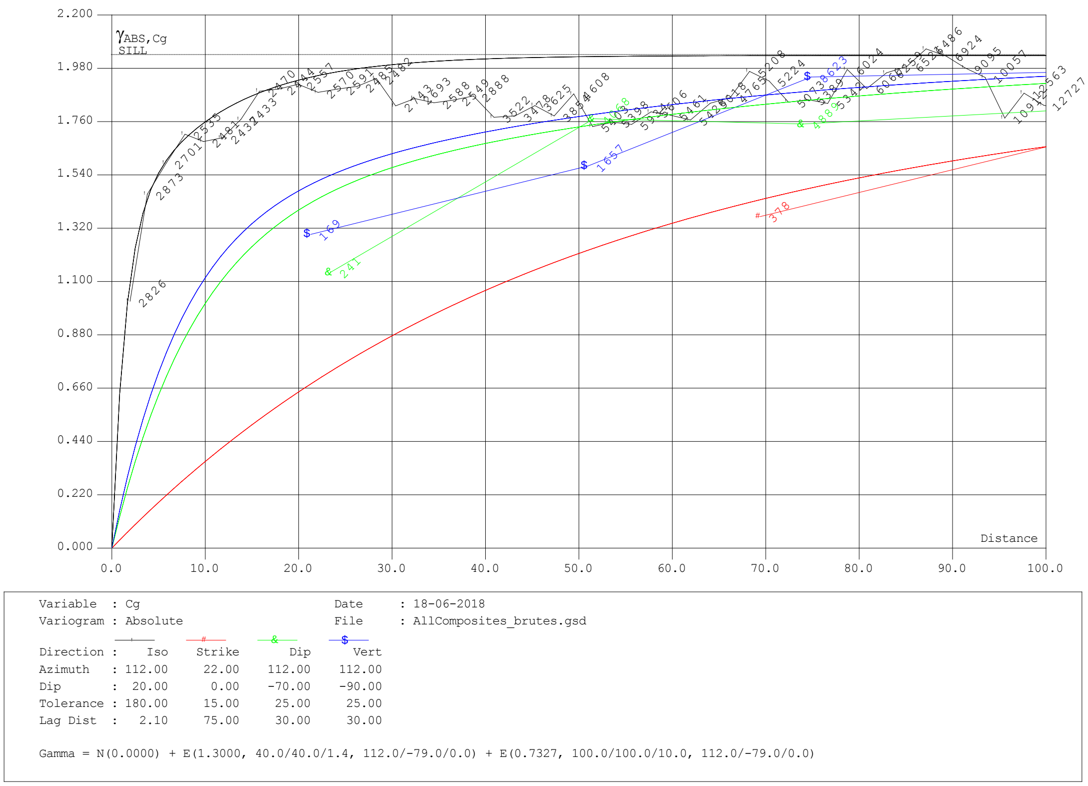


Table 14.8 – Summary of Variogram Model

Component			Ranges (m)			Orientation (degrees)		
Number	**Type**	**Sill**	**Long**	**Medium**	**Short**	**Azim**	**Dip**	**Spin**
3	Exponential	0.7327	100	100	10	112	-79	0
2	Exponential	1.3	40	40	1.4	112	-79	0
1	Nugget	0	NA	NA	NA	NA	NA	NA

14.6.2 Grade Interpolation Methodology

To interpolate graphitic carbon grade, the IDS method was used, with ellipsoid influenced distances in the calculation and the composite selection. Block discretization was set to 2 × 2 × 2 for the estimation of block to composite distance. Blocks were created within all the mineralized volumes. Three (3) passes were used with a small ellipsoid for the first pass, larger ellipsoid for the second pass and larger again ellipsoid for the third pass. The small ellipsoid has a radius of 50 m × 50 m × 15 m, the medium ellipsoid has a radius of 100 m × 100 m × 30 m, and the large ellipsoid has a radius of 200 m × 200 m × 60 m. The algorithm used for the estimation has “variable orientation” for the ellipsoids. Each block has a local orientation for the search ellipsoid to be used for the estimation of that block. The resulting estimation fits better the orientation of the layers and has better-looking results than some other algorithms.

The first pass of the estimation used a minimum of five (5) and a maximum of 11 composites, with the additional limit of three (3) composites per drill hole. The second pass of the estimation used a minimum of five (5) and a maximum of 11 composites, with the additional limit of three (3) composites per drill hole. The third pass of the estimation used a minimum of four (4) and a maximum of 11 composites, with the additional limit of three (3) composites per drill hole. There are exceptions: for the volumes W0, W0A, W1C and W1D, the third pass of the estimation used a minimum of three (3) and a maximum of 11 composites, with the additional limit of three (3) composites per drill hole to estimate the full volumes.

Of all blocks inside the mineralized volumes, 99.9 % of them were estimated. The remaining 0.1 % were too far from the drill hole data to be estimated.

14.7 Classification

14.7.1 Definitions

The following definitions are selected parts from the Canadian Institute of Mining, Metallurgy and Petroleum (CIM). The full definition is available from: http://www.cim.org/~/media/Files/PDF/Subsites/CIM_DEFINITION_STANDARDS_20142.

<u>Mineral Resource</u>

Mineral Resources are subdivided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.

A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction.

The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

<u>Inferred Mineral Resource</u>

An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and *sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.*

An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

An Inferred Mineral Resource is based on limited information and sampling gathered through appropriate sampling techniques from locations such as outcrops, trenches, pits, workings and drill holes. Inferred Mineral Resources must not be included in the economic analysis, production schedules, or estimated mine life in publicly disclosed Pre-Feasibility or Feasibility Studies, or in the Life of Mine plans and cash flow models of developed mines. Inferred Mineral Resources can only be used in economic studies as provided under NI 43-101.

<u>Indicated Mineral Resource</u>

An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.

Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.

An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.

<u>Measured Mineral Resource</u>

A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit.

Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation.

A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.

14.7.2 Classification Method

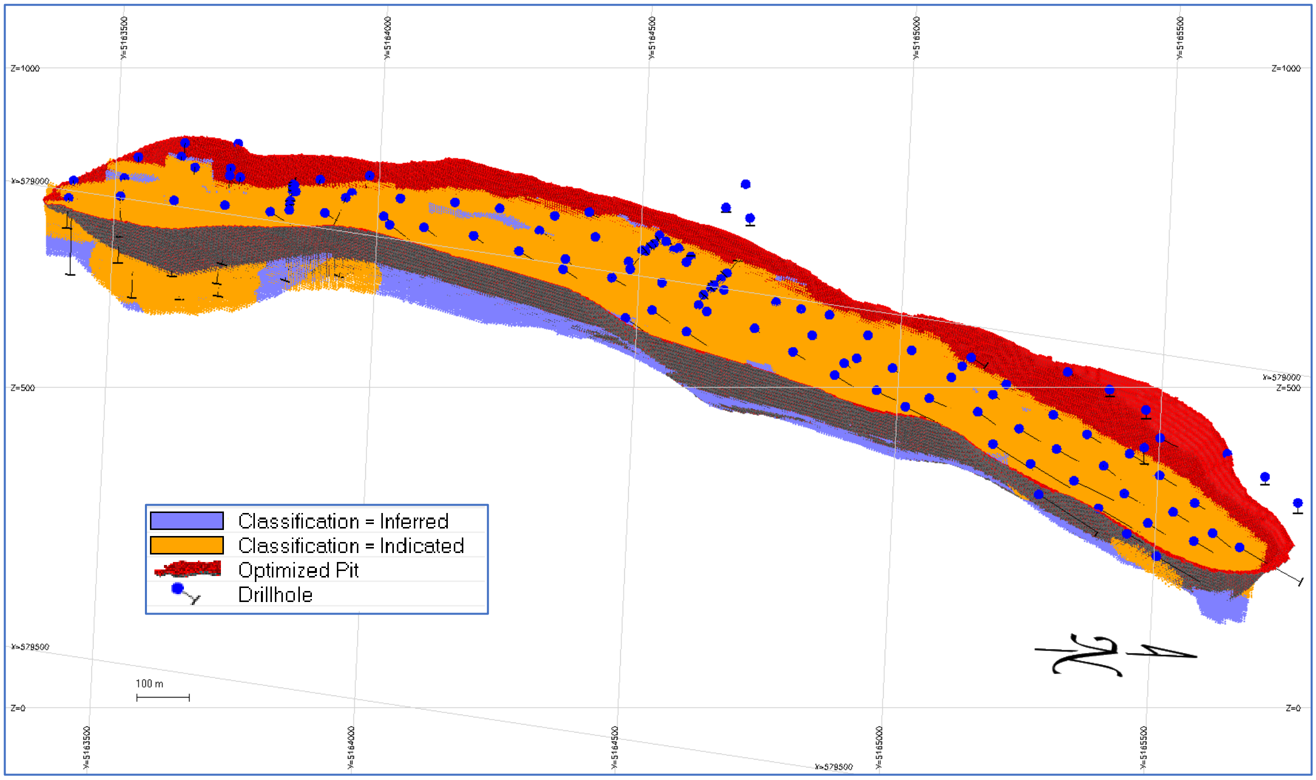
The Indicated Category has been given to blocks by drawing outlines manually on a longitudinal view. The volume named W0A was forced to keep the Inferred Category because it has more uncertainty in its interpretation. No measured resources are present in the Project. The extents of the outlines for Indicated Resources are based on the distance between drill holes.

The classification was made from an automatic classification algorithm using search ellipsoids centred on composites.

The Indicated Resource is a continuous area 2.6 km long by about 150 m wide. The drill holes are typically spaced every 100 m or less section to section and spaced every 75 m or less on the sections.

All resources outside of this perimeter are given the default Inferred Category.

Figure 14.3 – Block Model Coloured by Classification with Optimized Pit and Drill Hole Traces



14.8 Optimized Open Pits and Cut-off Grade Used to Constrain the Resource

The method of exploitation chosen for this Project is by open pit. Therefore, the resource was constrained by an optimized open pit. The block model was fed to GEOVIA's Whittle software to provide an optimized pit. Some pit optimizations have been run and the assumptions of concentrate price, costs and technical mining factors used for the open pits suggest an economical Cut-off Grade ("**COG**") of 1.78 %C(g) used for the resource estimation. The open pit used to constrain the resource presented here are shells with no designs of ramps.

Whittle software was used to create pit shells based on the resource model and the topographic surface and overburden bottom surfaces. The concentrate price, mining and processing costs and slope angle used for this optimization are shown in Table 14.9. The final open pit has been selected with a general factor of 1 for the concentrate price.

Figures 14.4 to 14.7 illustrate some interpretations of the mineralization with drill holes, assay results, topographic and overburden bottom surfaces, block model and the optimized open pit selected to constrain the resource.

Table 14.9 – Assumptions Used for the Optimization of the Open Pits

Parameters	Values	
Currency (CAD unless specified)	1.28 CAD = 1.00 USD	
Block Size	5 m × 5 m × 5 m	
Specific Gravity	2.76 t/m^3	
Overall Slope Angle	rock	55°
	overburden	25°
Pit Selection Method	Price Factor of One	
Mining Cost	Mineralized Material	3.06 $/t
	Waste	3.46 $/t
	Overburden	3.17 $/t
Mining Dilution	5 %	
Mining Recovery	95 %	
Rehabilitation Cost	0.61 $/t	
Processing Cost	12.94 $/t	
Transportation Cost	47.92 $/t	
Processing Recovery	94 %	
G&A	1.60 $/t	
Selling Price of Concentrate	1,124.00 USD/t Minus Transportation Cost	
NSR Royalty	2 %	
Concentration of C(g) in the concentrate	97 %	

Figure 14.4 – West Zone Section -200

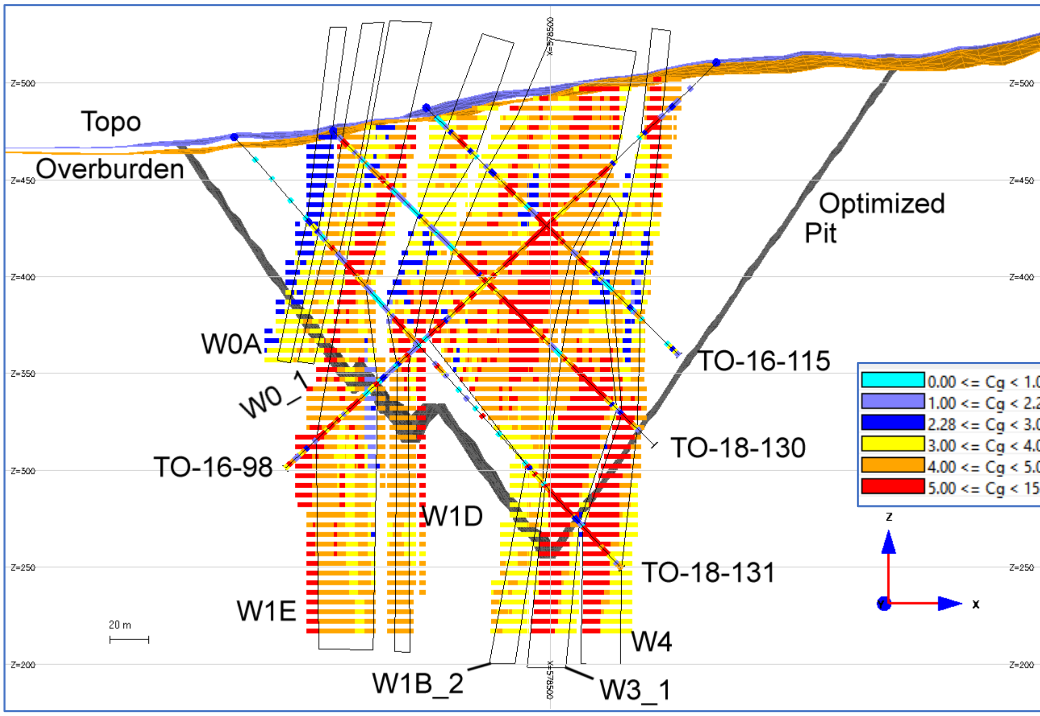


Figure 14.5 – West Zone Section 700

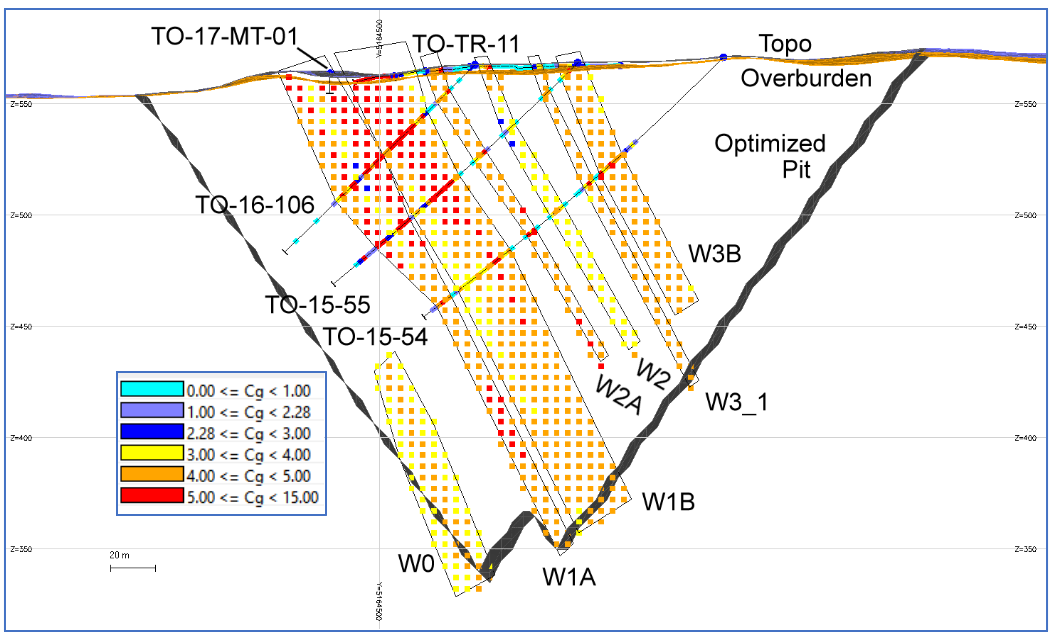


Figure 14.6 – West Zone Section 1300

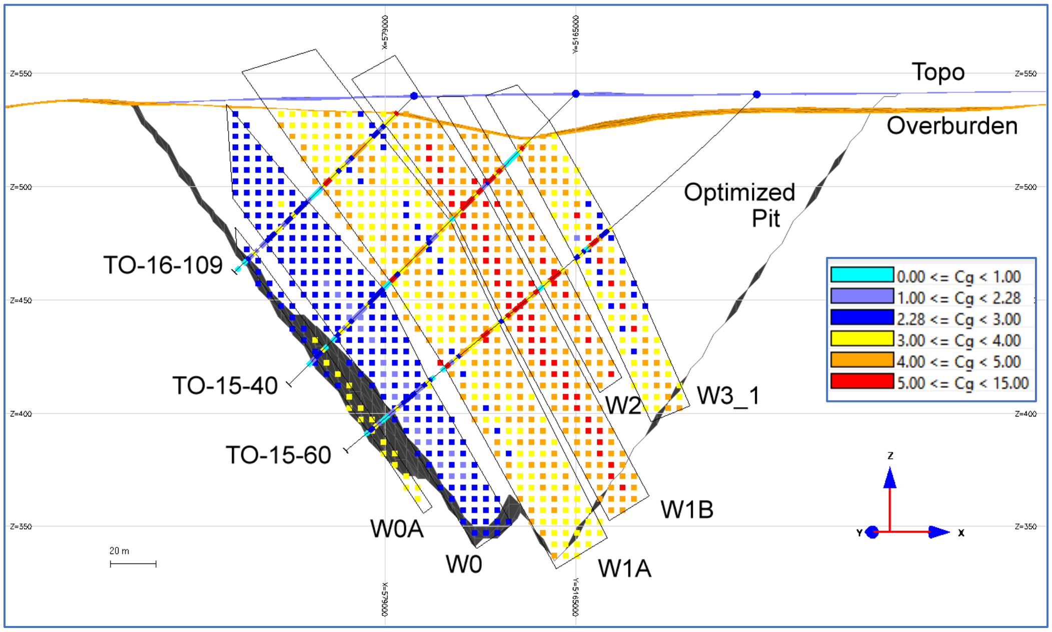


Figure 14.7 – West Zone Section 1900

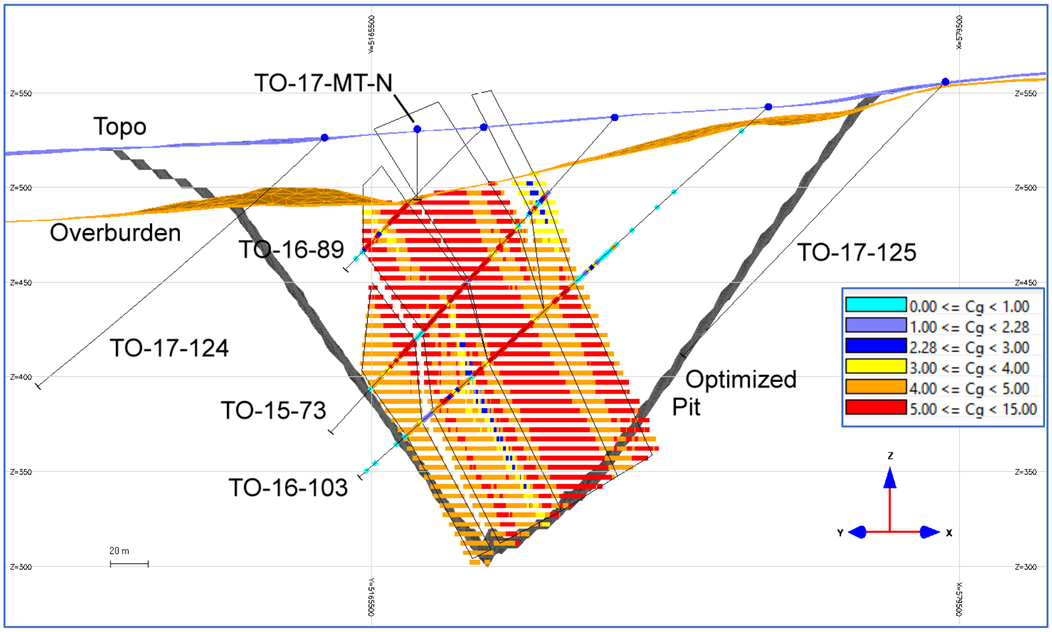
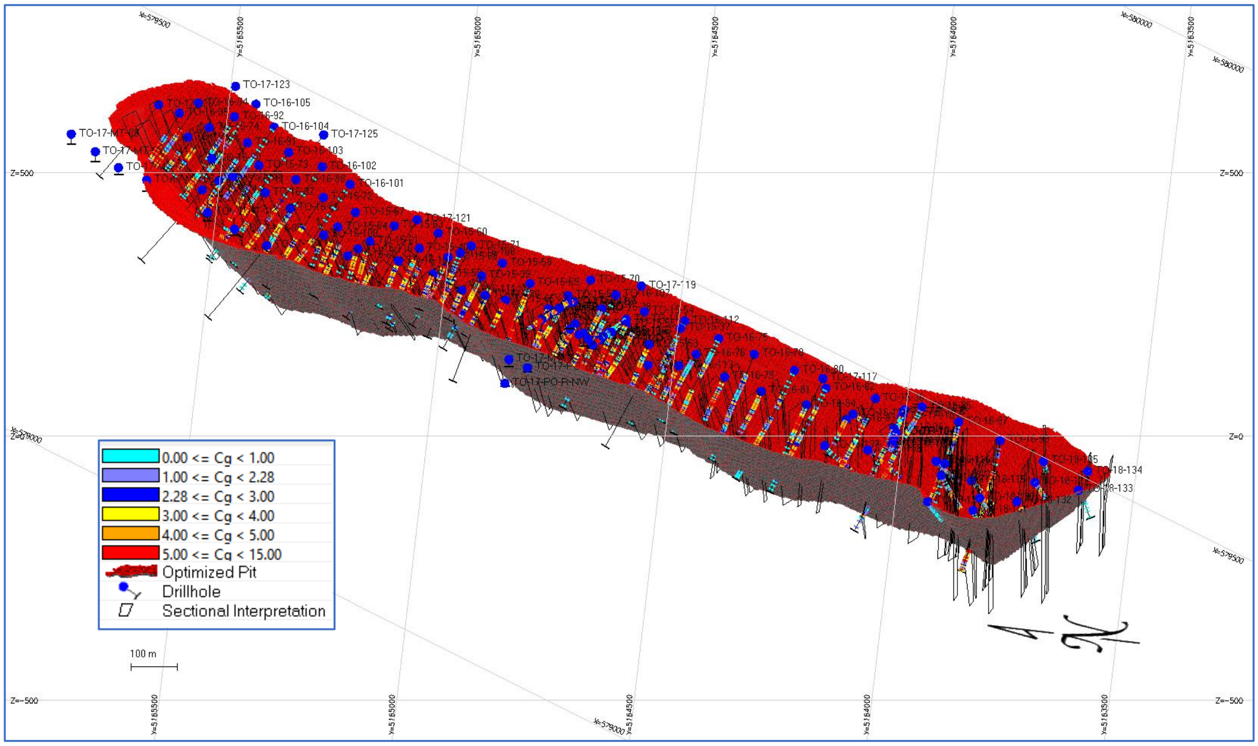


Figure 14.8 – West Zone Optimized Pit



14.9 Mineral Resource Estimates (West Zone Base Case)

The block model, used to generate the Current Resource of the West Zone, is based on a total of 104 core drill holes which produced 4,491 samples as well as 207 samples collected from channeling work in three (3) trenches. This does not include the quality control samples which comprise of 198 duplicates, 198 blanks and 96 standard samples, all of which returned within acceptable limits. In all, 19 mineralized horizons encased in paragneiss units were interpreted and modelled from this data.

The Current Resource block model for the West Zone was prepared by Yann Camus, P. Eng., of SGS Canada Inc. - Geostat office in Blainville, Quebec, Canada ("SGS Geostat"), using the Genesis© mining software. Interpolation was performed using inverse square distance ("**ID^2**") as well as different search ellipses which were adapted for the geology of the deposit. The block model was then fed to GEOVIA's Whittle software to provide an optimized pit. The optimized pit containing the Current Resource was limited to the Tony Block Property boundary to the South of the West Zone Deposit at the effective date of the Resource Estimate (June 27th, 2018). The Mineral Resources of the West Zone are presented in the Table 14.10.

Table 14.10 – Pit-Constrained Mineral Resource Estimate for the West Zone[1]

Mineral Resource Category[2]	Current Resource (July 10th, 2018) [7]		
	Tonnage (Mt)[5,6]	Grade [% C(g)][3]	C(g) (Mt)
Indicated	95.8	4.28	4.10
Inferred[4]	14.0	4.19	0.59

1 The Mineral Resources provided in this table were estimated using current Canadian Institute of Mining, Metallurgy and Petroleum ("**CIM**") Standards on Mineral Resources and Reserves, Definitions and Guidelines.
2 Mineral resources that are not mineral reserves have not demonstrated economic viability. Additional trenching and/or drilling will be required to convert Inferred and Indicated Mineral Resources to Measured Mineral Resources. There is no certainty that any part of a mineral resource will ever be converted into reserves.
3 All analyses used for the Resource Estimates were performed by ALS Minerals Laboratories and delivered as % C(g), internal analytical code C-IR18.
4 Inferred Mineral Resources represent material that is considered too speculative to be included in economic evaluations. Additional trenching and/or drilling will be required to convert Inferred Mineral Resources to Indicated or Measured Mineral Resources. It cannot be assumed that all or any part of the inferred resources will ever be upgraded to a higher resource category.
5 Current Resource effective July 10th, 2018.
6 Mineral Resources are stated at a cut-off grade of 1.78 % C(g).
7 Standards used for this resource update are the same standards produced over the course of the Pre-Feasibility Study (results published October 25th, 2017). The difference comes from a newly acquired land package (see July 5th, 2017 press release), the south-west extension drilled in 2018, the new hydrogeological and geotechnical information as well as the updated market outlook.

14.10 Mineral Resource Estimates (South Zone Base Case)

This Report also presents resources for the South Zones, which are also located on the Tony Claim Block. The South Zones are separated into the South-East and South-West Zones. The South Zones resource details are available in the PEA report: "Preliminary Economic Assessment Report for the Matawinie Graphite Project" by Norda Stelo dated August 5th, 2016. Details of the PEA Resources can be found in the report available on NMG's web site and on SEDAR. SGS Geostat has audited the PEA resource methodology as well as the overall quantities. These mineralized Zones are considered a lower priority than the West Zone as detailed in the PEA.

The South Zones resources have been prepared with similar methodology as the West Zone presented in this Report. The mineral resources of the South Zones are presented in the Table 14.10. The location of the resources is visible in Figure 9.1 of this Report.

Table 14.11 – Pit-Constrained Mineral Resource Estimate for the South Zones

Mineral Resource Category[2]	Current Resource (July 10th, 2018) [1,5]		
	Tonnage (Mt)[6]	Grade [% C(g)][3]	In-Situ C(g) Tonnage (Mt)
Indicated	26.3	3.73	0.981
Inferred[4]	19.2	3.67	0.705

1 The Mineral Resources provided in this table were estimated using current Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Standards on Mineral Resources and Reserves, Definitions and Guidelines.
2 Mineral resources that are not mineral reserves have not demonstrated economic viability. Additional trenching and/or drilling will be required to convert Inferred and Indicated Mineral Resources to Measured Mineral Resources. There is no certainty that any part of a mineral resource will ever be converted into reserves.
3 All analyses used for the Resource Estimates were performed by ALS Minerals Laboratories and delivered as % C(g), internal analytical code C-IR18.
4 Inferred Mineral Resources represent material that is considered too speculative to be included in economic evaluations. Additional trenching and/or drilling will be required to convert Inferred Mineral Resources to Indicated or Measured Mineral Resources. It cannot be assumed that all or any part of the inferred resources will ever be upgraded to a higher resource category.
5 Current Resource still effective July 10th, 2018 because no new data is available for the South Zones and no material has been extracted since the PEA.
6 Mineral Resources are stated at a cut-off grade of 2.5 % C(g). This is more conservative than current cut-off grade.

14.11 Conclusion

To the knowledge of the author who prepared Sections 12.0 and 14.0 of this Report, there are no special factors that could affect materially the mineral resource estimate presented here.

More details about specific risks are discussed in the “Interpretation and Conclusions” of this Report.

15.0 MINERAL RESERVE ESTIMATES

Open Pit Mineral Reserves have been developed using best practices in accordance with CIM guidelines and National Instrument 43-101 reporting.

The effective date of the Mineral Reserve estimate is July 10th, 2018.

The Mineral Reserves were derived from the Mineral Resource Block Model that was presented in Section 14.0. The Mineral Reserves are the Measured and Indicated Mineral Resources that have been identified as being economically extractable and which incorporate mining loses and the addition of waste dilution. The Mineral Reserves form the basis for the mine plan presented in Section 16.0.

15.1 General Parameters Common to the Open Pit Mineral Reserves

The following Section discusses the geological information that was used for the open pit mine plans and mineral reserve estimate. This information includes the topographic surface, the geological block model and the material properties for ore, waste and overburden.

The mine planning work carried out for the Feasibility Study was done using MineSight® Version 13.00. MineSight® is a commercially available mine planning software that has been used by MC-DRA for over 25 years.

15.1.1 Topographic Surface

The mine design for the FS was carried out using a topographic surface based on one (1) meter contour intervals. The contours were supplied by NMG and derived from a LiDAR survey that took place on December 18th, 2015.

15.1.2 Resource Block Model

The mine design for the FS is based on the 3-dimensional geological block model that was prepared by SGS Geostat and presented in Section 14.0. Each block in the model is five (5) m wide, five (5) m long and five (5) m high and the model is rotated at 293°. Only blocks that contain mineralization are included in the 3-dimensional geological block model.

Each block in the model contains the Cg grade, density and resource classification (Measured, Indicated and Inferred). Using the overburden surface provided by SGS Geostat, MC-DRA was able to differentiate the non-mineralized material as either overburden or waste rock.

15.1.3 Material Properties

The material properties for the different rock types are outlined below. These properties are important in estimating the mineral reserves, the equipment fleet requirements as well as the dump and stockpile design capacities.

15.1.3.1 Density

As was discussed in Section 14.0 of this Report, the in-situ dry density of the mineralized material was estimated to be 2.76 t/m^3. MC-DRA assumed a density of 2.76 t/m^3 for waste and 2.1 t/m^3 for the overburden.

15.1.3.2 Swell Factor

The swell factor reflects the increase in volume of material from its in-situ state to after it is blasted and loaded into the haul trucks. A swell factor of 45 % was used for the FS, which is a typical value used for open pit hard rock mines. Once the rock is placed in the waste dumps and stockpiles, the swell factor is reduced to 35 % due to compaction.

15.1.3.3 Moisture Content

The moisture content reflects the amount of water that is present within the rock formation. It affects the estimation of haul truck requirements and must be considered during the payload calculations. The moisture content is also an important factor for the process water balance.

Since the mineral reserves are estimated using the dry density, they are not affected by the moisture content value. A moisture content of five (5) % was used for the FS. This value is typical for similar projects in the region.

15.2 Open Pit Mineral Reserves

15.2.1 Open Pit Optimization

The first step in the mineral reserve estimate is to carry out a pit optimization analysis. The pit optimization analysis uses economic criteria to determine the cut-off grade and to what extent the deposit can be mined profitably.

The pit optimization analysis was done using the MS-Economic Planner module of MineSight® Version 11.5. The optimizer uses the 3D Lerchs-Grossmann algorithm to determine the economic pit limits based on input of mining and processing costs and revenue per block. In order to comply with NI 43-101 guidelines regarding the Standards of Disclosure for Mineral Projects, only blocks classified in the Measured and Indicated categories are allowed to drive the pit optimizer. Inferred resource blocks are treated as waste, bearing no economic value.

Table 15.1 presents the parameters that were used for the pit optimization analysis. All figures are in Canadian Dollars. The cost and operating parameters that were used are preliminary estimates for developing the economic pit and should not be confused with the operating costs subsequently developed for the FS and presented in Section 20.1.

Table 15.1 – Pit Optimization Parameters

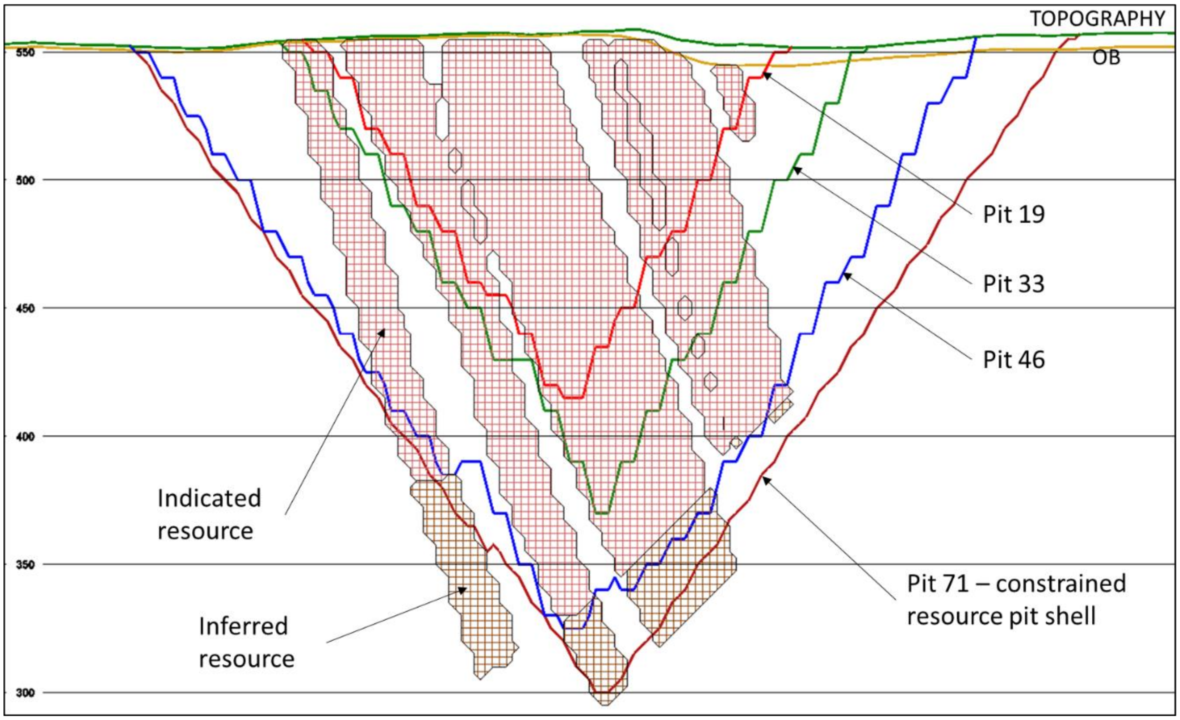
Item	Value	Units
Mining Cost – Overburden	3.65	$/t mined
Mining Cost –Waste	3.98	$/t mined
Mining Cost – Ore	3.52	$/t mined
Processing Cost	12.94	$/t milled
Transportation Cost (FOB Montréal)	47.92	$/t concentrate
Administration Cost	1.60	$/t milled
Sales Price (FOB Montréal)	1,439	$/t concentrate
Mill Recovery	95	%
Concentrate Grade	97.0	%
Pit Slope [1]	HW:55 / FW: 60	Degrees
Dilution [2]	5	%

1 Pit slope parameters correspond to Geotechnical report by Journeaux & Assoc. dated Aug. 25th, 2017. (Report No. L-17-1980)
2 Diluted Cg grade was estimated in block model considering cut-off grade (2.20 % Cg).

The pit optimization analysis considered the Cg grades after mining dilution was accounted for. Mining dilution was quantified by slicing the resource in 5 m bench solids and contouring each of the bench solids by level. These were used as a reference to evaluate the dilution and mining recovery at the contact between ore and waste. Average values of 5 % dilution and 97 % mining recovery were determined to be in line given the geometry of the orebody and consideration for 5m bench heights. Dilution is further discussed in the next Section of this Report.

Using the cost and operating parameters, a series of 29 pit shells were generated by varying the selling price (revenue factor) from $ 610 to $ 1,800 /t (Revenue factor between 0.42 and 1.25). Figure 15.1 shows a typical section through the deposit with several of the pit shells.

Figure 15.1 – Pit Optimization Shells



The tonnages and grades associated with each of the pit shells are presented in Table 15.2. The Net Present Value ("**NPV**") of each shell was calculated assuming a selling price of $ 1,439/t of concentrate, a discount rate of 8 % and an annual production of 100,000 tonnes of concentrate. Figure 15.2 presents the results in a graphical format.

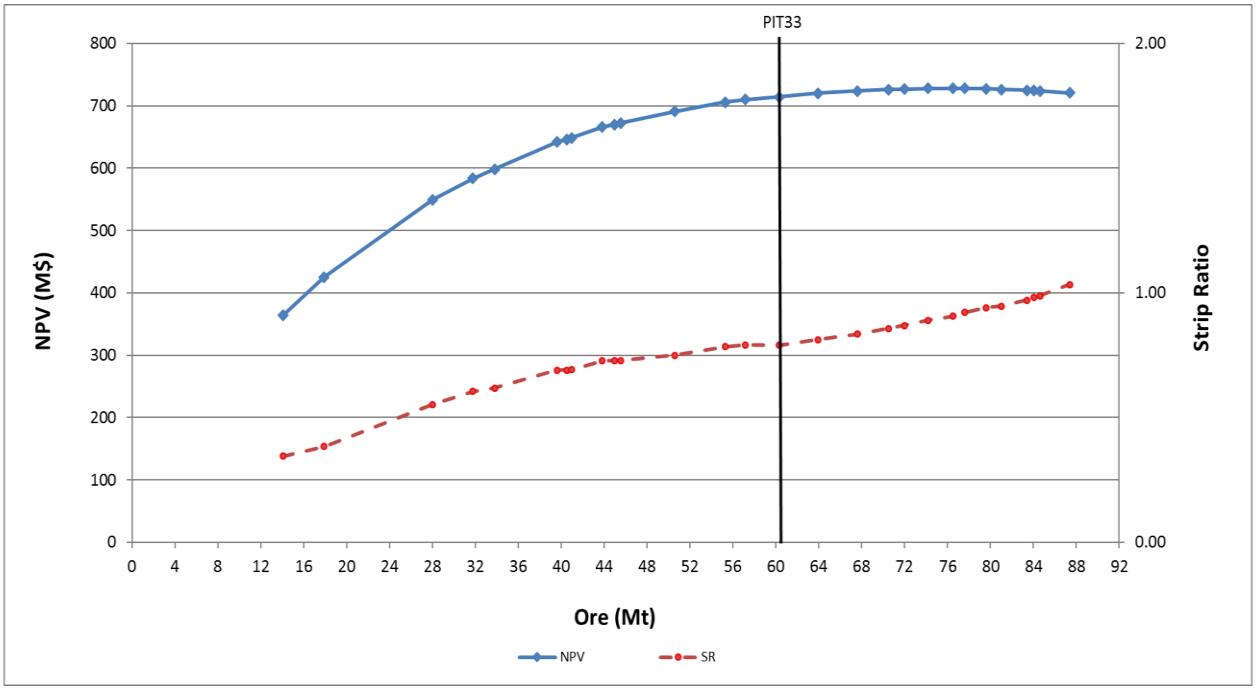
The pit optimization analysis shows that the open pit design should be based on PIT33 (Revenue Factor - 0.7). This pit shell contains 63.9 Mt of Indicated Mineral Resources at a strip ratio of 0.8 to 1 (waste to ore). Mining additional resources with an open pit beyond these limits of this pit shell increases the strip ratio. A slight increase in NPV is visible for PIT38; however, it was decided to remain at a lower stripping ratio.

Upon completion of the FS, MC-DRA confirmed that the pit optimization exercise was still valid using the updated cost estimate developed in the Study.

Table 15.2 – Pit Optimization Results

PIT	Revenue Factor	Ore (Mt)	CG (%)	Total Waste (Mt)	Strip Ratio	Concentrate (Mt)	NPV (M$)	Mine Life (y)
PIT18	0.42	14.1	4.60	4.9	0.35	0.6	364	6
PIT19	0.44	17.9	4.54	6.9	0.38	0.7	425	8
PIT20	0.46	28.0	4.52	15.5	0.55	1.1	549	12
PIT21	0.46	31.8	4.52	19.2	0.61	1.3	583	14
PIT22	0.47	33.8	4.51	20.9	0.62	1.4	598	14
PIT23	0.47	39.6	4.54	27.4	0.69	1.6	642	17
PIT24	0.47	40.5	4.53	27.9	0.69	1.7	646	17
PIT25	0.48	41.0	4.52	28.3	0.69	1.7	648	17
PIT26	0.48	43.8	4.54	31.9	0.73	1.8	666	19
PIT27	0.48	44.9	4.53	32.8	0.73	1.8	670	19
PIT28	0.49	45.6	4.53	33.2	0.73	1.9	673	19
PIT29	0.50	50.6	4.50	37.9	0.75	2.1	691	21
PIT30	0.51	55.3	4.49	43.3	0.78	2.3	706	23
PIT31	0.52	57.2	4.48	45.3	0.79	2.3	710	24
PIT32	0.53	60.3	4.45	47.6	0.79	2.4	714	25
PIT33	**0.54**	**63.9**	**4.43**	**51.9**	**0.81**	**2.6**	**720**	**26**
PIT34	0.56	67.6	4.42	56.4	0.83	2.7	724	28
PIT35	0.57	70.5	4.41	60.4	0.86	2.8	726	29
PIT36	0.58	72.0	4.40	62.6	0.87	2.9	727	29
PIT37	0.60	74.2	4.39	66.1	0.89	2.9	728	30
PIT38	0.61	76.5	4.38	69.4	0.91	3.0	728	31
PIT39	0.63	77.6	4.38	71.5	0.92	3.1	728	31
PIT40	0.64	79.6	4.37	74.9	0.94	3.1	727	32
PIT41	0.65	81.0	4.35	76.7	0.95	3.2	726	32
PIT42	0.67	83.4	4.34	80.9	0.97	3.3	725	33
PIT43	0.68	84.1	4.34	82.4	0.98	3.3	725	33
PIT44	0.70	84.6	4.33	83.6	0.99	3.3	724	34
PIT45	0.76	87.4	4.32	90.3	1.03	3.4	721	35
PIT46	1.25	94.8	4.30	118.6	1.25	3.7	702	37

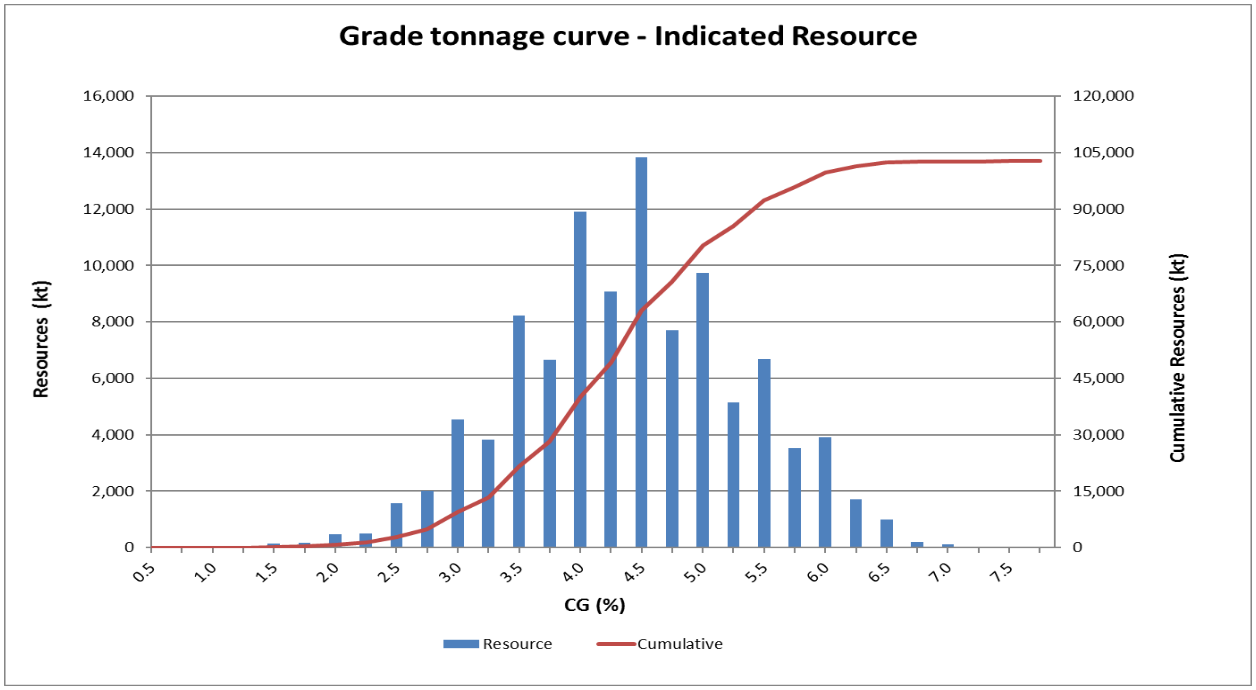
Figure 15.2 – Pit Optimization Results



Using the economic parameters presented in Table 15.1, the open pit cut-off grade was estimated at 2.20 % Cg. The cut-off grade is used to determine whether the material being mined will generate a profit after paying for the processing, transportation and General and Administration costs. Material that is mined below the cut-off grade is sent to the waste dump.

Figure 15.3 presents a histogram of the grades and tonnage of the Indicated Mineral Resources contained within the entire resource model. The histogram shows that the Tony Block contains very little tonnage below the cut-off grade of 2.20 % Cg.

Figure 15.3 – Grade Tonnage Curve



15.2.2 Open Pit Design

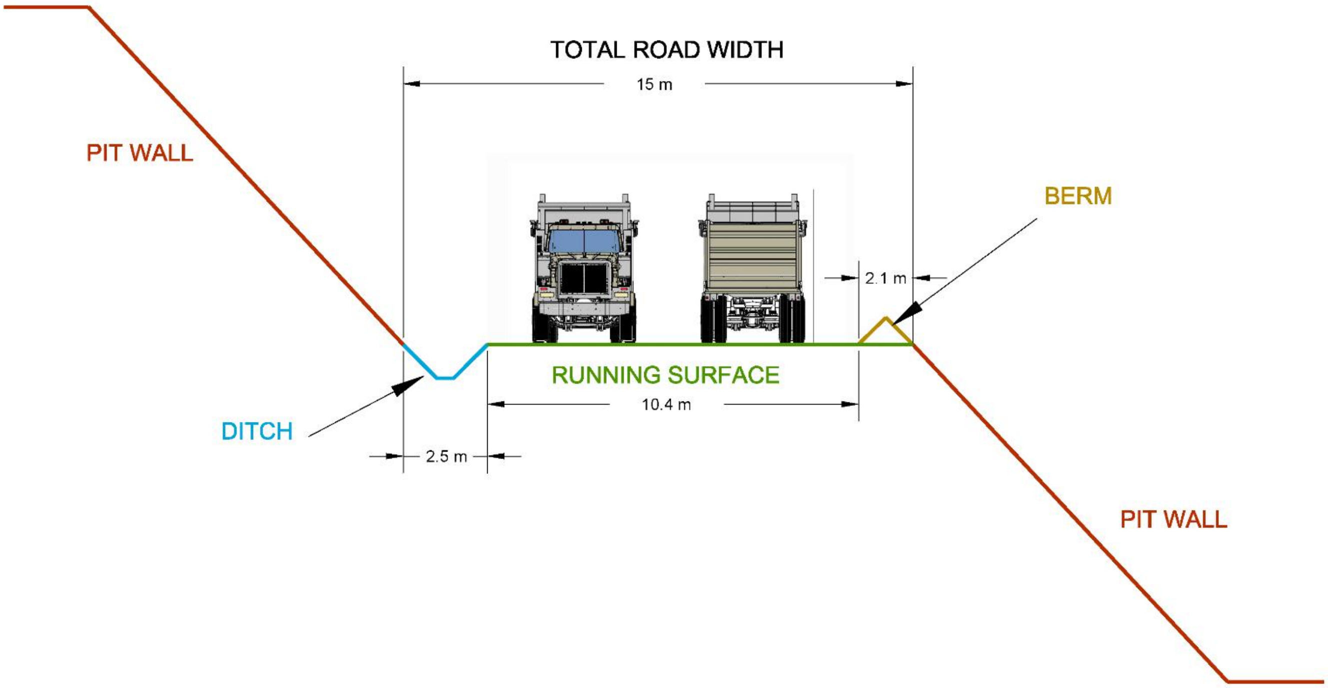
The next step in the Mineral Reserve estimation process is to design an operational pit that will form the basis of the production plan. This pit design uses the pit shell as a guideline and includes smoothing the pit walls, adding ramps to access the pit bottom and ensuring that the pit can be mined using the initially selected equipment. The following section provides the parameters that were used for the open pit design and presents the results.

15.2.2.1 Haul Road Design

The ramps and haul roads were designed with an overall width of 15 m. For double lane traffic, industry practice indicates the running surface width to be a minimum of three (3) times the width of the largest truck. The overall width of a 40-ton (36.3-tonne) haulage truck is 3.25 m which results in a running surface of approximately 10 m. The allowance for berms and ditches increases the overall haul road width to 15 m.

A maximum ramp grade of 12 % was considered for the FS. This grade is acceptable for a smaller sized 36.3-tonne haul truck. Figure 15.4 presents a typical section of the in-pit ramp design. A minimum mining width of 22 m was considered for the open pit design. This is based on a 10 m turning radius for a 36.3-tonne haul.

Figure 15.4 – Ramp Design



15.2.2.2 *Mine Dilution*

In every mining operation, it is impossible to perfectly separate the ore and waste, as a result of the large scale of the mining equipment and the use of drilling and blasting. In order to account for mining dilution, MC-DRA assign a diluted Cg grade value for each block of ore that neighbors a waste block.

The mining dilution was estimated at 5 %, meaning that for each five (5) m wide block of ore, 0.25 m of the neighboring waste block was included as dilution. A Cg grade of 0 % was used for the waste. The addition of mining dilution resulted in lowering the Cg grade of the Mineral Reserves from 4.42 % to 4.35 %.

The gain in tonnage that results from including the 0.25 m wide slice of waste was not included in the Mineral Reserves in order to remain conservative with the methodology of applying mining dilution.

15.2.2.3 *Mining Recovery*

A mining recovery of 97 % was considered for the FS and was used to quantify ROM feed tonnage to the crusher. A value of 97 % was demonstrated based on an average volumetric offset from the ore/waste contact.

15.2.3 Open Pit Design Results

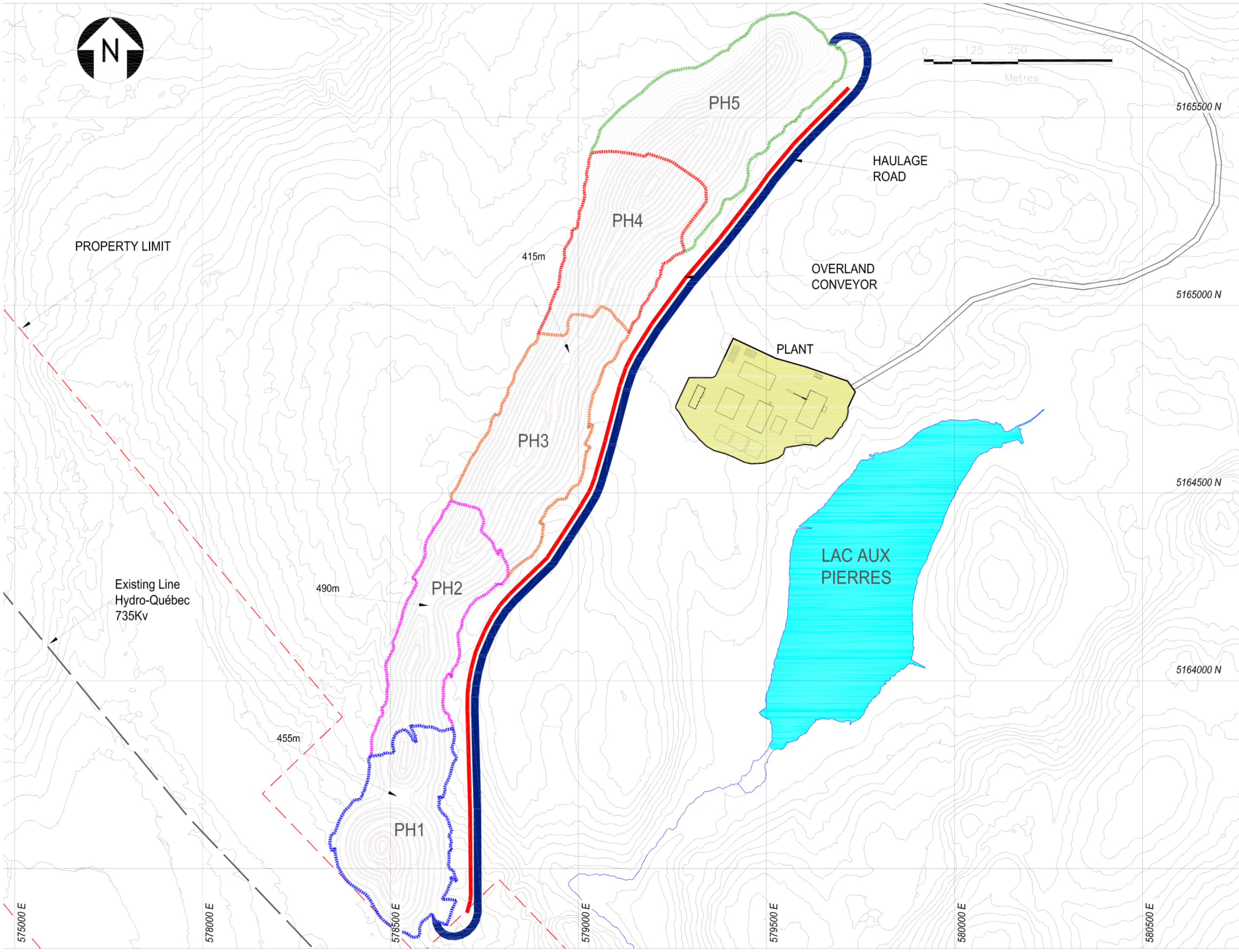
The pit designed for the Tony Block consists of five (5) phases of varying size and grade. The ultimate pit (all phases combined) is approximately 2,600 m long and 380 m wide at surface with a maximum pit depth from surface of 235 m. The total surface area of the pit is roughly 680,000 m^2. The overburden thickness varies along the strike of the orebody increasing in thickness towards the North. For Phases 1, 2 and 3 of the Project, overburden thickness is on average five (5) m ranging between 0 to 15 m in thickness. In Phases 4 and 5 overburden thickness increases and varies between 10 and 38 m.

There are multiple ramps which facilitate access to the pit over the duration of the Mine life. All ramp access for the pit are designed on the hanging wall (East wall) of the pit at different elevations and positioned to optimize distance to surrounding co-disposal locations, reduce in-pit haulage as well as allowing access to the in-pit crushing and conveying system. The deepest part of the open pit is located in Phase 5 at an elevation of 305 m.

The open pit is limited by Hydro-Québec property limits south of the Property.

Figure 15.5 presents the open pit design for the Tony Block.

Figure 15.5 – Open Pit Design



15.2.4 Open Pit Mineral Reserves Estimate

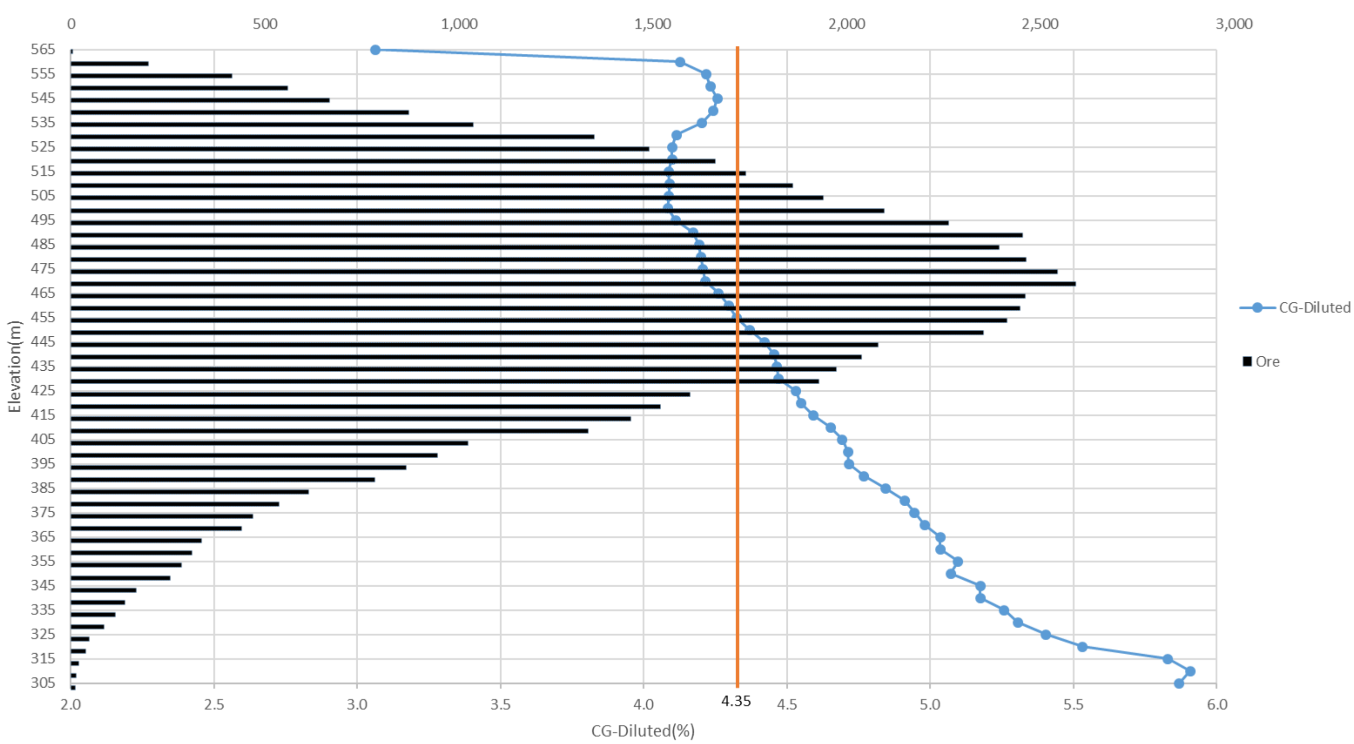
The open pit design includes 59.8 Mt of Probable Mineral Reserves at a diluted grade of 4.35 % Cg. In order to access these reserves, 13.2 Mt of overburden and 50.0 Mt of waste rock will need to be removed. This results in a stripping ratio of 1.06 to 1 (waste/ore). Table 15.3 presents the open pit Mineral Reserves for the Tony Block.

Table 15.3 – Open Pit Mineral Reserves

Category	Tonnage (Mt)	Cg Grade (%)
Proven	0	0
Probable	59.8	4.35
Proven & Probable	59.8	4.35

In addition, Figure 15.6 Figure 15.6 – Grade/Tonnage by Bench presents the pit design as a distribution of tonnage and grade by 5 m elevation (benches). As seen, the average grade increases with depth with low grade concentrated primarily on the upper benches.

Figure 15.6 – Grade/Tonnage by Bench



16.0 MINING METHODS

16.1 Open Pit Mining

16.1.1 Mine Design Methodology

The mining method selected for the Matawine Project will consist of an open pit truck and shovel operation considering an all-electric mining fleet. In addition, an in-pit crushing and conveying system will supply crushed ore to the concentrator.

The use of electric equipment for drilling, loading and hauling operations will minimize carbon emissions over the duration of the mine life. This incentive aligns directly with NMG's low environmental impact initiative. The design and implementation of an all-electric mining project is an opportunity to reduce the environmental impact on the community of Saint-Michel-des-Saints.

This incentive is also the main driver for minimizing the visual impacts and footprint of waste stockpiles on-site hence promoting the backfilling of waste and tailings material in-pit. As a result, the mine sequence and the methods used to extract and transport material are strategic as to mitigate and minimize environmental and social impacts on the surrounding communities. This was achieved by incorporating the following aspects into the FS methodology:

- Maximize backfilling of waste and tailings in-pit;
- Progressive reclamation of waste stockpiles;
- Minimizing volume of Ex-Pit dumps;
- Minimize haulage distance through use of in-pit crushing and conveying systems;
- Maximize haulage in-pit by conserving access between phases throughout the LOM when possible or practically achievable;
- Working schedule of mining and crusher reduced to mitigate sound and dust pollution;
- Design of haulage routes to consider placement of battery charging stations to increase productivity and higher efficiency haulage.

16.1.2 Open Pit Mining Method

The haulage fleet will consist of 36.3-tonne battery powered haul trucks which will need to be recharged at dedicated fast charging stations every cycle between 0.3-7 minutes depending on haulage demands (distance and grade of haulage profile). The impact on truck productivity associated with charging the haulers will potentially result in productivity losses between 7.8 and 20 % in comparison to diesel equipment of the same payload capacity.

This loss in productivity is due to the limitation in autonomy of these vehicles. The battery chosen has to be smaller than required to operate a full shift so that payload capacity is not affected. In order to make up for this, the trucks require a charge as part of the haulage cycle which results in the productivity loss. The battery technology employed has a high cycle life combined with the ability for fast charging (3C charge rate depending on State of Charge ("**SOC**")). This combination allows for an optimized run time vs charge time ratio of the equipment where charging can occur over breaks, lunch and shift change as much as feasible.

Material movement will be managed by a loading fleet consisting of fully electric hydraulic shovels (connected by cable reel) and battery powered loaders. Electric cable powered dozers will also be used to build and manage the co-disposal dump.

Both the crushing, conveying of ore to the plant as well as the operation of the pit itself will consider different operating schedules to reduce dust and noise pollution to the surrounding community of Saint-Michel-des-Saints.

Vegetation, topsoil, and overburden will be stripped and stockpiled separately for future reclamation use. The ore and waste rock will be mined considering five (5) m high benches, drilled, blasted and loaded into fully electric haul trucks by excavators and wheel loaders.

For a smooth-running operation, it is planned to blast the ore and waste rock approximately twice a week at 18,322 m^3 per blast. This equates to an approximate 55 m×55 m square pattern, twice a week considering a 4.25 m burden and spacing and a bore hole diameter of 140 mm (5.5 inch).

Dedicated equipment for the manipulation of the Potentially Acid Generating ("**PAG**") tailings is required to assure no contamination on-site. For the feasibility, considerations for batch loading of Non-Acid Generating tailings ("**NAG**") and PAG tailings from the concentrator to the co-disposal dump allows for use of one loader which will need to wash its bucket between batches. In addition, a 72-tonne capacity trailer was considered for the NAG haul which allows for larger payload/volumetric capacity for the truck. For the NAG haul, it is assumed that battery charging will occur while being loaded at the plant.

Support and auxiliary equipment such as graders service equipment will use a battery technology which uses higher energy density to increase its autonomy (lower charge rates supported over breaks and on cross shift).

16.1.3 Geotechnical Pit Slope Parameters

Journeaux Assoc. ("**Journeaux**") performed a geotechnical analysis of the Tony Block property to evaluate the pit slope design recommendations for the open pit mine located West of *Lac aux Pierres*, six (6) km Southwest of the community of *Saint-Michel-des-Saints*, *Québec*.

MC-DRA provided Journeaux with delineated pit limits as well as drill core information seen in Figure 16.1 below to assess the structural geologic features of the rock formation that will affect the stability of the ultimate pit walls of Tony Block Deposit.

The results of the geotechnical pit slope parameters estimated by Journeaux can be seen in the following Figure 16.2. The report recommends an overall pit slope of 55° for the West wall (hanging wall) and an overall pit slope of 60° for the East wall (foot wall). The 55° slope is achieved with ten (10) m bench heights, a bench face angle of 75° and a seven (7) m wide catch bench per two (2) benches. For the 60° slope, the catch bench is 6.2 m wide.

Figure 16.1 – Pit Limits and Drill Holes

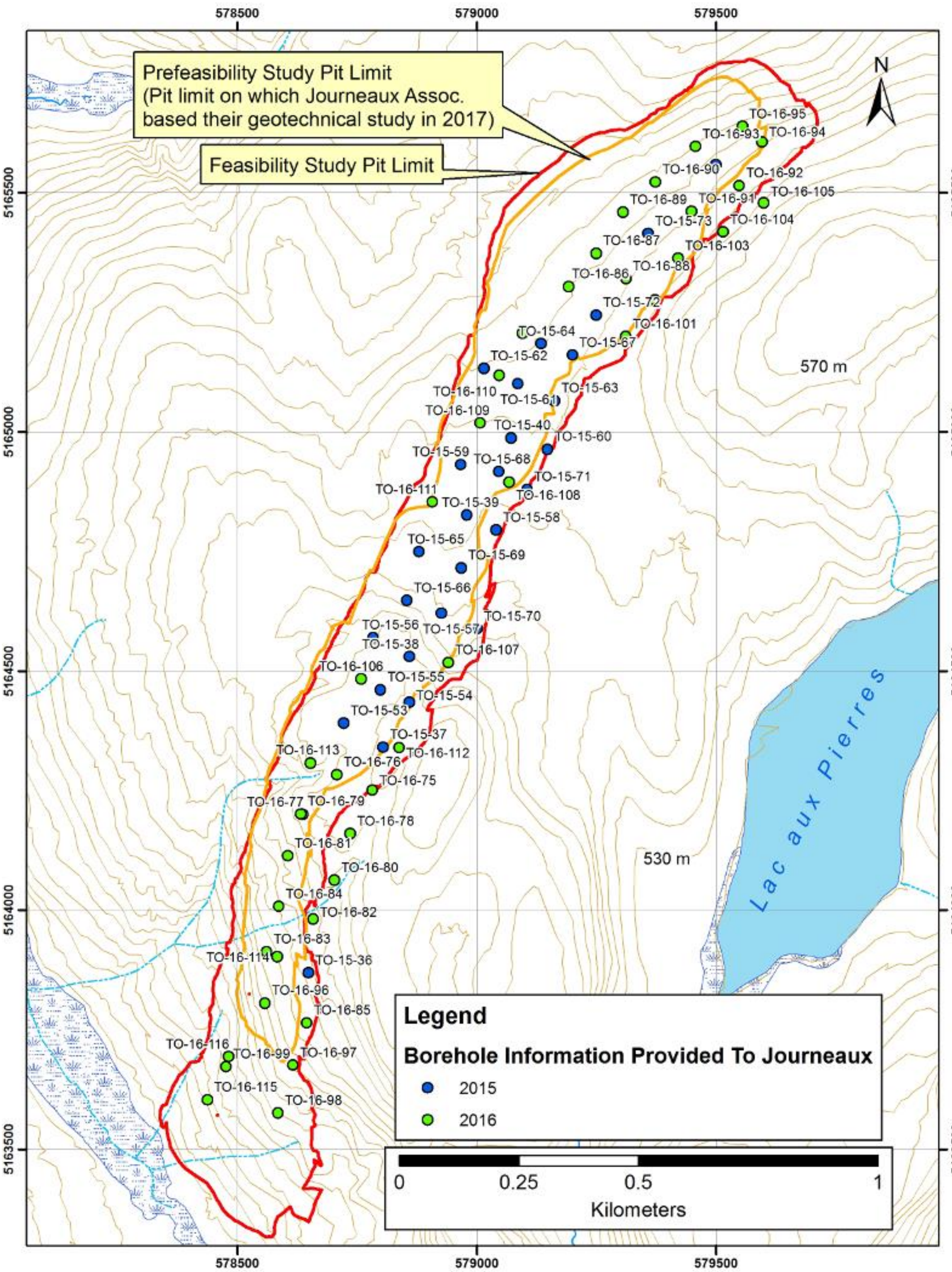
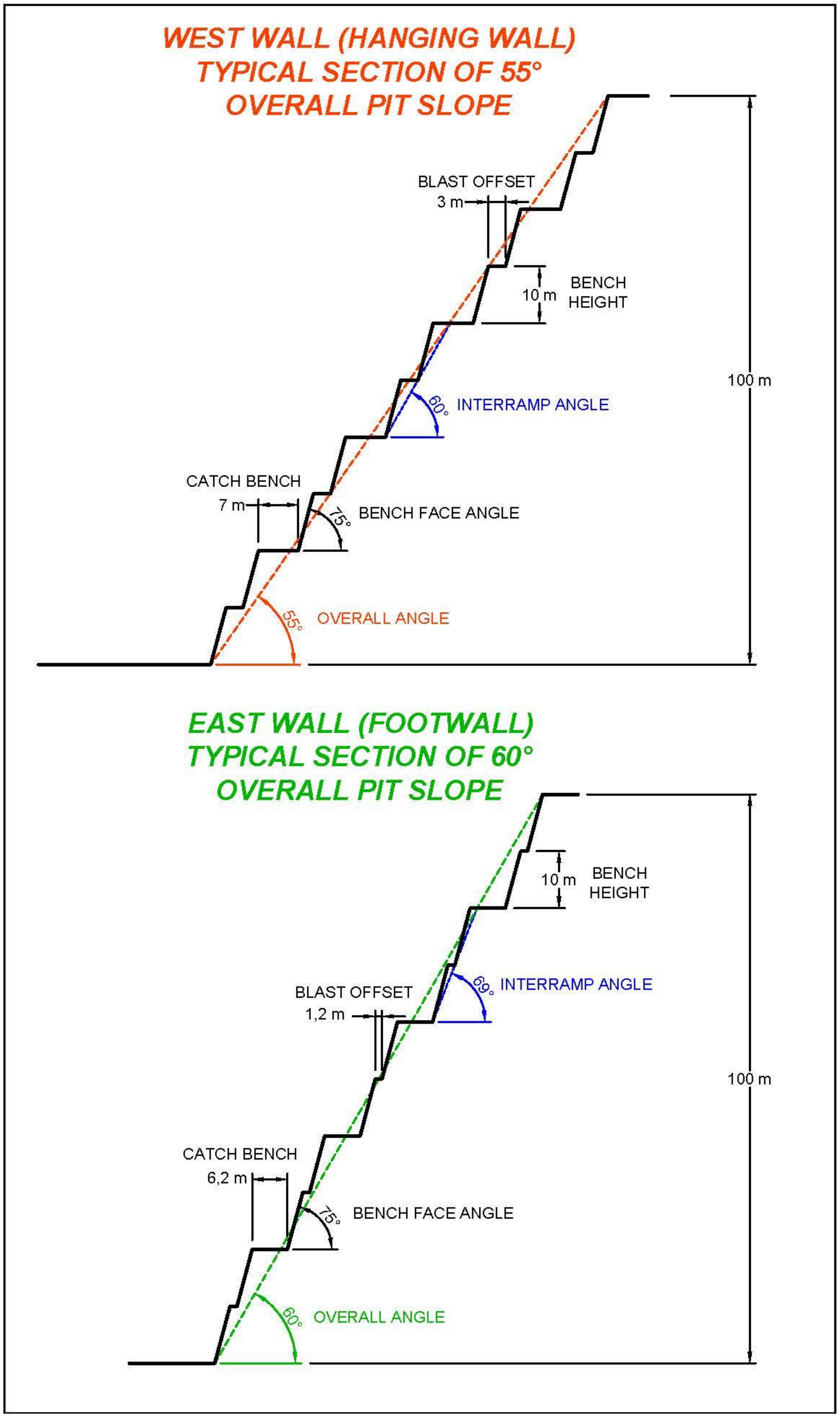
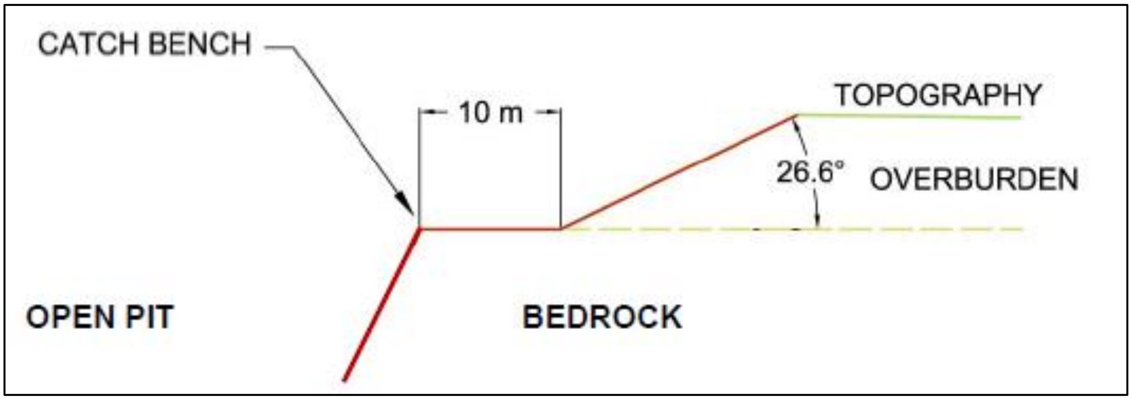


Figure 16.2 –Wall Sections of Proposed Tony Block Pit Walls



The recommended slope through the overburden formation is 26.6° with a ten (10) m wide catch bench at the contact between the overburden and the bedrock. The pit wall configuration is presented in Figure 16.3.

Figure 16.3 – Pit Wall Configuration



Maintaining ramp access on the East side of the pit will allow for an inter-ramp angle of 60° to be considered on the West side of the pit allowing for a steeper wall in dry conditions.

In addition, Journeaux recommends blasting a free face perpendicular to the pit wall to avoid back-break and widening the joint systems parallel to the pit slope. Pre-shearing techniques and scaling are recommended to reduce risks of local failures.

For the FS, MC-DRA considered five (5) m high mining benches to allow for selective mining. Pre-shear drilling and blasting was considered over a ten (10) m vertical separation to minimize rock falls. Journeaux recommends a 75° face angle with an allowance for blast offsets between safety berms every 20 m height.

Journeaux's geotechnical recommendations were followed for the FS.

16.1.4 Hydrogeology and Hydrology Parameters

Please refer to section 20.1.1.8b of this Report for the hydrogeology in the pit area. This hydrogeology study is ongoing. Potential water sources that affect the mining operation are surface run-off, rainfall, snowmelt, and groundwater. Additional information will be required and included in the next phase of the Project.

16.1.5 Property Limits

For the FS, the property limits have been extended South West of the pit. This property extension was considered and is included in the Mineral Resource and Reserve sections of this Report. Planning and scheduling of the pit will commence in Phase 1 located in this extension zone.

16.1.6 Phase Design

The ultimate pit design consists of five (5) phases of production to assure a consistent feed grade for the entire 26-year mine life of the Project. The initial starter pit (Phase 1) was designed at the south most extension closest to the Hydro-Québec property boundaries. Phase 1 will supply the majority of the run of mine ("**ROM**") ore for the first four (4) years of the operation and will be mined to completion to allow in-pit backfilling of waste and tailings (PAG and NAG). Mining will commence in Phase 1 and progress toward the north reaching Phase 5 (see Figure 15.5). This mining sequence will help minimize the project's environmental footprint as the disposal of waste, PAG and NAG tailings can commence backfilling in-pit as early as Year 5 of production. The driving factor for the mining sequence is the progressive reclamation of the site while minimizing environmental footprint and assuring a consistent feed grade (Cg %) to the mill. This involves maximizing the backfilling of waste and tailing in-pit and minimizing the size of any external co-disposal stockpile.

Due to the configuration of the pit, starting in the south extension will also minimize overburden ("**OB**") removal as the majority of overburden is located in Phases 4 and 5 (as seen in Table 16.1). Phase 2 consists of an extension of Phase 1 to the north and will be mined in majority between Years 2 and 8 of the operation. Phase 3 consists of a high-grade zone which will be blended with a Phase 4 (located north of Phase 3) as to facilitate a consistent Table 16.1 summarizes the mine reserves by phase.

Table 16.1 – Mine Reserves by Phase

Description	Unit	Phase 1 (PH1)	Phase 2 (PH2)	Phase 3 (PH3)	Phase 4 (PH4)	Phase 5 (PH5)	TOTAL
Resources (Indicated)	kt	8,094	7,918	15,492	10,304	18,047	59,855
Cg Grade	%	4.27	4.17	4.38	4.13	4.79	4.42
Cg Grade (diluted)[1]	%	4.18	4.11	4.30	4.06	4.73	4.35
Waste	kt	8,468	6,704	12,263	6,497	16,029	49,962
OB	kt	540	743	1,381	3,004	7,554	13,222
SR (w/o)	t/t	1.11	0.94	0.88	0.92	1.31	1.06

1 Diluted grade based on 5 % volumetric dilution 0.25 m
* Totals may not add up due to rounding

16.1.7 Stockpile Design

Please refer to Section 18.12 – Tailings and Waste Rock Storage Facility for stockpile design and co-disposal design of this Report.

16.1.8 Mine Planning

The following Section discusses the mine plan that was prepared for the open pit for the FS. This mine plan forms the basis of the mine capital and operating cost estimate presented in Section 20.1. The mine plan was established quarterly for the first year of production and then annually until Year 15 of production. The schedule is then divided into five (5) year increments for the remainder of the mine plan. The current proposed mine plan considers a total of approximately 26 years of production considering 100,000 tonnes per year of ROM feed to the mill.

16.1.8.1 Mine Planning Parameters

1. Work Schedule

   Mining operations for the Project will be 51 weeks per year, operating five (5) days per week on a two (2) shift per day basis, eight (8) hours per shift. This results in a 16-hour work day for the mining operations. One (1) week closure was considered accounting for adverse weather conditions.

   The Matawinie Project will incorporate the use of an in-pit crushing system. This comprises of a jaw and gyratory crusher in series to achieve a desired particle size for secondary crushing at the concentrator. These crushers will be semi-mobile and are planned to move annually after the completion of Phase 1 in Year 5 of the mine plan. In addition, the concentrator will be fed from a series of overland conveyors from the in-pit crushing system. The crushed ore will be stockpiled on a secondary ore stockpile located at the plant as to facilitate a 24-hour per day, seven (7) days per week plant operation.

   The primary in-pit crusher will operate on a 12-hour per day work schedule to assure minimal dust and noise disturbance to surrounding communities. As a result, there will be a blasted ore stockpile consisting of approximately four (4) hours of ore production located near the in-pit crusher as the mine will operate on a 16-hour per day basis. This material will be re-handled the following day by a wheel loader at the beginning of the shift.

   The mine fleet, crushing system and manpower will be contracted and will abide to these work schedules.

2. Annual Production Requirements

   The mine plan is based on an annual production of 100,000 tonnes of concentrate. The production in Year 1 was limited to 75,000 tonnes of concentrate (75 % of full production), to account for start-up and commissioning.

3. Mill Recovery and Concentrate Grade

   The following calculation is used to determine the amount of concentrate that is produced from the run of mine ore. The mill recovery is 94 % and the concentrate grade is 97 %.

$$\text{Concentrate Tonnes} = \frac{\text{Run of Mine Ore (t)x CG Grade diluted (\%) x Mill Recovery (\%)}}{\textit{Concentrate Grade}\ (\%)}$$

16.1.8.2 Mine Production Schedule

Table 16.1 and Figure 16.4 present the mine production schedule that was developed for the 26-year life of the open pit mine. This schedule includes a pre-production phase of five (5) months which is required for pit development. During this period, 343 kt of overburden and 790 kt of waste rock will be mined. A total of 133,000 tonnes of ore will also be stockpiled during pre-production. This ore stockpile has an average diluted grade of 3.6 % Cg and will be processed between Years 3 and 8 of the mine plan.

The total material mined annually during the 26-year mine life ranges from 3.9 Mt to a maximum of 5.7 Mt which occurs during periods of elevated stripping between Year 16 and Year 20. Figure 16.3 presents a chart showing the tonnages mined each year. The average annual diluted grade of Cg varies between 4.14 % to 5.25 % during the 26-year period.

Figure 16.5 to Figure 16.8 illustrate the pit, waste pile, and overburden stockpile advances as of Year 3, Year 10, Year 15, and Ultimate Pit respectively.

Table 16.2 – Mine Production Schedule

	Mill feed	CG (in-situ)	CG (Diluted)	*PH1*	*PH2*	*PH3*	*PH4*	*PH5*	*Waste Rock*	*Overburden*
	kt	%	%	*kt*	*kt*	*kt*	*kt*	*kt*	*kt*	*kt*
PRE-PROD[1]	0	3.73	3.60	*133*	*0*	*0*	*0*	*0*	890	343
Q1	311	4.25	4.15	*241*	*71*	*0*	*0*	*0*	291	66
Q2	466	4.26	4.15	*305*	*160*	*0*	*0*	*0*	465	132
Q3	467	4.24	4.15	*451*	*17*	*0*	*0*	*0*	552	42
Q4	622	4.21	4.14	*622*	*0*	*0*	*0*	*0*	470	4
Y2	2,483	4.22	4.14	*2,317*	*166*	*0*	*0*	*0*	2,500	126
Y3	2,468	4.26	4.17	*2,447*	*9*	*0*	*0*	*0*	2,580	9
Y4	2,461	4.25	4.17	*1,435*	*989*	*0*	*0*	*0*	2,019	485
Y5	2,479	4.22	4.15	*143*	*1,759*	*571*	*0*	*0*	2,051	306
Y6	2,481	4.22	4.15	*0*	*1,522*	*941*	*0*	*0*	2,155	144
Y7	2,461	4.26	4.18	*0*	*1,333*	*1,103*	*0*	*0*	2,429	281
Y8	2,358	4.42	4.36	*0*	*1,892*	*429*	*0*	*0*	2,275	295
Y9	2,372	4.42	4.34	*0*	*0*	*2,372*	*0*	*0*	2,166	433
Y10	2,485	4.24	4.15	*0*	*0*	*2,485*	*0*	*0*	2,616	0
Y11	2,486	4.23	4.15	*0*	*0*	*2,477*	*9*	*0*	1,826	574
Y12	2,439	4.32	4.24	*0*	*0*	*2,283*	*155*	*0*	1,401	1,101
Y13	2,381	4.42	4.34	*0*	*0*	*1,971*	*410*	*0*	1,532	1,172
Y14	2,481	4.23	4.15	*0*	*0*	*859*	*1,622*	*0*	2,250	761
Y15	2,497	4.22	4.14	*0*	*0*	*0*	*2,497*	*0*	2,488	584
Y16-Y20	11,939	4.38	4.32	*0*	*0*	*0*	*5,612*	*6,327*	10,363	6,365
Y21-Y25	10,756	4.85	4.79	*0*	*0*	*0*	*0*	*10,756*	6,553	0
Y26	964	5.29	5.25	*0*	*0*	*0*	*0*	*964*	91	0
Total	**59,855**	**4.42**	**4.35**	***8,094***	***7,918***	***15,492***	***10,304***	***18,047***	***49,962***	***13,222***

[1] ROM material mined in Pre-Production is Low grade and is stockpiled and fed to mill at later date

Figure 16.4 – Mine Production Schedule

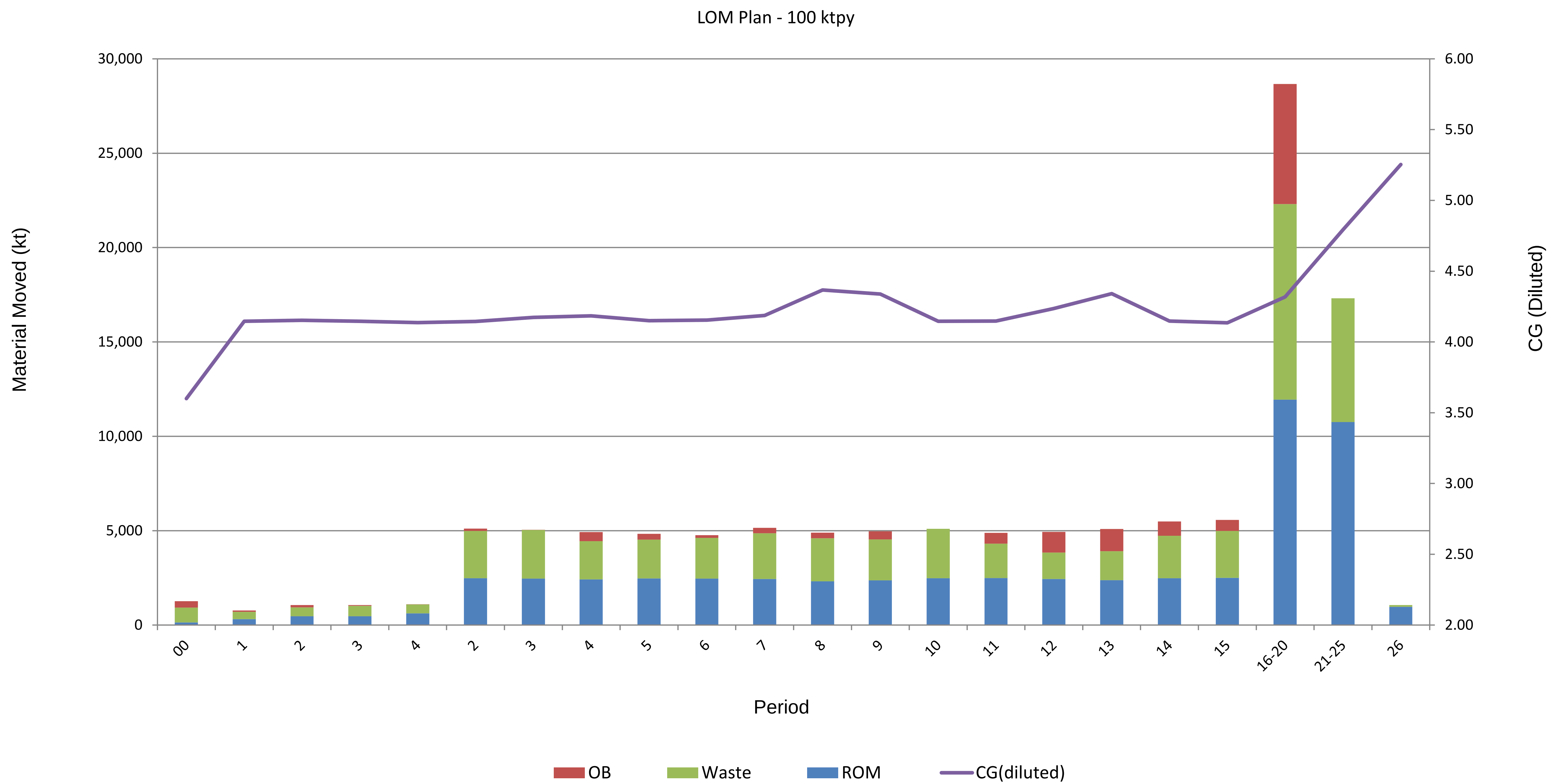


Figure 16.5 – End of Year 3

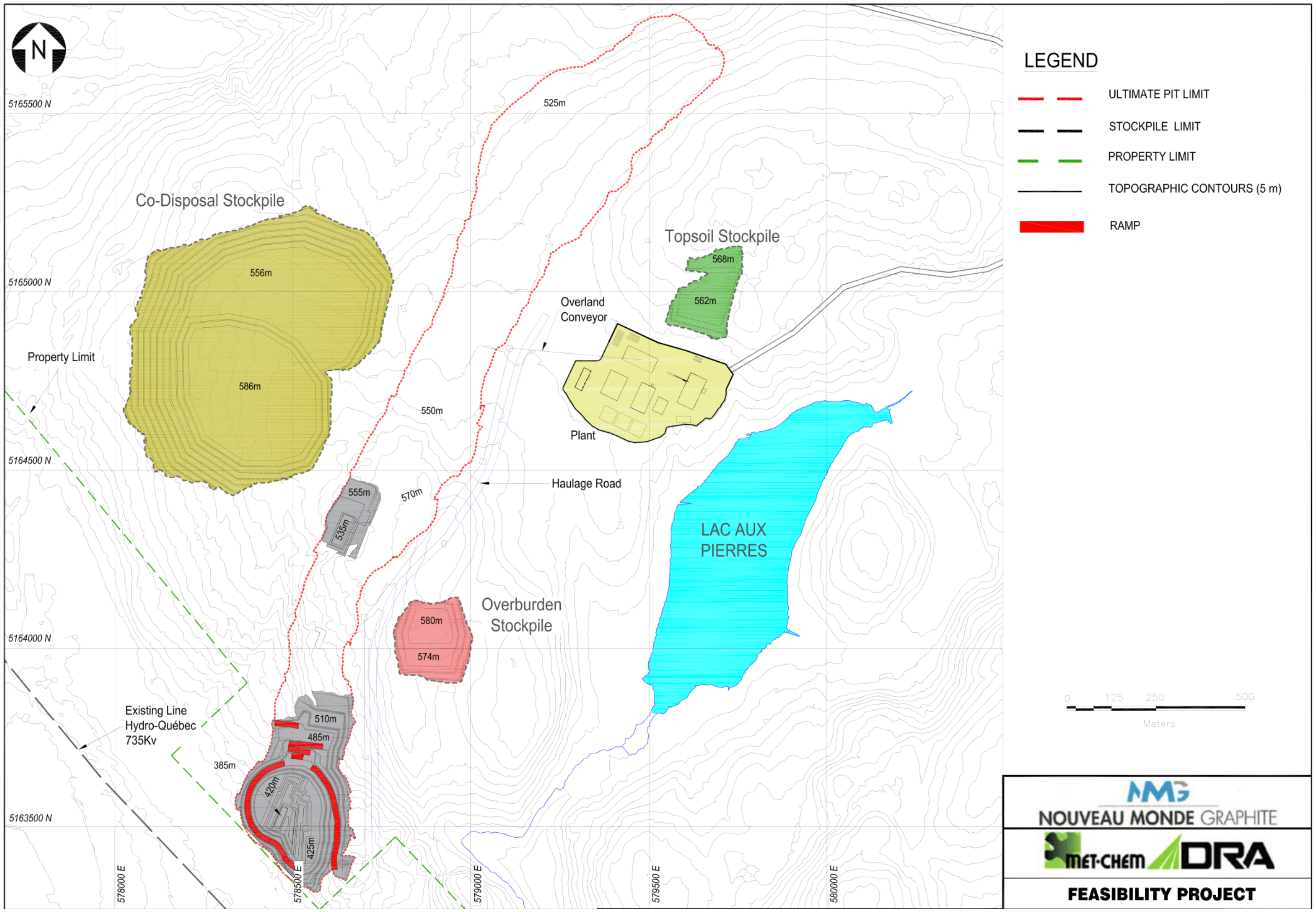


Figure 16.6 – End of Year 10

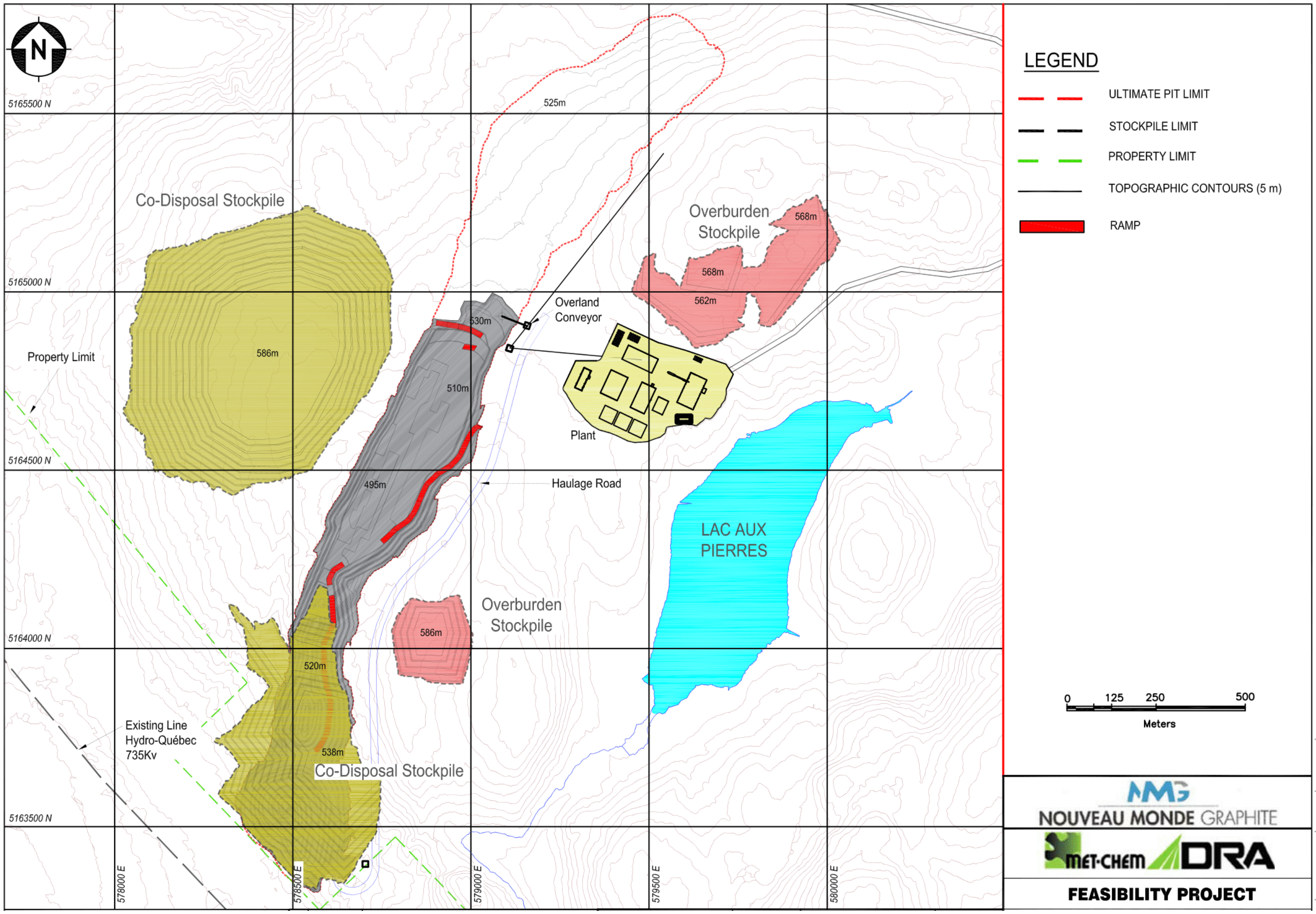


Figure 16.7 – End of Year 15

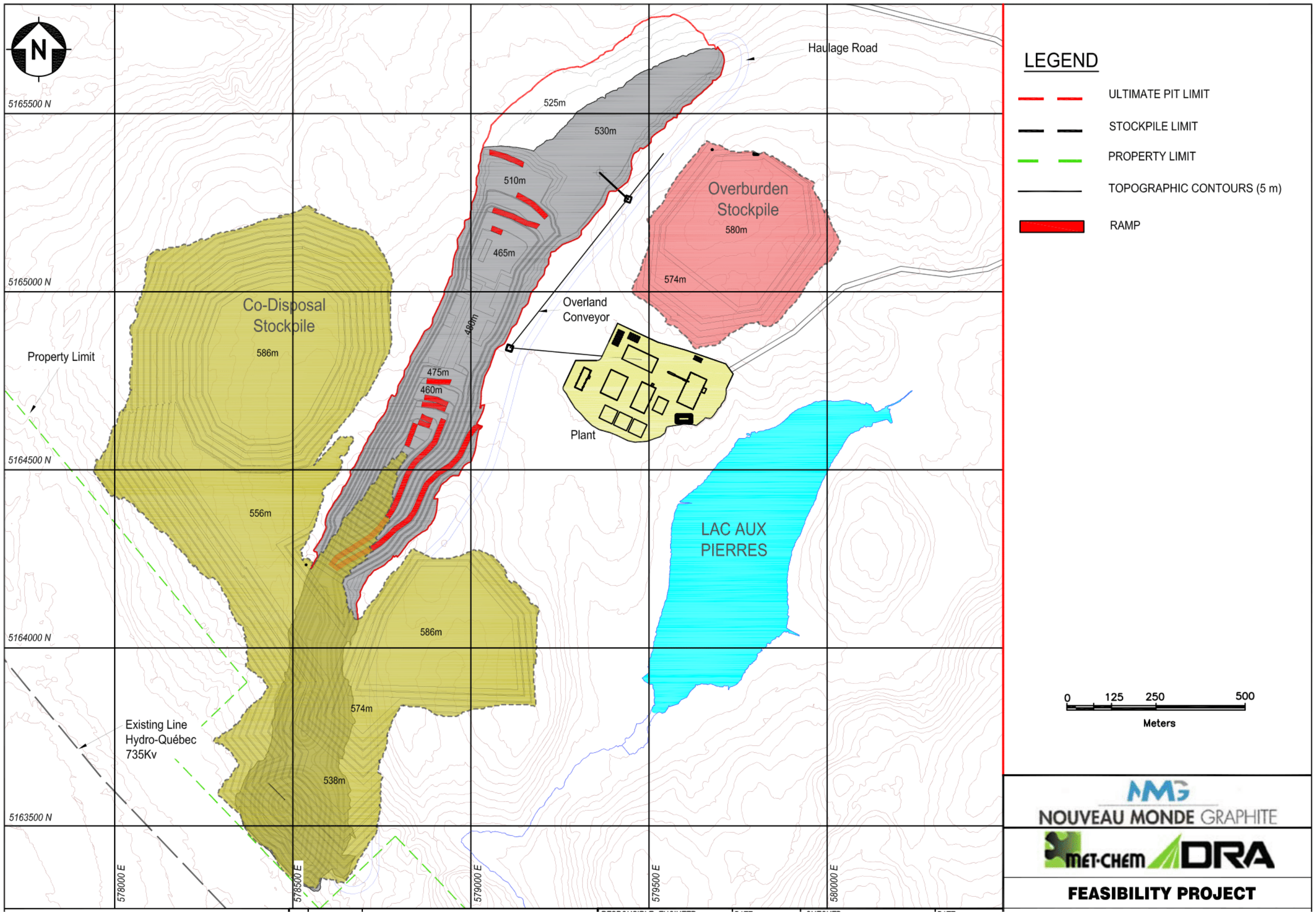
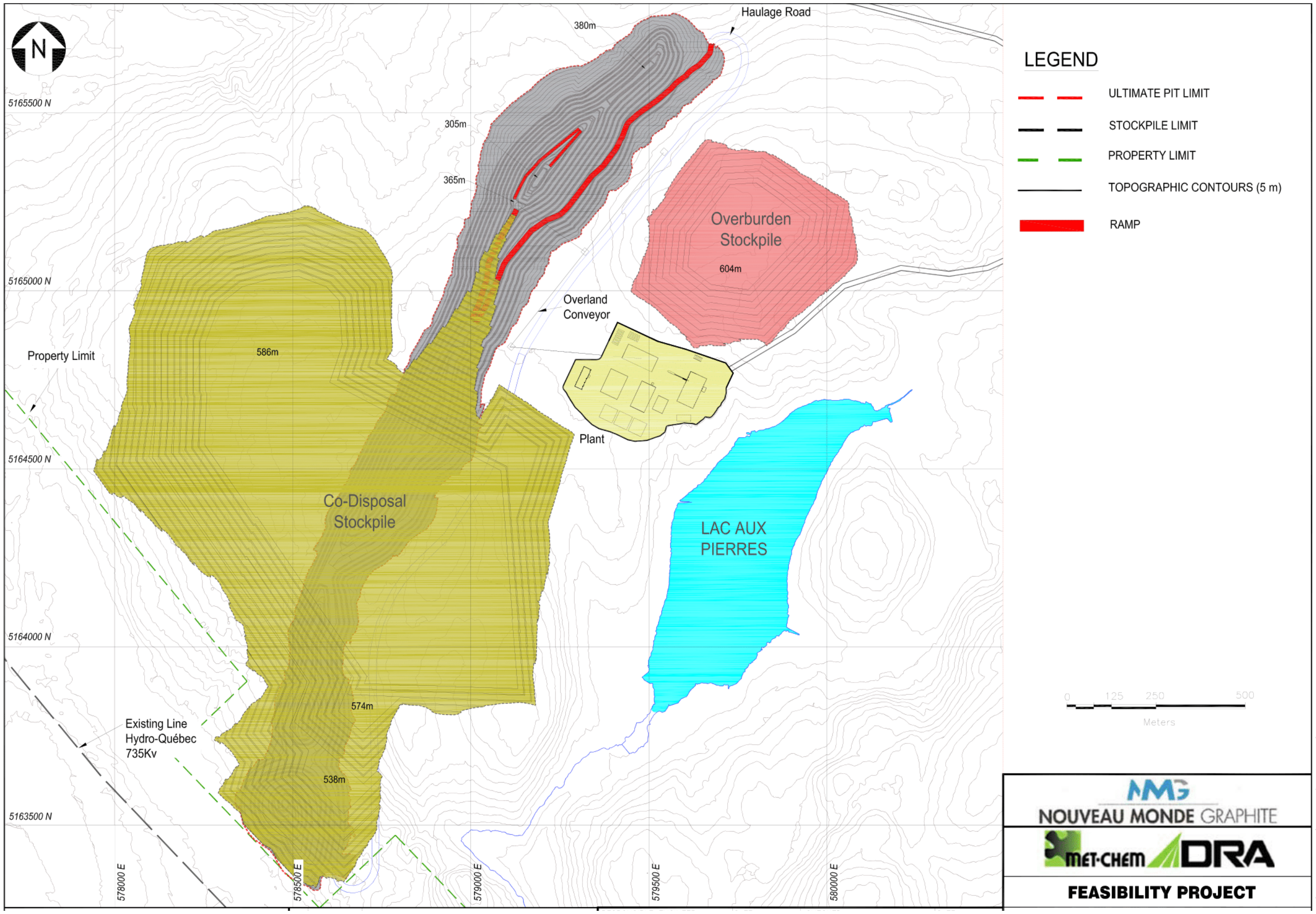


Figure 16.8 – Ultimate Pit



16.1.9 Mine Equipment Fleet

The following Section discusses equipment selection and fleet requirements to carry out the mine plan for the open pit. Although the mine will be operated by a contractor, the following section presents the mine equipment selection and methodology that was used to estimate the fleet requirements and manpower from an owner operated perspective. This provided a basis of estimation for contractor pricing which was subsequently used to evaluate project economics in Section 20.1.

The owner fleet is based on a five (5) day per week, 16-hour per day work schedule (two (2) 8-hour shifts), operating 51 weeks per year. Table 16.3 identifies the mine fleet selected for Year 5 of the mine plan to give the reader an appreciation for the size of the operation. This fleet estimate also accounts for material handling and movement of tailings material from the mill to the co-disposal stockpile.

Table 16.3 – Mining Equipment Fleet (Year 5)

Equipment	Typical Model	Description	Units
Major Equipment			
Haul Truck	Electric – 6900XD	Payload – 36.3 t	11
Hydraulic Excavator	Electric – JD870G	Bucket – 4.2 m^3	2
Production/Pre-shear Drill	Electric - Flexi Roc d60	140 mm/114 mm holes	2
Support Equipment			
Wheel Loader	JD 944		2
Track Dozer	JD 850		2
Road Grader	JD 872G		1
Utility excavator	JD 470G		
Mechanics Truck	F350		2
Service/Boom truck	6900XD		1
Pickup Truck	Ford F250	300 kW	4
Dewatering Pump	HL130M	220 kW	1

16.1.9.1 Haul Trucks

The haul truck selected for the Project is a mining truck with a payload of 36.3 tonnes. This size truck was selected since it matches well with the production requirements and results in a manageable fleet size. The following parameters were used to calculate the number of trucks required to carry out the mine plan. These parameters result in 3,074 working hours per year for each truck as is presented in Table 16.4.

- Mechanical Availability – 90 %;
- Utilization – 90 % (non-utilized time is accrued when the truck is not operating due to blasting, excavator relocation and no operator available);
- Nominal Payload – 36.3 tonnes (23 m^3 heaped);
- Shift Schedule – Two (2), 8-hour shift per day, five (5) days per week;
- Operational Delays – 40 min/shift (this includes 10 minutes for equipment inspection and 30 minutes for lunch);
- Job Efficiency – 95 % (57 min/h; this represents lost time due to queuing at the shovel and dump as well as interference on the haul road);
- Rolling Resistance – 3 %.

Table 16.4 – Annual Truck Hours

Description	Annual Hours	Details
Total Hours	4,335	5-day per week, 16-hour per day, 51 weeks per year
Down Mechanically	434	10 % of total hours
Available	3,902	Total hours minus hours down mechanically
Standby	390	10 % of available hours (represents 90 % utilization)
Operating	3,511	Available hours minus standby hours
Operating Delays	275	40 min/shift
Net Operating Hours	3,236	Operating hours minus operating delays
Working Hours	3,074	95 % of net operating hours (reflects job efficiency)

Haul routes were designed for each period of the mine plan to calculate truck cycle times, productivity and truck requirements.

The truck cycle times are a function of the truck spot time (at loader or excavator), travel time, battery charging time and the time taken to dump material at its destination. In order to estimate average battery charging time, MC-DRA worked with an external firm that specializes in the conversion of diesel mining equipment to electric battery-operated mining equipment. MEDATECH, a company located in Collingwood, Ontario, simulated the average charge time of the trucks. In addition to receiving profiles from MC-DRA, the following parameters were the basis of estimate for these simulations:

- Electric motor – one (1) TM4 HV3500 electric motor (259kW);
- Battery - 1.5C Discharge/3C charge/30 % Depth of Discharge (“**DoD**”);
- Charging station – 540 kW;

- Truck capacity – 36.3-tonnes (40 ton).

MEDATECH estimated the travel time and average charge time per trip by analyzing an 8-hour operating period. The amount of energy required in an 8-hour shift accounting for the different haulage profiles per period for Ore, Waste, OB and Tailings. Based on the length and grade of the haul profile, the charge time and the speed of the motor will yield loses in truck productivity between 7.8 % and 20 %.

Table 16.5 shows the various components of a truck's cycle time. The load time is calculated using a hydraulic excavator with a 4.2 m^3 (9-tonne) bucket as the loading unit. This size excavator which is discussed in the following section loads ore and waste rock in a 36.3-tonne haul truck in five (5) passes, six (6) for overburden.

Table 16.5 – Truck Cycle Time

Activity	Duration (sec)
Spot @ Excavator	30
Load Time[1]	138
Travel Time[2]	Calculated by MEDATECH
Charging Time[2]	Calculated by MEDATECH
Spot @ Dump	30
Dump Time	60

1. Five (5) Passes @ 18 sec/pass.
2. Variable, calculated based on haulage distance

Haul productivities (tonnes per work hour) were calculated for each haul route using the truck payload and cycle time. Table 16.6 shows the cycle time and productivity for the mineralization and waste haul routes in Year 5 as an example.

Table 16.6 – Truck Productivities (Year 5)

Material	Cycle Times (min)						Productivity	
	Spot	Load	Travel	Dump	Charge	Total	Loads/hour	t/hour
Ore (PH1)	0.5	1.5	12.67	1.0	3.34	**19.01**	2.2	132
Ore (PH2)	0.5	1.5	6.18	1.0	1.69	**10.87**	3.8	230
Overburden	0.5	1.8	3.29	1.0	0.92	**7.51**	5.6	334
Waste (PH1)	0.5	1.5	21.6	1.0	5.72	**30.32**	1.4	83
Waste (PH2)	0.5	1.5	9.97	1.0	2.59	**15.56**	2.7	161
Tailings(PAG)	0.0	1.5	8.82	1.0	1.93	**13.25**	3.15	189
Tailings[1](NAG)	0.0	6.0	8.82	1.0	0.0	**15.82**	4.6	275

1 Assume battery will be charged while loaded, use of oversize trailer (72-tonne) no spot as truck will be side loaded at plant by loader.

Truck hour requirements were calculated by applying the tonnages hauled to the productivity for each haul route.

The fleet was estimated based on the haulage profile by material, by mining Phase and by period. For ore haulage, a semi-mobile crushing system was considered as the destination point. This point will move and follow the ore front towards the north to help reduce the trucking requirements for the fleet. The mining source and crusher displacement is summarized in Table 16.7.

Table 16.7 – Mining and Crushing Locations

<table>
<tr><th rowspan="2">Period</th><th colspan="2">Mining Location (Source and bench)</th><th colspan="3">Crusher Location (E, N, elevation)</th></tr>
<tr><th>Source (Phase)</th><th>Active Benches (m)</th><th>E</th><th>N</th><th>Z</th></tr>
<tr><td>**PP**</td><td>PH1/ PH2</td><td>485-540 / 560-565</td><td></td><td></td><td></td></tr>
<tr><td>**Q1**</td><td>PH1/ PH2</td><td>505-515 / 560</td><td rowspan="7">578639</td><td rowspan="7">5163394</td><td rowspan="7">490</td></tr>
<tr><td>**Q2**</td><td>PH1/PH2</td><td>490-495 / 550-555</td></tr>
<tr><td>**Q3**</td><td>PH1</td><td>480-495</td></tr>
<tr><td>**Q4**</td><td>PH1</td><td>455-485</td></tr>
<tr><td>**Y02**</td><td>PH1/PH2</td><td>415-490 / 535-555</td></tr>
<tr><td>**Y03**</td><td>PH1/PH2</td><td>380-460 / 535-540</td></tr>
<tr><td>**Y04**</td><td>PH1/PH2</td><td>355-420 /525-565</td></tr>
<tr><td>**Y05**</td><td>PH1/ PH2/PH3</td><td>320-350 /505-535 /545-570</td><td rowspan="2">578853</td><td rowspan="2">5164393</td><td rowspan="2">570</td></tr>
<tr><td>**Y06**</td><td>PH2 / PH3</td><td>480-510 / 535-565</td></tr>
<tr><td>**Y07**</td><td>PH2 / PH3</td><td>460-495 / 525-560</td><td>578972</td><td>5164594</td><td>550</td></tr>
<tr><td>**Y08**</td><td>PH2 / PH3</td><td>485-475 / 530-550</td><td>579015</td><td>5164814</td><td>540</td></tr>
<tr><td>**Y09**</td><td>PH3</td><td>505-540</td><td rowspan="2">579087</td><td rowspan="2">5164932</td><td rowspan="2">535</td></tr>
<tr><td>**Y10**</td><td>PH3</td><td>490-525</td></tr>
<tr><td>**Y11**</td><td>PH3/PH4</td><td>480-505 / 535-540</td><td rowspan="2">579048</td><td rowspan="2">5164903</td><td rowspan="2">530</td></tr>
<tr><td>**Y12**</td><td>PH3/PH4</td><td>465-490 / 525-530</td></tr>
<tr><td>**Y13**</td><td>PH3/PH4/PH5</td><td>430-465/520-530/525-545</td><td rowspan="3">579362</td><td rowspan="3">5165334</td><td rowspan="3">535</td></tr>
<tr><td>**Y14**</td><td>PH3/PH4/PH5</td><td>405-440/495-515/535-540</td></tr>
<tr><td>**Y15**</td><td>PH4/PH5</td><td>460-500 / 530</td></tr>
<tr><td>**Y20**</td><td>PH4/PH5</td><td>385-485 / 450-530</td><td>578994</td><td>5164901</td><td>415</td></tr>
<tr><td>**Y25**</td><td>PH5</td><td>360-470</td><td>579133</td><td>5165239</td><td>365</td></tr>
</table>

The resulting productivity estimates yield a requirement of six (6) trucks in pre-production, seven (7) in Year 1. This number increases to 11 in Year 2 and fluctuates slightly over the course of the mine plan to reach a maximum of 13 between Years 14 and 20. This number drops to eight (8) by the end of the mine life in Year 26. This estimate includes the movement of tailings, overburden, waste and ore. Initial requirements are elevated due to the Project's mining method and the need to deepen Phase 1 to completion as quickly as possible.

16.1.9.2 Excavators

The main loading machine selected for the Project is a hydraulic excavator with a 4.2 m^3 bucket. The shovel will mine the bench in backhoe configuration and will be powered by a cable reel which will connect to a transformer near the pit limit at a topographical level. The cables will need to be moved by a cable crew at the end of each shift and secured during blasts to avoid damage. The excavators will be placed on top of the muck pile and the haul trucks will be at the bottom of the loading face.

Based on the tonnages in the mine plan, a second excavator will be required to meet production needs starting in Year 1 until Year 21. After Year 21 of the mine plan, the mining front has progressed into Phase 5 and the amount of waste mining decreases.

Two (2) loaders will be used on-site for re-handling tailings material at the concentrator and re-handling ROM at the in-pit crusher. Furthermore, the loaders will also assist operations and the construction of a CSF area. The loader will be versatile and can also be equipped with a dozer attachment for cleanups and road maintenance if required.

16.1.9.3 Drilling and Blasting

For the FS, a contractor was considered for the drill and blast portion of the Project. This is reflected in the Project economics in Section 20.1 of this Report.

Production drilling will be carried out with an electric-powered track mounted down the hole ("**DTH**") drills. Using the following parameters; 85 % mechanical availability, 80 % utilization and a penetration rate of 28 m/h, MC-DRA calculated that two (2) drills are sufficient to complete the drilling requirements for the Project. A second drill will be required starting in Year 1 and should be replaced over the course of the mine life to assure equipment availability. Major repairs will be performed during off hours as to maximize use of this machine during working hours. Table 16.8 presents the drilling and blasting parameters for both production and pre-shear holes that have been designed for the FS. Pre-shear drilling and blasting techniques will be used for the development of the final pit walls and will be completed with the same DTH drills to provide for a flexible operation. The table shows one (1) value for both ore and waste rock since the two (2) rock types have relatively similar densities.

Table 16.8 – Drilling and Blasting Parameters

Parameter	Units	Production	Pre-Shearing
Bench Height	m	6	12
Blasthole Diameter	mm	140	114
Burden	m	4.25	n/a
Spacing	m	4.25	1.8
Subdrilling	m	1.0	0.6
Stemming	m	2.0	0.6
Explosives Density	g/cm^3	1.20	1.37
Powder Factor	kg/t	0.31	n/a
Shear Factor	kg/m^2	n/a	0.61

The blasting will be carried out with bulk emulsion and non-electric detonators for production ore and waste. For wall control work on final pit walls packaged continuous emulsion of 28 mm to 40 mm diameter were used. MC-DRA evaluated the use of either ANFO or bulk emulsion and even though bulk emulsion was costlier, it was considered for the following reasons:

- Performs better under wet loading conditions;
- Produces less residual ammonia;
- Overall better fragmentation.

The bulk emulsion will be transported to the site in 20,000 kg tankers and transferred into a 35,000 kg ISO tanker. This will supply a 12,000 kg re-pump bulk handling trucks which will load the blast holes directly. The size of the blasts is predicted to be based on the maximum load that can be delivered which is about 12,000 kg during most months of the year. In the spring when half load restrictions apply the load per blast will drop to 9,500 kg. Hence the blasting will need to be scheduled more often to maintain the same volume per week. For days when pre-shearing is required this should be planned with a production blast and would require an additional helper to load the blast.

The recommended drill pattern is 4.25 m x 4.25 m for ore when loading bulk gassed emulsion. In waste, the drill pattern will remain the same. In both cases, the recommended drill pattern is a square drill pattern as that will be easier to layout and drill than a staggered drill pattern.

The holes will be loaded and shot approximately twice a week in order to achieve the desired production. Since the load and shoot operation will be contracted, the mine equipment fleet will not include a bulk truck and a powder truck. The mine workforce will also not include a blasting crew.

In order to protect the surrounding infrastructure such as the Hydro-Québec powerline, against rock projections, blasting mats will be installed on the benches before the blasts. In addition, the blasts will be designed to protect the surrounding infrastructure from vibration damages. The particle velocity tolerance is identified for each of them and the vibrations will be monitored to ensure that none of these infrastructures are damaged during the blast. If a risk is identified, the blast design can be modified to reduce the total explosive charges per delay.

16.1.10 Mine Manpower Requirements (Operations)

Owner operated manpower requirements were estimated and range from 50 to 79 over the duration of the mines life, assuming one (1) mechanic for every three (3) pieces or major mining equipment. Table 16.9 shows an example of the mine operator manpower requirement in Year 5 of the Mine Plan. Since the work schedule considers two (2) 8 hour-shifts per day, five (5) days per week, MC-DRA considered two (2) crews (2,168 hour working hours per year per employee).

Table 16.9 – Mine Manpower Requirements (Year 5)

Description	Personnel (Year 5)
Mine Operations	
Pit Foreman	2.0
Truck Operator	22.0
Shovel/Loader Operator	4.0
Drill Operators	4.0
Dozer Operators	2.0
Grader Operator	2.0
Labourer	8.0
Mechanic	7.5
Service - Electric	3.5
Blaster	2.0
Blaster Helper	4.0
Bulk Truck Operator	1
Total Mine Workforce	**62**

The total mine manpower requirements during peak production is expected to reach 70 operators in Years 14 to 20 of the mine plan. Employees designated for cable moving purposes were considered in the laborer category. This basis of estimation serves to provide the reader an example of the number of operators required. Mine salaried staff was not accounted for in this estimate as this was taken into consideration as a mine management cost explained in Section 21.2.5.3 Mine operators' salaries were also accounted for within the mine contractors' unit rates as explained in Section 21.2.1 of this Report.

16.2 Mine Equipment Fleet and Manpower (Mining Contract)

The mining contract whose pricing was used for the cost estimate that is presented in Section 21.1.5 has elected to use a very similar fleet to the one that was presented in this Section of this Report. The contractor chosen for this study has signed a letter of intent with the mine owner and as such was the sole provider of a quotation regarding the operation and maintenance of a fully electric mining fleet. The contractor's workforce includes all the mine equipment operators, a pit foreman to assign objectives to the operators and a surveyor to stake and delineate future excavations. The contractor will also supply the manpower to maintain and service all production and service equipment on-site.

A drill and blast contractor were also considered for this Project. The workforce was included in the unit cost estimates submitted based on the proposed drill and blast parameters stated previously. This includes a Blaster, blaster helpers and an emulsion truck operator.

In order to supervise the contractor and to provide engineering and geology support, the Owner will have the following four (4) personnel as workforce, a Senior mining engineer, a geologist, a surveyor, and a mine planner.

17.0 RECOVERY METHODS

17.1 Mineral Processing Facility Design

The mineral processing facility has been designed to produce 100,000 dry tonnes of graphite concentrate per year. This is increased from the scenario evaluated in the Pre-Feasibility Study which was 52,000 tonnes per year.

The mineral processing facility consists of comminution, beneficiation, dewatering, bagging and tailings processing areas. The mineral processing facility is made up of three (3) principal areas: the in-pit mobile crushing facility, the graphite concentrator building, and the tailings processing facility.

The concentrator is designed to produce a graphite concentrate containing 97 % C(t) ("total carbon") from an ore containing 4.35 % C(t). To achieve this concentration the comminution and beneficiation processes include grinding, conventional flotation, polishing and column flotation. The facility will also perform thickening, filtration, drying, screening, bagging and material handling.

Tailings will be processed to generate two (2) tailings stream, non-sulphide ("NAG") and sulphide ("PAG"). Each stream will be dewatered and filtered to a product containing 17.5 % and 15 % moisture, respectively.

17.1.1 Design Criteria

Graphite quality is measured in flake size and purity. The design of the concentrator takes this into account to avoid degradation of graphite flakes while producing high purity graphite. All throughput rates are based on the production of 100,000 dry tonnes of 97 % C(t) graphite concentrate from a feed grade of 4.35 % C(t). Average weight recovery of 4.2 % and average graphite recovery of 94 % are used for design. These figures are based on lock cycle test work results and may change depending on ore composition.

The concentrator will operate 24-hour per day, 7-day per week, 52-week per year. Operating availability of the concentrator is 92 %.

The concentrator capacity has been established at an average rate of 6,499 dry tonnes per day or a nominal throughput rate of 294.3 dry tonnes of ore per hour. Table 17.1 summarizes the design basis for the crusher, concentrator and shipping facilities.

Table 17.1 – Design Criteria

Plant Capacity		
Parameter	**Units**	**Value**
Total ore processing rate	dry tonnes per year	2,372,235
Average concentrator ore processing rate	dry tonnes per day	6,449
Ore moisture	percentage	5.0
Graphite ore grade	percentage	4.35
Crusher operating time	percentage	30
Nominal ore crushing rate	dry tonnes per hour	916.1
Concentrator operating time	percentage	92.0
Nominal ore processing rate	dry tonnes per hour	294.3
Final graphite concentrate grade	percentage	97.0
Final graphite concentrate recovery	percentage	94.0
Jumbo (+48 mesh) graphite production	dry tonnes per year	14,800
Coarse (–48+80 mesh) graphite production	dry tonnes per year	33,400
Intermediate (–80+150 mesh) graphite production	dry tonnes per year	27,657
Fine (–150 mesh) graphite production	dry tonnes per year	24,143
Total graphite production	dry tonnes per year	100,000

17.1.2 Mass Balance and Water Balance

The process plant mass balance has been calculated based on the developed flow sheet and design criteria previously discussed.

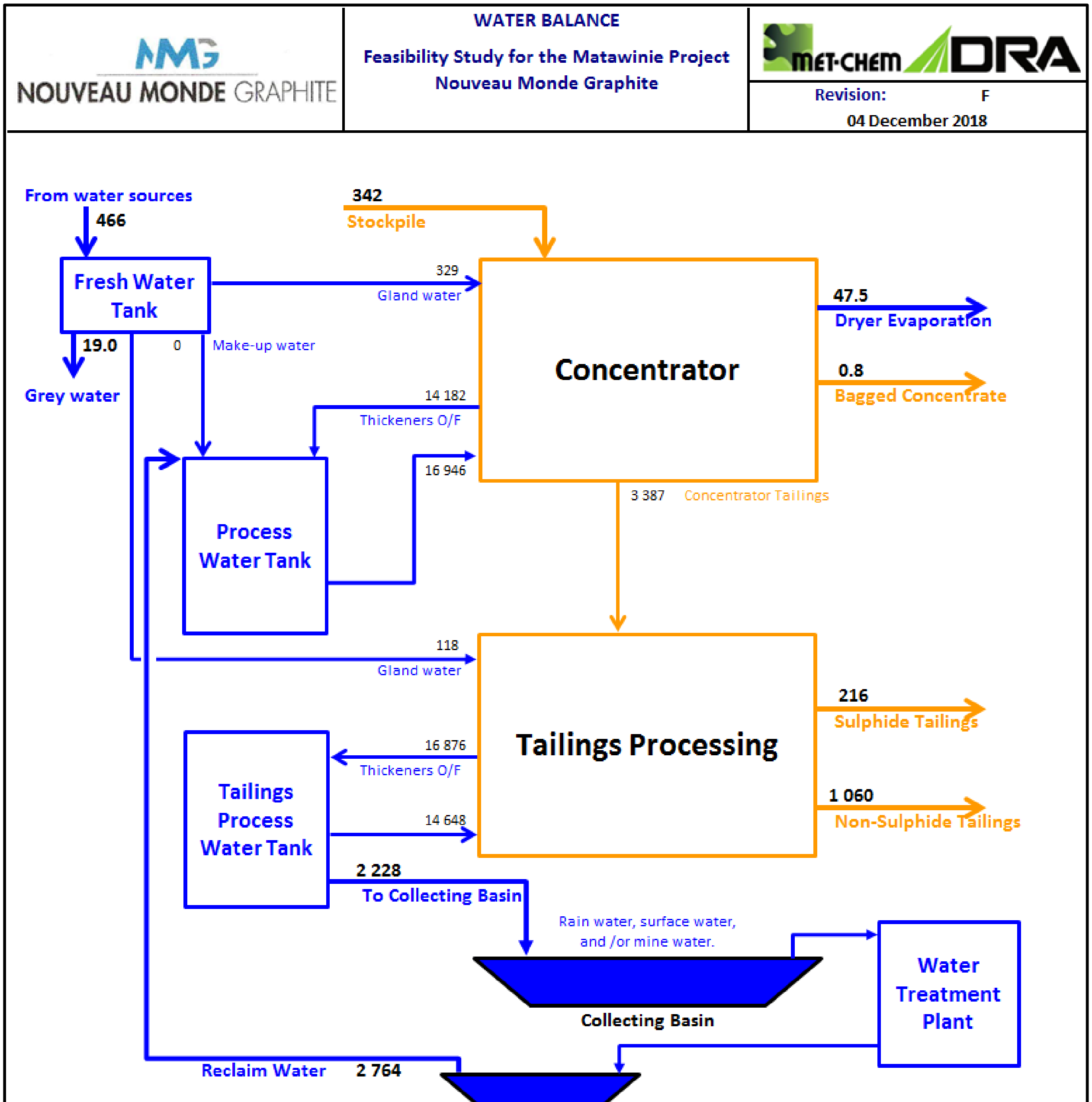
Table 17.2 below shows a summary of the mass balance. Throughput and flow rates are shown in t/d ("**tonnes per day**") and m^3/d ("**cubic metres per day**"). One (1) m^3/d of water is equal to one (1) t/d.

Table 17.2 – Matawinie Concentrator Summarized Process Mass Balance

Mass Entering System				Mass Exiting System			
Streams	**Dry Solids (t/d)**	**Water (m^3/d)**	**Total Mass (t/d)**	**Streams**	**Dry Solids (t/d)**	**Water (m^3/d)**	**Total Mass (t/d)**
Graphite ore to Concentrator	6,499	342	6,841	Grey Water	—	19	19
Fresh water from sources	—	466	466	Water evaporation from Dryer	—	48	48
Reclaim water from surroundings	—	2,764	2,764	Final Concentrate	274	1	275
				Sulphide filter cake	1,226	216	1,442
				Non-sulphide tailings filter cake	4,999	1,060	6,059
				To collecting basin	—	2,228	2,228
Total Entering	**6,499**	**3,572**	**10,071**	**Total Exiting**	**6,499**	**3,572**	**10,071**

Figure 17.1 below shows a more detailed water balance. The polishing basin is not considered part of the processing facility water system and is only added for illustrative purposes.

Figure 17.1 – Water Balance



WATER BALANCE

Area	IN	OUT	DIFF
Concentrator	17 618	17 618	0.0
Tailings Processing	18 153	18 153	0.0
Mill system	3 572	3 572	0.0

17.2 Process Flow Sheet and Process Description

Figure 17.2 shows a simplified flow sheet indicative of the process. The mineral processing facility has seven (7) distinct areas: in-pit crushing, grinding and flotation, polishing and cleaning, graphite concentrate dewatering, screening and packaging, graphite tailings dewatering, and tailings processing.

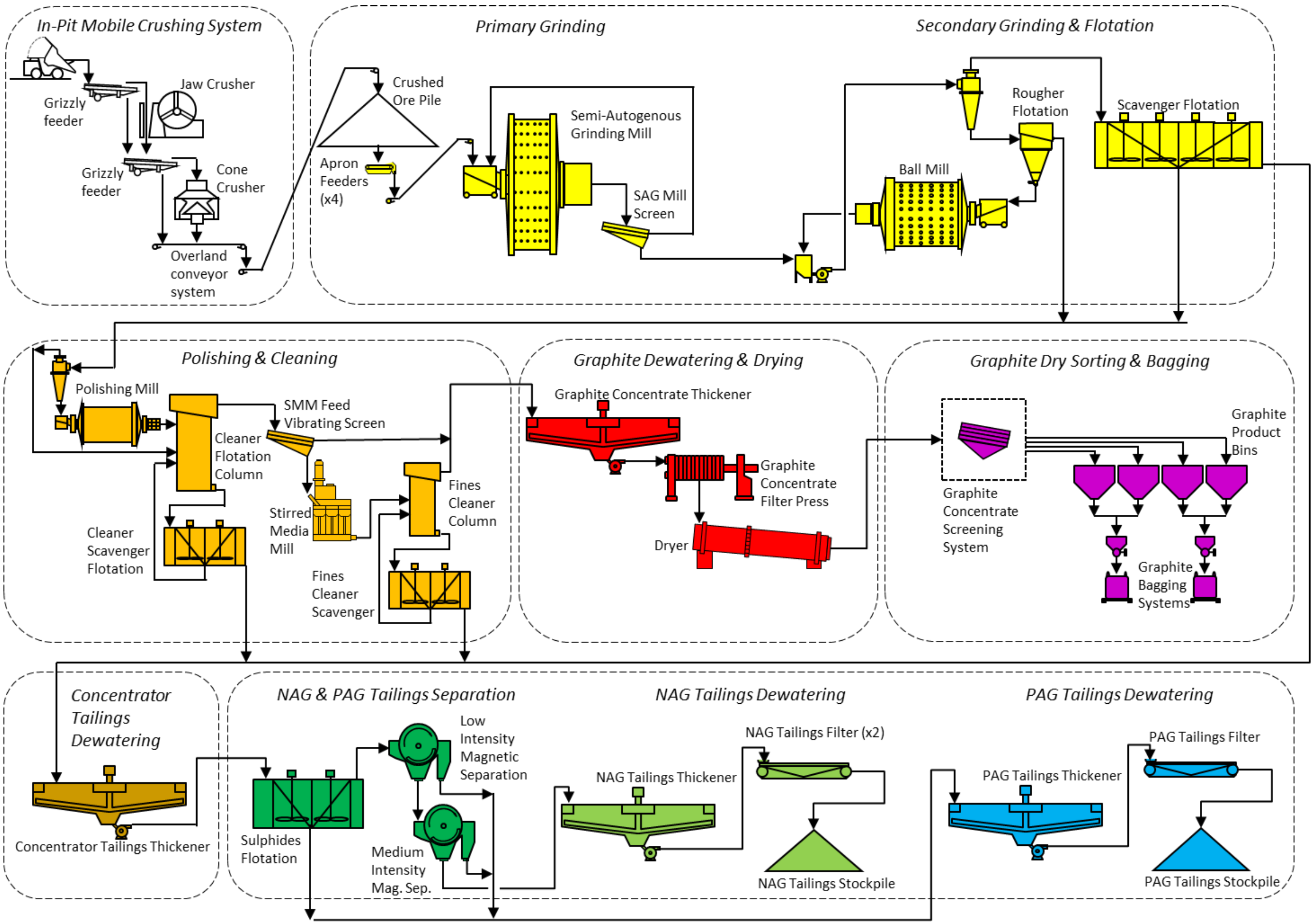
The in-pit mobile crushing facility will operate independent from the rest of the concentrator, using a stockpile to decouple its operations from the rest of the plant. The grinding, flotation and graphite concentrate dewatering area which covers thickening, filtration and drying, and the concentrate bagging area are in the main concentrator building. The concentrate tailings dewatering area, consists of single thickener to remove and recycle water from the concentrator tailings prior to processing at the tailings processing facility. The tailings processing facility consists of sulphide flotation, magnetic separation, and dewatering of two (2) separate tailings streams.

The simplified flow sheet presented below is very general. The following sections describe each area in more detail.

17.2.1 Crushing

Two (2) stages of crushing will be performed in the in-pit mobile crushing facility. The crushed ore is transported from the pit to the concentrator and stockpiled in front of the concentrator building in a dome by a series of overland conveyors.

Figure 17.2 – Simplified Flow Sheet



17.2.2 Grinding and Flotation

Crushed ore is withdrawn from the 21,200 tonnes stockpile using four (4) apron feeders. The apron feeders transfer the crushed ore via a conveyor to a SAG mill. The SAG mill is in closed circuit with a double deck vibrating screen. The SAG mill circuit aims to produce a product with a P_{80} = 0.63 mm. The screen undersize is pumped to the ball mill discharge pump box.

The ball mill operates in closed circuit with the rougher flotation and a set of hydrocyclones. The ball mill discharge is pumped to the ball mill hydrocyclones. The hydrocyclones underflow report to rougher flotation while the overflow proceeds to scavenger flotation. The rougher flotation in closed circuit with the ball mill allows for the removal of large graphite flakes as soon as they are liberated from the ore and helps maintain graphite flake integrity. Fuel oil and methyl isobutyl carbinol ("**MIBC**") are added to the flotation process. There is no modifier required in the flotation process. The rougher flotation circuit consists of a single special coarse flotation cell which provides 2.1 minutes of retention time. The rougher graphite concentrate is expected to contain 76.7 % C(t). The rougher flotation tailings are returned to the ball mill.

The hydrocyclones overflow is expected to have a particle size distribution of 80 % less than (P_{80}) 0.212 mm.

The scavenger flotation circuit consists of four (4) mechanical cells and aims to float the remaining graphite. The four (4) cells will provide 2.5 minutes of retention time.

The scavenger concentrate containing 40.5 % C(t) will be combined with the rougher concentrate and directed to the polishing circuit. The scavenger tails containing 0.18 % C(t) will be directed to the concentrator tailings thickener.

The combined concentrate from the rougher and scavenger circuits is expected to contain 55.6 % C(t) and achieve 96.4 % graphite recovery.

17.2.3 Primary Cleaner Circuit and Secondary Cleaner Circuit

The cleaning of graphite concentrate is done in two (2) distinct phases. The first cleaning phase consists of polishing, column flotation and cleaning-scavenger flotation. The second cleaning phase starts with size classification. The coarse fraction is directed to final concentrate while the fines fraction is upgraded through polishing, column flotation and cleaner-scavenging.

The primary cleaning circuit aims to remove surface contaminants from graphite. The combined concentrate coming from the rougher and scavenger circuits is dewatered using a set of hydrocyclones to control the density inside the polishing mill. The cyclone underflow, which contains the bulk of the graphite concentrate, goes to the polishing mill.

The polishing mill which uses ceramic media, scrubs gangue minerals from the surface of the graphite flakes. The cyclone overflow and the polishing mill discharge are re-combined and pumped to primary cleaning column flotation.

The primary cleaning flotation column is expected to upgrade the rougher and scavenger graphite concentrate to 95 % C(t). The column tailings are directed to a cleaner-scavenger step to recover any remaining graphite. The concentrate of the cleaner-scavenger step is pumped back to the primary cleaner column feed and the tailings report to the concentrator tailings thickener.

The primary cleaner concentrate is dewatered using a second set of hydrocyclones. The cyclone underflow is then screened to separate coarse flakes. The screen oversize is > 0.18 mm and will be directed to final graphite concentrate.

The underflow from the vibrating screen is directed to the stirred media mill for a gentle scrub followed by column flotation. The fine cleaner column concentrate is above 97 % C(t) and is directed to the final graphite concentrate thickener. The tailings of the column are directed to the fines cleaner-scavenger. The concentrate from the cleaner-scavenger is pumped back to the fines cleaner column feed and the tailings report to the concentrator tailings thickener.

17.2.4 Graphite Dewatering

The coarse flakes concentrate and the fines cleaner column concentrate are thickened to 35 % solids in a high capacity thickener. The thickener underflow is pumped to a holding tank prior to being pumped to a press filter. The purpose of a holding tank is to de-couple the continuous operation of the thickener upstream from the batch nature of the press-filter downstream.

The press filter consists of a horizontal pressure filter and delivers a graphite product containing 15 % moisture. The filtered concentrate is dropped onto a conveyor and is transported via a hopper and screw conveyor to the dryer.

An electric rotary dryer will dry the graphite concentrate to 0.3 % moisture. Low moisture content is required to ensure product integrity and quality.

17.2.5 Graphite Dry Screening and Bagging

NMG aims to produce four (4) different size products (see Table 17.3). After the dryer, dry graphite is pneumatically transported to a bulk graphite bin. From this bin, graphite is blown to two (2) sifters. Each sifter consists of six (6) sections of with 27 sizing screens per section. The screened fractions are collected in eductor hoppers and then transported to the appropriate holding bins. The distribution is shown in Table 17.3.

Table 17.3 – Matawinie Graphite Concentrate Breakdown

Graphite Concentrate Size Fraction	Weight (%)	Annual Production (tonnes)
Jumbo (+48 mesh)	14.8	14,800
Coarse (–48+80 mesh)	33.4	33,400
Intermediate (–80+150 mesh)	27.7	27,657
Fine (–150 mesh)	24.1	24,143

Below each bin is a vibrating feeder to transport the product to two (2) semi-automatic bagging systems which includes automatic sampling systems. Each bag can contain up to 1,134 kg graphite. Small quantities of bags can be stored in the bagging facility. There will be a separate bag storage facility for excess production.

17.2.6 Concentrator Tailings Dewatering

The concentrator tailings are thickened near the concentrator the thickened tailings are pumped to the tailings processing facility. The thickener overflow is recycled to the concentrator process water tank.

A high capacity thickener is used to thicken the tailings to 65 % solids. The thickener underflow is then pumped to the tailings processing plant while the overflow is pumped to the concentrator process water tank.

17.2.7 Tailing Processing and Tailings Dewatering

Sulphide upgrading takes place in two (2) phases: sulphide flotation and magnetic separation. The thickened tailings from the main concentrator report to the sulphide flotation circuit. Density of the stream is adjusted for flotation using process water. Potassium amyl xanthate (“**PAX”**) and MIBC are used to produce a sulphide concentrate.

The tailings from flotation are directed to a low intensity magnetic separator (“**LIMS”**) and a medium intensity magnetic separator (“**MIMS”**) where permanent magnets are used to generate a magnetic field and extract any remaining sulphides. The MIMS concentrate combines with the sulphide flotation concentrate and is directed to the sulphide thickener. The sulphides concentrate is expected to contain <1 % C(t) and 20 % S. The MIMS tailings, containing <0.1 % C(t) and <0.1 % S, report to the non-sulphide tailings thickener.

Tailings dewatering is comprised of two (2) parallel circuits: sulphide (PAG) dewatering and non-sulphide tailings (NAG) dewatering.

Sulphide concentrate is thickened to 65 % solids in a high capacity thickener. The thickener underflow is pumped to a holding tank and from there to a belt filter to obtain a final product containing 15 % moisture. The filtered product is dropped onto a conveyor and is transported to the sulphide stockpile. A loader will be used to fill trucks to transport the sulphide concentrate to the co-disposition tailings storage facility.

The Non-Sulphide tailings dewatering circuit consists of a high capacity thickener and two (2) parallel belt filters. The thickener, containing 65 % solids, is pumped to a holding tank followed by belt filters. Given the high tonnages processed in this circuit, two (2) belt filters are required to produce a final product containing 17.5 % moisture. The material then drops onto a set of conveyors which transport the material to the non-sulphide tailings stockpile. Again, a loader is used to fill trucks to transport the non-sulphide tailings to the co-disposition tailings storage facility.

17.3 Equipment Sizing and Selection

The equipment selection was based on the fulfillment of the design criteria. The equipment list was prepared, and the equipment was sized based on the design criteria developed, flow sheet drawings, the mass balance, and layout considerations.

Design factors used where: 0 % for comminution equipment, 20 % for most processing equipment and 5 % for slurry pumps.

17.3.1 Crushing

Ore crushing will be performed by contractors using a mobile crushing plant. The crushing plant main equipment is a C150 Jaw Crusher and a CS660 cone crusher. The crushed ore is transported via overland conveyor to be stored in a crushed ore stockpile. The crushed ore stockpile has a storage capacity of three (3) days, assuming 5 % average ore moisture. The mobile crushing plant discharges rocks with a particle size distribution of 80 % less than (P_{80}) 97 mm.

17.3.2 Primary Grinding and Rougher and Scavenger Flotation

Ore is withdrawn from the bottom of the stockpile using a maximum of four (4) apron feeders with variable speed drives. Each feeder has the capacity to provide the SAG mill with 100 % throughput rate.

The SAG mill is 6.71 m in diameter by 4.88 m long with 3,500 kW variable frequency drive motor. The SAG mill operates in closed circuit with one (1) double deck vibrating screen with top deck screen panel apertures of 8.0 mm and bottom deck screen panel apertures of 2.0 mm. The top deck protects the bottom deck from pebble damage. Both top deck and bottom deck oversize are returned to the SAG mill for more comminution. The screen undersize has a P_{80} of 0.70 mm and is pumped to ball mill cyclone.

The secondary grinding circuit consists of a ball mill in closed circuit with a hydrocyclone pack and rougher flotation circuit. The hydrocyclone pack comprising five (5) 570 mm cyclones. The cyclone underflow flows into the rougher flotation circuit, this circuit is composed of a single mechanical cell with a volume of 43 m^3. The rougher flotation concentrate goes to the scavenger flotation circuit, while the rougher tailings are pumped to the ball mill. The ball mill is 4.3 m in diameter by 6.5 m long with 2,000 kW variable frequency drive motor. The cyclone overflow with a P_{80} of 0.21 mm is pumped to the scavenger flotation circuit while the underflow is directed back to the ball mill for further grinding. The scavenger flotation circuit is composed of four (4) mechanical flotation cells each with a volume of 8.5 m^3.

The SAG mill and vibrating screen circuit design criteria are based on test work and MC-DRA experience. The variable speed motor and automatic ball addition for the SAG mill should create excellent size reduction control.

The ball mill, cyclone and rougher flotation and scavenger flotation circuit design are based on test work and MC-DRA experience. The variable speed motor for the ball mill, should control the size reduction and mechanical flotation cells are selected to minimize the risk of sanding.

17.3.3 Primary Cleaning and Secondary Cleaning Circuit

The primary cleaning circuit consists of one (1) hydrocyclone pack, one (1) polishing mill, one (1) flotation column and two (2) mechanical cleaner scavenger flotation cells.

The combined rougher and scavenger flotation concentrates are dewatered using one (1) hydrocyclone pack comprising two (2) 350 mm cyclones.

A polishing mill is used to scrub the graphite flakes and loosen gangue minerals from the graphite surface without reducing flake size. The polishing mill is 5.5 m in diameter by 9.0 m long, equipped with a 1,300 kW motor. The polishing mill discharge is re-combined with the dewatering screen undersize and pumped to the cleaner flotation column.

The cleaner flotation column is 3.0 m in diameter by 8.0 m high and is aerated using spargers. The column concentrate goes to the secondary cleaning circuit. The column tailings are pumped to two (2) mechanical cleaner scavenger cells with a volume of 2.8 m^3 each.

The secondary cleaning circuit consists of one (1) hydrocyclone pack, one (1) vibrating screen, one (1) stirred media mill, one (1) flotation column for fines flotation and two (2) mechanical cleaner scavenger flotation cells for fines flotation.

The dewatering cyclone, polishing mill, primary column flotation and cleaner scavenger flotation circuit designs are based on test work, supplier input and MC-DRA experience.

Column flotation using spargers should reduce graphite flake degradation as compared to mechanical cells or cavitation column. Mechanical cells are used as scavenger cells only.

Concentrate coming from the primary cleaner flotation column is dewatered using one (1) hydrocyclone pack comprising of two (2) 350 mm cylones. The cyclone underflow flows onto a vibrating screen with 0.18 mm screen panel openings. The screen oversize reports to the graphite concentrate thickener while the screen undersize is fed to the stirred media mill for fines polishing.

The stirred media mill is a vertical stirred media mill equipped with a 355 kW motor. This mill gently polishes the small graphite flakes to maintain flake integrity. The stirred media mill discharge is combined with the cyclone overflow and pumped to the fines cleaner column.

The fines cleaner column is 3.0 m in diameter by 8.0 m high and is aerated using spargers. The column concentrate goes to final graphite concentrate while the tailings are pumped to two (2) mechanical fines cleaner scavenger cells with a volume of 2.8 m^3 each.

The hydrocyclones, vibrating screen, stirred media mill, fines column flotation and fines cleaner scavenger flotation circuit designs are based on test work, supplier input and MC-DRA experience. The design aims to minimize graphite degradation while improving the graphite grade.

17.3.4 Graphite Concentrate Dewatering

The dewatering circuit consist of one (1) high rate concentrate thickener, one (1) pressure filter and one (1) dryer.

The combined graphite concentrate is pumped to the 8.0 m diameter concentrate thickener. The thickener overflow is pumped to the process water tank for recirculation of process water while the concentrate thickener underflow at 35 % solids is pumped to the graphite concentrate holding tank. This tank is 4.0 m diameter × 4.0 m high and has a 7.5 kW agitator to keep solids in suspension.

From the holding tank, the concentrate is pumped to the graphite concentrate pressure filter. The filter press will have a total filter area of 83.5 m^2. The filtrate is re-circulated to the graphite concentrate thickener by a filtrate pump. The filter cake at 15 % moisture is conveyed to a dryer hopper.

The dryer hopper evenly distributes the filtered graphite into the dryer. The dryer is an electric rotary dryer 1.9 m diameter × 17.0 m long containing electric heaters with a 2,500 kW capacity. The dryer is complete with bag house and exhaust fan. The dried product is pumped using pneumatic conveyance to a bulk graphite holding bin.

The concentrate thickener, pressure filter, and dryer circuits designs are based on test work, supplier input and MC-DRA experience.

17.3.5 Graphite Dry Screening and Bagging

From the bulk graphite holding bin, the dried concentrate is pneumatically transported to a distributor that splits the concentrate into two (2) systems of six (6) parallel units with 27-deck sifters, producing four (4) distinct size fractions.

The coarse decks have openings of 0.30 mm, then next ones have openings of 0.18 mm. The finest decks have openings of 0.10 mm.

The distinct size fractions are pneumatically transported to the jumbo, the coarse, the intermediate, and the fine graphite flake bins.

If different graphite product sizes are required, sifter panels can be changed in a very short time.

The two (2) bagging systems are semi-automatic systems, each with an automatic sampling system for quality control. The bagging systems are equipped with a common automatic pallet distributor. The actual super sack filling is automated; the super sack positioning is manually accomplished. The filled bags automatically get conveyed down a roller conveyor and must then be removed manually by forklift.

The graphite concentrate dry screening and bagging circuit designs are based on test work, supplier input and MC-DRA experience.

17.3.6 Concentrator Tailings Dewatering

The tailings from the scavenger, cleaner scavenger and fines cleaner scavenger circuits are fed to the concentrator tailings thickener. This is a high rate thickener with a 21-m diameter and sits outside the main processing building. The thickener overflow is pumped to the process water tank for recirculation of process water. The thickener underflow at 65 % solids is pumped to the concentrator holding tank and from there it is pumped to the tailings processing facility.

The concentrator tailings thickener design is based on test work, supplier input and MC-DRA experience.

17.3.7 Tailings Processing and Tailings Dewatering

The sulphide removal circuit consists of two (2) mechanical sulphide flotation cells, one (1) LIMS, and one (1) MIMS.

The thickened tailings from the concentrator are pumped to the sulphide flotation circuit. This circuit is composed of two (2) mechanical flotation cells with a volume of 160 m^3

each. The sulphide flotation tailings are directed to two (2) stages of magnetic separation while the concentrate reports to the sulphide thickener.

The sulphide flotation and magnetic separation circuit designs are based on test work, supplier input and MC-DRA experience.

The tailings dewatering circuit is composed of one (1) sulphide thickener, one (1) sulphide belt filter, one (1) NAG tailings thickener and two (2) NAG belt filters.

The combined concentrate from the sulphide flotation and the magnetic separation circuits is pumped to a 9-m diameter high rate thickener. The thickener overflow is pumped to the tailings area process water tank for recirculation of process water. The thickener underflow at 62 % solids is pumped to the sulphide holding tank. This tank is 3.6 m diameter × 3.6 m high and has a volume of 34 m^3 with an 11.2 kW agitator to keep solids in suspension.

From the holding tank the sulphide concentrate is pumped to the sulphide vacuum belt filter. The filter will have a total filter area of 32 m^2. The filtrate is re-circulated to the sulphide thickener by a filtrate pump. The filter cake at 15 % moisture is conveyed to the sulphide stockpile.

The NAG tailings are the non-magnetics from low intensity magnetic separator which are pumped to an 18-m diameter high rate thickener. The thickener overflow is pumped to the tailings area process water tank for recirculation of process water. The thickener underflow at 65 % solids is pumped to the non-sulphide tailings holding tank. This tank is 6.0 m diameter × 6.0 m high and has a volume of 161 m^3 with a 22.4 kW agitator to keep solids in suspension.

From the holding tank the non-sulphide tailings are pumped to two (2) belt filters. The filters will have a total filter area of 290 m^2. The filtrate is re-circulated to the non-sulphide tailings thickener by a filtrate pump. The filter cake at 17.5 % moisture is conveyed to the non-sulphide tailings stockpile.

17.3.8 Reagents

a. Fuel Oil

Fuel Oil #2 is used as collector for graphite flotation. The fuel oil will be delivered by the fuel truck on request from the mill and stored in a 54 m^3 double walled tank. The expected fuel oil usage is 645 litres per day. The fuel oil will be transferred from the storage tank to a one (1) m^3 holding tank within each facility for distribution in the process.

b. Methyl Isobutyl Carbinol

MIBC is used as the frother for both graphite and sulphide flotation. The MIBC will be delivered by tanker truck, which will transfer its contents into the storage tanks at the concentrator and the tailings processing facility. Each storage tank has a capacity of 54 m^3. MIBC will be transferred from the storage tank to a one (1) m^3 holding tank within each facility for distribution in the process. The bulk shipment of MIBC will remove possible container disposal issues. The expected MIBC consumption is 1,035 litres per day.

c. Flocculant

Flocculant is used in the all four (4) thickeners to aid the settling of graphite concentrate and tailings. Given the location of the thickeners, two (2) separate flocculant mixing systems are required, one for the main processing plant and one for the tailings processing area.

The flocculant requirements at each location are small and therefore 25 kg bags and small mixing systems have been selected. The total expected flocculant consumption is 260 kg per day.

d. Potassium Amyl Xanthate

PAX is used as collector for sulphide flotation. PAX is a very non-selective sulphide collector. It will be delivered in bulk bags and stored in pallets at the tailings processing plant. The PAX mixing system design is based on the bulk bag size. The total expected PAX consumption is 640 kg per day.

e. Lime

Lime is not used in the process. Lime will be available to the environmental group in case it is required for increasing the alkalinity of site water or retention basins. The maximum anticipated lime usage is 270 kg per day.

17.4 Utilities

17.4.1 Concentrator Water Services

The water consumption is based on concentrator plant nominal water consumption per hour.

a. Fresh Water / Gland Water

The main fresh water source for the concentrator will be underground water wells. The fresh water /gland water system has a separate 3.0 m diameter × 3.0 m high gland water tank. The source is fresh water with a flow rate of 21.1 m^3/h.

Table 17.4 summarizes the distribution of fresh water.

Table 17.4 – Fresh Water Breakdown

Stream	Consumption m^3/h
Potable Water Treatment System	0.9
Process Water Tank	0.0
Tailings Fresh/Gland Water Tank	5.3
Fresh/Gland Water Tank	14.9

b. Process Water

Reclaim Water is recycled back, at a nominal rate of 124 m^3/h, from the polishing basin. The remainder of the water, 637 m^3/h comes from overflow of the concentrate and graphite tailings thickener. The process water tank will be 10.5 m diameter × 10.5 m high with a capacity of 883 m^3.

c. Fire Water

Fire water comes from the fresh water system. Fresh water will be pumped to a 10.0 m diameter × 10.0 m high fire water tank with a capacity of 762 m^3. Under normal circumstances the flow rate is 0. However, the system can pump water up to 325 m^3/h.

17.4.2 Tailings Processing Facility Water Services

a. Fresh Water / Gland Water

The main fresh water source for the concentrator will be underground water wells. The fresh water / gland water system has one separate 3.0 m diameter × 3.0 m high water tank. The source is fresh water with a flow rate of 5.3 m^3/h.

b. Fire Water

Fresh water in the tailings processing area will be supplied from the concentrator fire water tank and stored in the 10.0 m diameter × 10.0 m high fire water tank with a capacity of 762 m^3.

c. Process Water

Overflow water from the sulphide and non-sulphide tailings thickeners will be pumped to the tailings area process water tank at a rate of 757 m^3/h. The process water tank will be 10.5 m diameter × 10.5 m high with a capacity of 883 m^3.

17.4.3 Concentrator Pressurized Air

a. High Pressure Air

The concentrator will have two (2) sets of high pressure air compressors.

Set #1 has two (2) compressors and it is designed for instrument air and plant air. In addition, it includes an air dryer and separate instrumentation air receiver.

Set #2 consists of one (1) air compressor dedicated to the flotation columns.

b. Low Pressure Air

The concentrator will have two (2) air blowers for the mechanical flotation cells.

17.4.4 Tailings Processing Pressurized Air

a. High Pressure Air

The tailings facility will have two (2) compressors to supply air for instrumentation air and filtration air. The instrument air system includes an air dryer and separate instrumentation air receiver.

b. Low Pressure Air

The tailings facility will have one (1) air blower for the mechanical flotation cells.

18.0 PROJECT INFRASTRUCTURE

This Section describes infrastructure, buildings, and other facilities such as access road and power line, that are required to complement the processing of graphite ore.

All topographic information for locating the infrastructure was based on a LiDAR topographic map survey data that was made available by NMG for the FS.

Additional geotechnical investigations will need to be performed prior to detailed engineering to confirm civil design criteria related to the foundation requirements of mills, process plant, de-sulphurization plant, co-disposition storage area, ditches, collecting basins, and other infrastructure such as the crushed ore storage area, tailings storage buildings and electrical substation.

An overall general site layout and access is shown on Figure 18.1 and Figure 18.2 shows the concentrator processing plant.

The Project infrastructure includes the 120 kV electrical power line, the main access road and site roads, general site works, site electrical distribution and communication, site fire protection, fresh water, potable water and sewage treatment, auxiliary buildings, tailings and water management facilities.

Figure 18.1 – Overall General Site Layout and Access

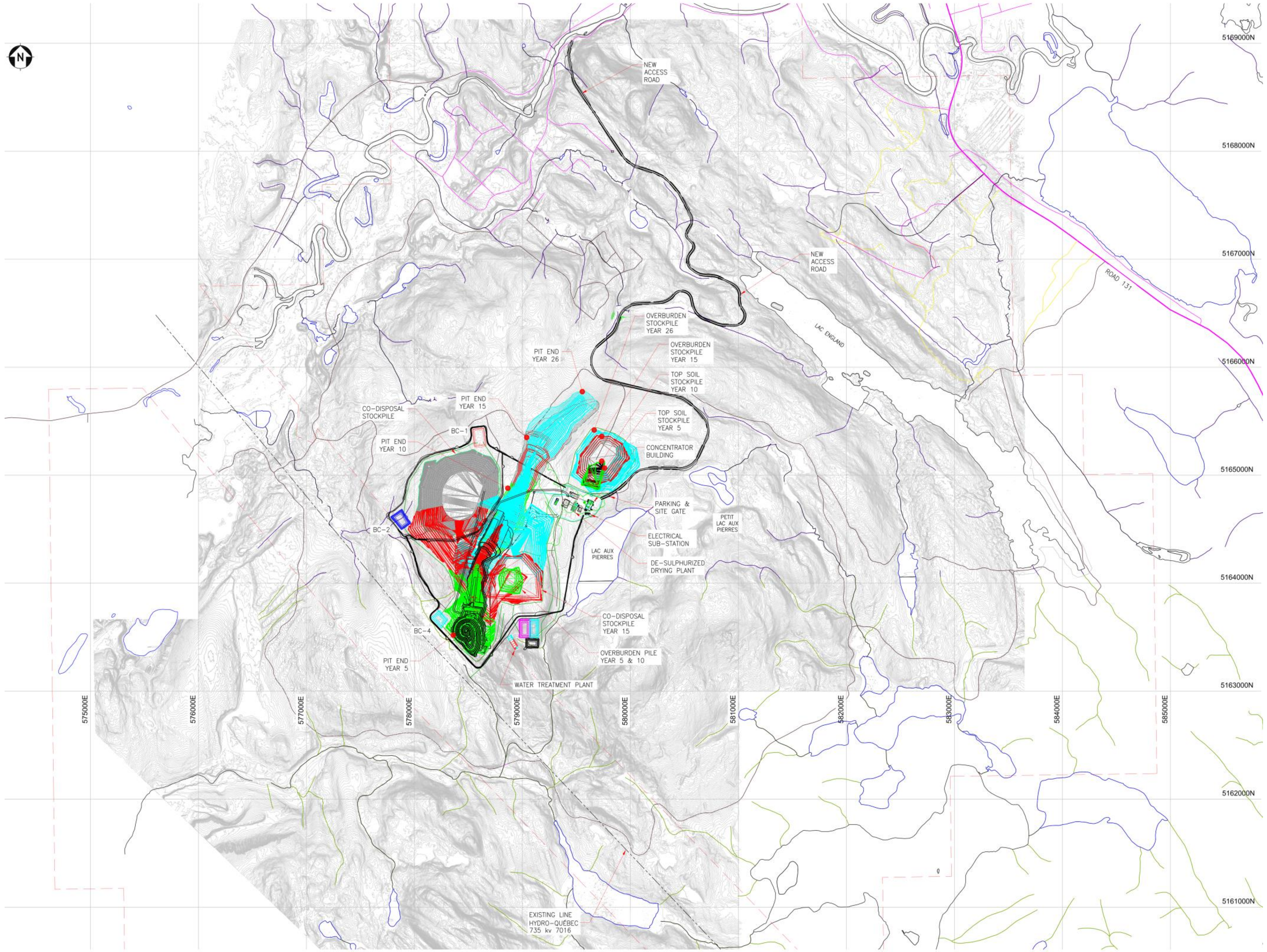


Figure 18.2 – Processing Plant

18.1 Power Line Main Substation and Electrical Distribution

The premise considered is that the electrical power for the Matawinie Mine will be supplied by Hydro-Québec through a new 120 kV transmission line. This line, which will feed a new outdoor mine substation, is expected to be connected to Hydro-Québec's nearest station, *Poste Provost*. The power line will be dedicated to the Project and will allow for possible future secondary transformation of the graphite.

From *Poste Provost*, the 120 kV power line will be built by Hydro-Québec such that it ultimately joins a new 735 kV power line corridor that will run just south of the mine property limits, before arriving at the mine substation. This new 735 kV power line corridor is currently being built by Hydro-Québec and is located adjacent to another existing 735 kV corridor.

The power line has changed from the Pre-Feasibility Study in that the mine has been designed to be all-electric thereby increasing the power requirements, and the production has doubled from 52,000 tonnes to 100,000 tonnes annually. This increase in power demand has resulted in having to increase the power supply voltage from 34.5 kV to 120 kV.

The 15 kV main switchgear will be located indoors in a pre-fabricated electrical room and, by feeding to downstream step-down distribution transformers, will provide power to:

- One (1) 15 kV power factor correction unit located near the substation area, via cable ducts and trays;
- Two (2) 4.16 kV and/or 600 V pre-fabricated electrical rooms near the concentrator building to power loads within, via cable trays:
    - A feeder from one of these electrical rooms will be the origin of an overhead 13.8 kV line going to the water treatment plant;
    - A feeder from one of these electrical rooms will be the origin of a 600 V cable (installed on wooden posts) going to the guard house and parking lot;
- One (1) 600 V pre-fabricated electrical room in the open pit for providing power to the in-pit crushers, via an overhead 13.8 kV line;
- One (1) 600 V pre-fabricated electrical room will be located on the west-side co-disposal area to provide power to electrically-cabled mobile equipment, via an overhead 13.8 kV line. This electrical room will be relocated as the co-disposal area progresses;
- One (1) 600 V pre-fabricated electrical room will be located beside the de-sulphurization plant (which will also be used to feed the garage area and a 480 V Electric Vehicle ("**EV**") charging station in the NAG stockpile area) via a 13.8 kV cable tray network;

- Two (2) 4.16 kV pre-fabricated electrical rooms will be situated in the open pit for providing power to electrically-cabled mobile equipment and dewatering pumps, via an overhead 13.8 kV line running alongside the mine access road and long distance conveyors;
- Three (3) 480 V mobile EV charging stations will also be situated in the open pit;
- One (1) 480 V mobile EV charging station will be located in the west-side co-disposal area;
- Three (3) 600 V overland conveyor drive stations will be located in each of the three (3) transfer towers along the east-side of the pit, connected to the overhead 13.8 kV line feeding the open pit electrical rooms.

Two (2) main branches of overhead 13.8 kV lines on wooden posts will be used for electrical distribution from the 15 kV main switchgear to service other areas of the mine. One (1) main branch will run across to the west-side co-disposal area, and the other main branch will run south alongside the eastern edge of the pit to supply power to the open pit and the water treatment plant.

The branch running south will be gradually dismantled as the exploitation face progresses northwards and as the pit gets progressively backfilled. By Year 8, the branch running south will have been completely dismantled and a branch running north to the other end of the pit will be constructed.

Prior to the dismantling of the overhead line, a new 13.8 kV overhead distribution line will be built in Year 7 connecting the main substation to the water treatment plant to the south.

Also in Year 8, the wooden posts running across to the co-disposal area will be dismantled and the retained line will be re-installed on structures installed on each side of the pit. The line is required to continue feeding the water basin pumps located in the BC-1 and BC-2 area.

18.2 Battery Charger

The 125 V_{DC} system specified for medium-voltage (4.16 kV and 13.8 kV) and high-voltage (120 kV) equipment control and protection systems will consist of battery banks and chargers, which will be installed in a clean, well-ventilated electrical room. The battery banks have been designed for 8 hours discharge time and 10-hour recharge time. Batteries will be of the valve-regulated lead-acid (“**VRLA**”) low-maintenance type.

18.3 Power Requirements

The mine will be an all-electric operation (excluding the emergency power supply), including ore extraction and hauling. The total power demand is estimated at 29 MW with 17.2 MW for the main process. The remaining power is required to service the EV charging stations, mechanical shop, laboratory, offices, electrical rooms, cold warehouse, guard house, heating of the concentrator as well as losses in transformers and feeders. The process power demand was estimated based on data from the mechanical equipment list prepared for the Project. A breakdown by area is presented in Table 18.1.

Power for the shovels, drills and bulldozers will be provided by electric cable, fed by two (2) 4.16 kV pre-fabricated mobile electrical rooms. These electrical rooms will be moved in the pit as required by development of exploitation.

The remaining heavy vehicles will be powered by batteries which will be charged by five (5) 600 kW mobile EV charging stations. Three (3) such stations will be located in the open pit, one (1) in the west-side co-disposal area and one (1) at the NAG stockpile. With the exception of the one charging station located at the NAG stockpile, all other charging stations will be moved as required by development of exploitation.

In addition, six (6) standalone standard 50 kW charging stations, dedicated for smaller battery-electric vehicles (e.g. pickup trucks), have been designated for the garage area.

Table 18.1 – Project Power Requirements

Process Area	Description	Power Demand Requirements (kW)
1100	Primary Crushing Circuit	1,645
1200	Grinding and Rougher Flotation Circuits	6,367
1300	Polishing and Cleaner Flotation Circuits	1,801
1400	Concentrator Tailings Dewatering Circuit	192
1500	Graphite Concentrate Dewatering Circuit	2,839
1600	Graphite Concentrate Dewatering Circuit	353
1700	Tailings Circuit	1,989
1800	Reagents Systems	49
1900	Concentrator Utilities Systems	1,935
	Total Process Power*	***17,170***
	Auxiliary systems (HVAC and lighting)	5,817
	EV-Charging systems and power supply for the electrical equipment	6,066
Total General Process and Services **|		**29,053**

Notes:
* This total Process Power (kW) is based on operation power from the mechanical load list;
** Loading and power factors are not considered.

18.4 Emergency Power Supply – Mine Area

An emergency power system has been provided as a standby source of power to feed critical process loads and essential services (e.g. low voltage (< 1 kV) system control, emergency and exit lighting) in the event of power loss from the power grid.

The standby power source consists of one (1) diesel generator (1.5 MW, 13.8 kV, PF = 0.8) located in the vicinity of the main substation electrical room 210-ER-001.

18.5 Main Access Road and Site Roads

18.5.1 Main Access Road

Throughout the Pre-Feasibility Study and the Feasibility Study phases, a number of options were evaluated to determine the optimal routing for the main access to the plant site. The retained main access road commences at the existing Chemin Matawin East, crosses public land and then generally follows the existing trails to the Project site. There are slight deviations to suit the maximum gradient of eight (8) % and to avoid creeks and rivers, if possible.

The design of the main access road considers a Class 1 road as per the *Ministère des Ressources Naturelles du Québec* classification. The main access road work will be designed at 8.5 m wide with ditches on both sides and estimated at 10.5 km long from the existing road network to the main gate. A parking lot for workers and visitors is located outside the main property with access through the main gate.

Access through the main gate will require communication with the plant security, located in the process plant, who will then remotely activate the main gate to permit entry to the Project site. Access cameras will be provided at the main gate for visual confirmation of vehicles and personnel desiring access to the Project site.

18.5.2 Service Roads

Service roads cover access from the main gate to the process areas and the raw material stockpile, roads from the plant area to the co-disposition area, from the mine area to the water treatment plant, and from the water treatment plant to the process area. Other service roads, such as the continuation of the co-disposition roads and connecting roads from existing basins to new basins, will be provided as the mine develops from the south to the north and will maintain the same specifications as the initial service roads.

In general, the roads will be designed to be 6 m wide to support vehicles not designated as mine vehicles. The roads, therefore, will be used by light trucks and pick-ups only. The road from the water treatment plant will be designed at 8.5 m wide to allow for the addition of a reclaim water line from the polishing basin to the process plant and for a 13.8 kV power line from the main substation to the water treatment plant.

Roads servicing any explosives plant or storage or any off-site requirements, have not been included in this FS.

18.5.3 Mine Service Roads

The mine service roads will be 18 m wide to support the use of 40-tonne trucks (3 times operating width) moving the dry tailings material from the tailings storage domes to the co-disposition areas and providing access from the mine operations to the mine repair shop located at the plant.

The mine service road from the mine operations to the mine repair shop will be designed at 27 m wide to allow for the 13.8 kV power line from the main substation to the mine pit and for the overland conveyors and transfer towers required to move the material from the pit to the ore storage facility.

A new mine road will be constructed at Year 12 from the plant area to the north pit. The mine road will also be 27 m wide to include allowances for a new 13.8 kV line and overland conveyor.

18.6 Surface Water Management

18.6.1 Design Criteria

The design criteria for surface water management are based on the Mining Industry *Directive 019* published by the MDDEP in March 2012. For the Project, all the surface water collecting basins, pumping stations and treated water outfall are designed to manage the spring runoff which is a combination of a 1:100-year snowpack depth melting over a 30-day period and a 1:2,000-year 24-hour rainfall event, in accordance with the *Directive 019* guidelines. Ditches are designed to convey a 1:100-year flood event with additional 0.3 m of freeboard. Environmental weather data to generate hydrological data for the NMG Project were taken from the closest weather station of Saint-Michel-des-Saints located 6 km north of the Project.

18.6.2 Water Management Design

The mine water management plan ("**WMP**") addresses the surface runoff and the process water that are to be collected from the industrial areas including the open pit, the overburden/topsoil stockpiles and CSF facilities of the mine site. This water, contact water, is to be collected through a series of 17 collection ditches that will discharge into collection basins. These collecting basins are interconnected to a main collection basin ("**BC**") by a pumping system (pumping stations and piping lines) and from there to a treatment system. Two (2) diversion ditches are placed to divert clean water (non-contact) into the environment.

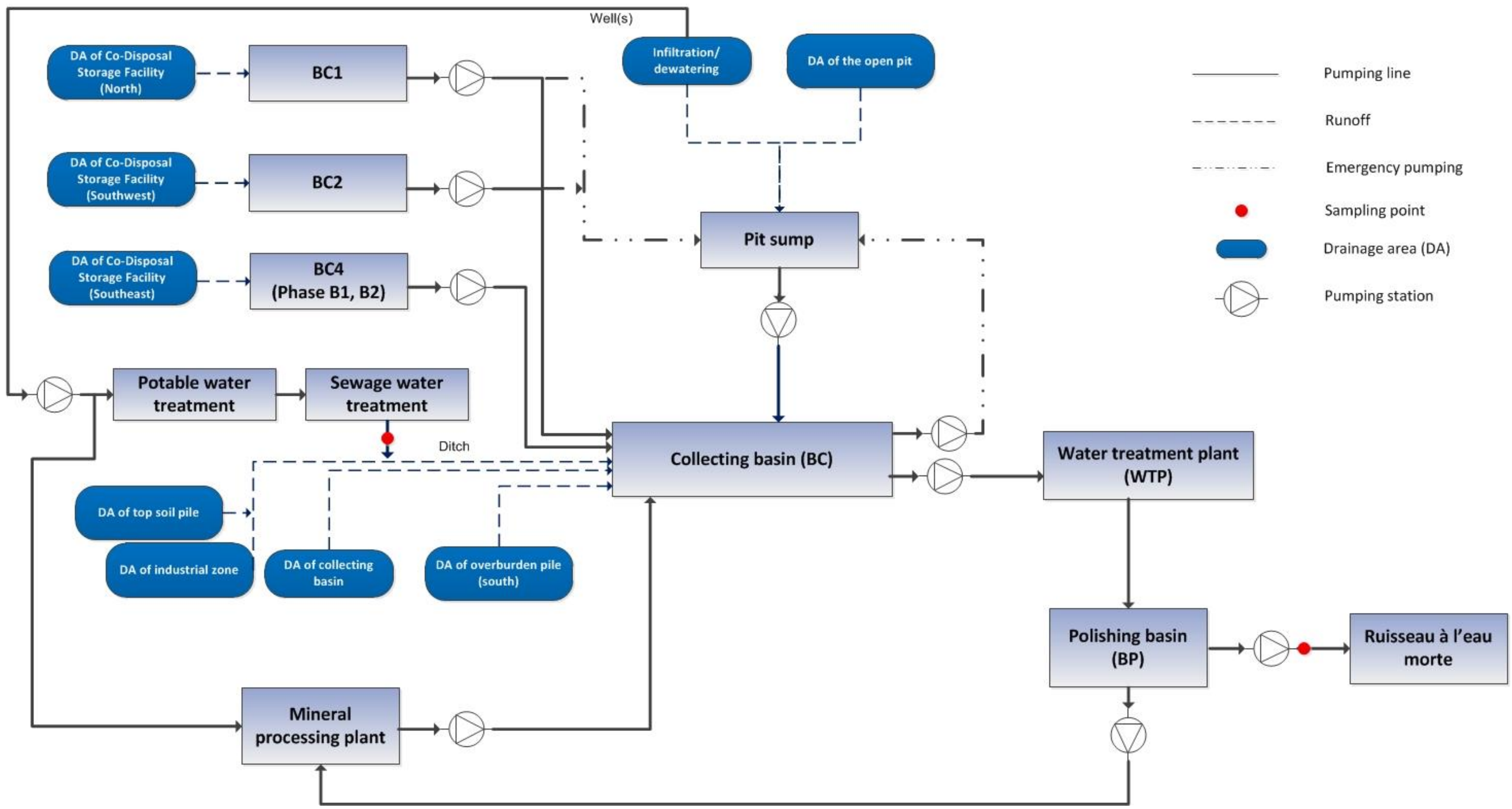
As part of the Project, the BC will be designed to provide an area to allow the settling of suspended solids prior to water treatment at the water treatment plant (“**WTP**”). The WTP will be designed to remove residual suspended solids and dissolved metal ions that are potentially leachable from the tailings or waste rocks. Treated water from the WTP will be discharged into a polishing basin. A portion of the treated water will be reused in the mineral processing plant and the remaining water will be discharged into the environment. The discharge point of the final effluent is the *ruisseau à l’eau morte* located south of the mine site. Pit dewatering will be carried out throughout the mine life.

Progressive reclamation and revegetation of the co-disposal areas will be carried out during mining operations to improve surface runoff and seepage water quality during mining operations.

NMG will prioritize reusing and recycling treated water in the process water make-up to minimize fresh water intake from fresh water wells. It should be mentioned that the suspended solids collected in the basins and the sludge generated in the WTP will be managed on-site and co-disposed with the tailings.

A conceptual water flow diagram which corresponds to the WMP is shown in Figure 18.3.

Figure 18.3 – Water Flow Diagram for NMG Project



18.6.3 Water Management Facilities by Project Phase

The development of the WMP for the Matawinie Project is divided into three (3) distinct phases as the drainage area increases with the mine development:

- Phase A: Based on the deposition plan layout of the facility from Year 0 to Year 5.
- Phase B1: Based on the deposition plan layout of the facility from Year 6 to Year 15.
- Phase B2: Based on the deposition plan layout of the facility from Year 16 to Year 26.

For each phase, the water management infrastructure (i.e. basins and pumping requirement) is sized based on the required volume of surface runoff to manage, which varies based on the size and development of the co-disposal facilities and the mine pit. By the end of the project, a total of four (4) new water collection basins are required to manage the surface runoff on the Project. The basins, ditches, pumping stations and pipelines for each phase of the project are illustrated in Figure 18.4 to Figure 18.6. For all phases, the pumping stations will be designed with sufficient redundancy and flexibility for maintenance.

In the water management Phase A (Years 0 to 5), due to the small catchment area influenced by mining activities, three (3) collecting basins (BC-1, BC-2, and BC), one (1) polishing basin (BP) and adjacent ditches need to be built. With the increase of the surface drainage area, a second portion of the collecting basin (BC) will be excavated in the beginning of Phase B1. Around Year 7, another basin (BC-4) will be integrated in the water management Phases B1 (Years 6 to 15) and B2 (Years 16 to 26). Furthermore, around Year 7 the treatment capacity of the WTP will be increased in order to manage the higher volumes of surface water runoff.

Figure 18.4 – Water Management Infrastructure for Phase 1 (Years 0 - 5)

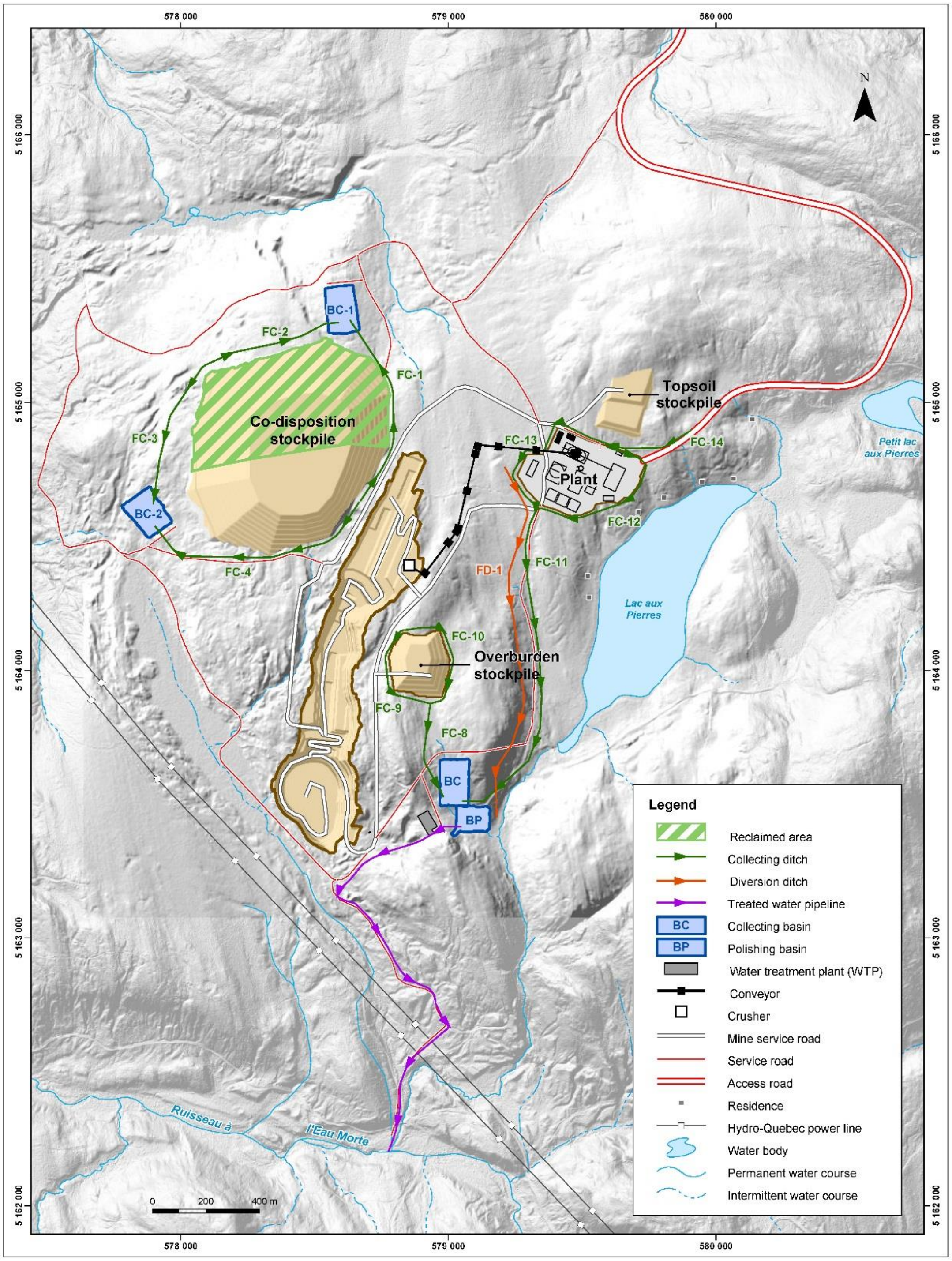


Figure 18.5 – Water Management Infrastructure for Phase 2 (Years 6 – 15)

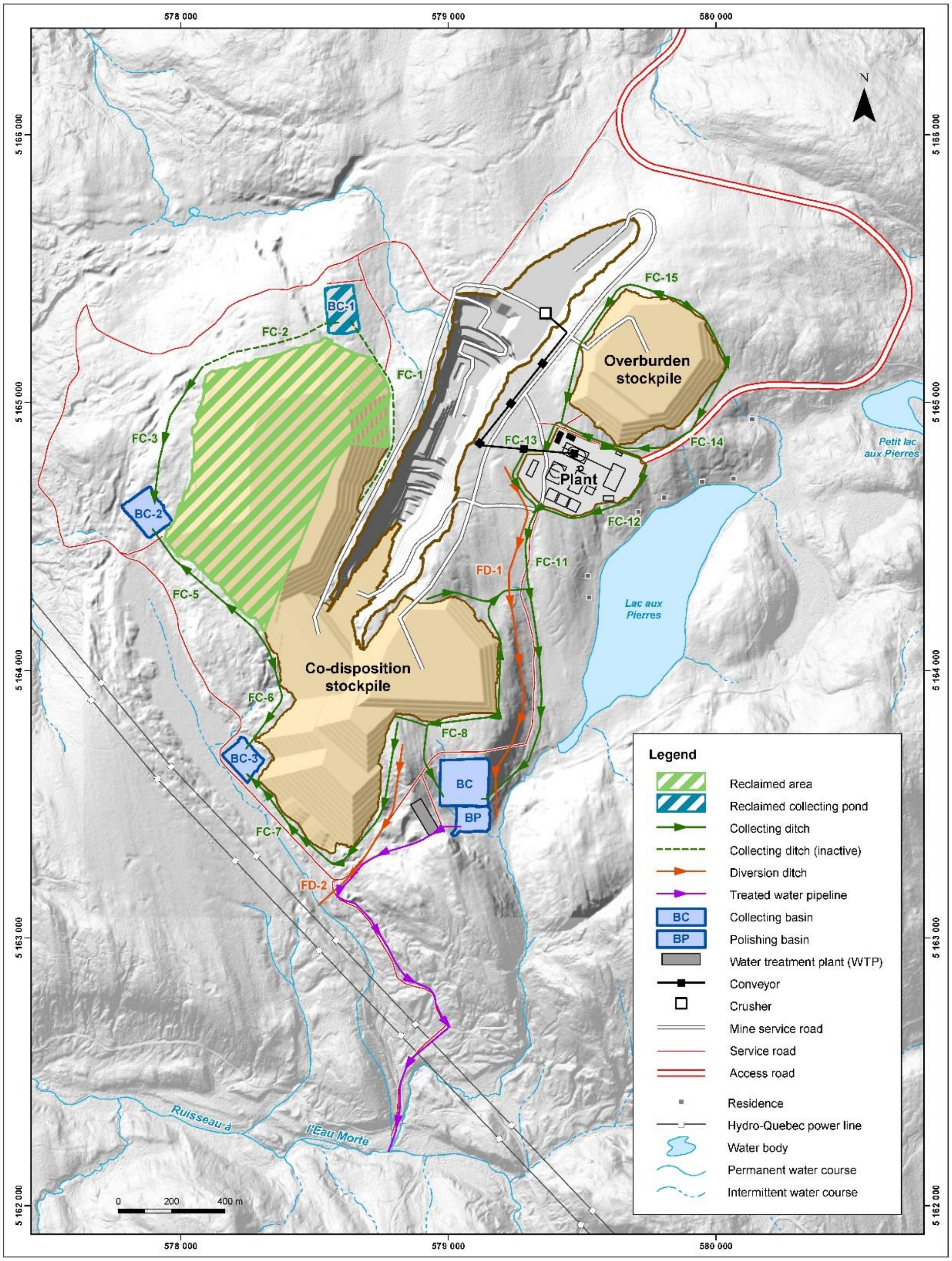
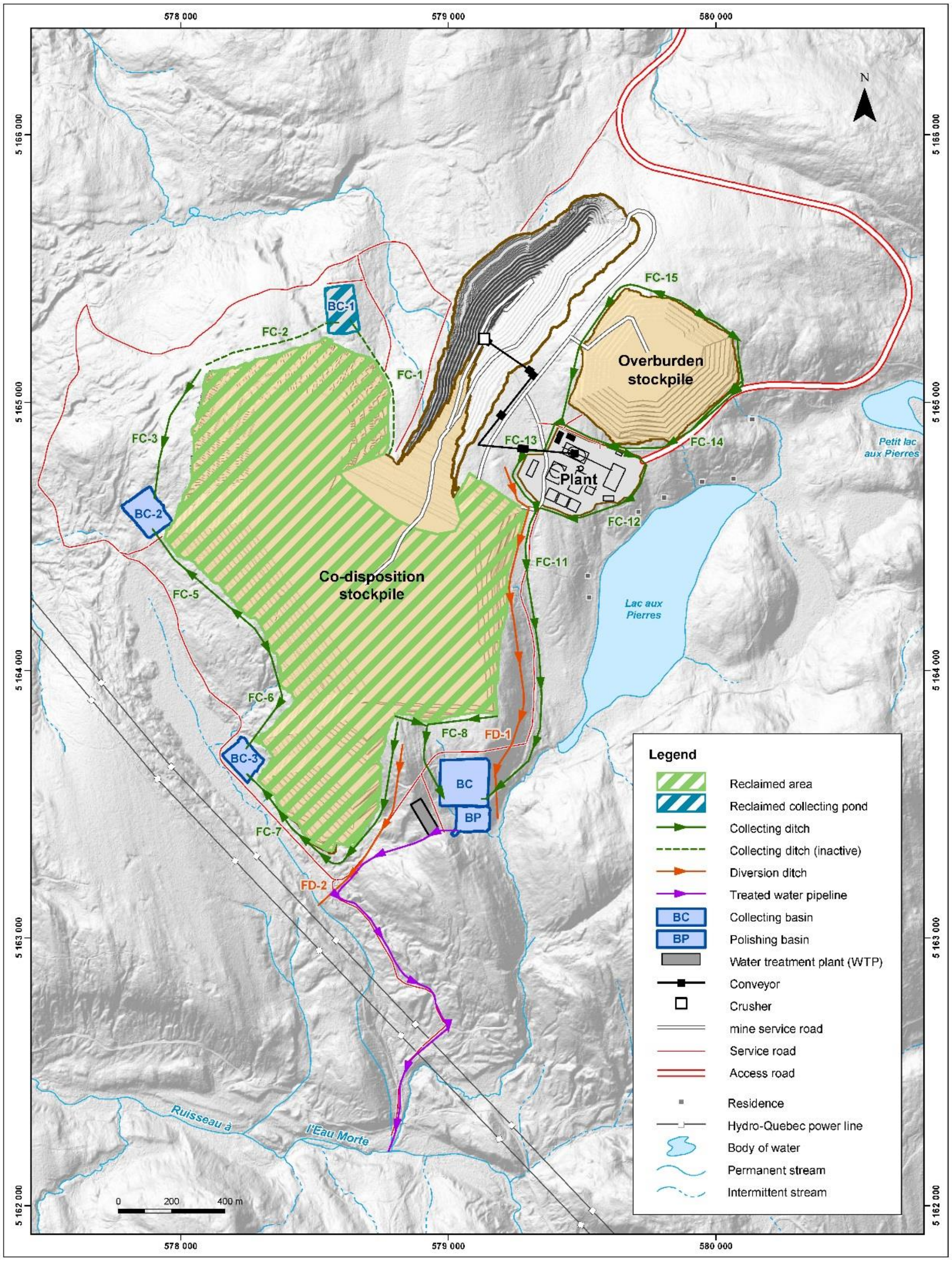


Figure 18.6 – Water Management Infrastructure for Phase 3 (Years 16 – 26)



18.6.4 Additional Requirements and Plans for Water Treatment

The following additional information is required to address project design refinements and confirm the assumptions made in water treatment:

- Collect surface water and process water quality data from laboratory tests and the demonstration project;
- Perform experimental leaching cell monitoring on site and gather water quality data;
- Optimize water recirculation within the mineral process plant and the mine in the aim of minimizing fresh water intake;
- Complete detailed engineering design for the water treatment facility and the final effluent outfall.

18.7 Camp Site Accommodations

Considering the close proximity of the town of Saint-Michel-des-Saints and other communities, no permanent camp has been provided for the Project. It is expected the nearby towns will provide some of the work force and all of the housing to the employees.

18.8 Site Buildings

18.8.1 Processing Plant Area

The processing plant area is located East of the open pit. The site is approximately 250 m by 400 m and slightly slopes towards the south. The area is excavated and backfilled to a starting level of 544 m. The access road reaches the site from the North-West and the mine service road rims the pit on the East side and the service road to the water treatment plant is further East from the pit (See Figure 18.1). Since the plant area is sloped, diversion and collecting ditches direct the surface water away from the plant to collector points (See Section 18.6 for further details).

18.8.2 Transfer Towers

The transfer towers supporting the overland conveying system are conventional design build facilities, uninsulated, with access for the incoming and outgoing conveyors and maintenance doors. With the addition of the Weba type chutes, there is no allowance for dust collection systems.

Overland conveyors will be sitting aboveground on pedestals with allowances for walkways when rising to the transfer towers. The conveyors will have covers over the belting to minimize the effects of snow, rain and wind.

The dimensions of the transfer buildings are 10 m wide by 10 m long and 12 m high to suit the complexity of the Weba type chute arrangement.

18.8.3 Crushed Ore Storage Dome

The crushed ore from the semi-mobile crusher(s) will be stored in a Norseman type dome or approved equivalent. The stockpile height at full capacity will be 15.7 m. The dome dimensions are 42.6 m wide by 91.6 m long. The storage dome walls will rest on pre-fabricated concrete foundations. The storage dome will be uninsulated.

The storage area will be on a concrete slab on grade to prevent spillage. Truck doors will be positioned at each end to allow for a loader to assist feeding the apron feeders when the stockpile volume is low. The crushed ore will be reclaimed via four (4) apron feeders located under the stockpile in a concrete reclaim tunnel. The inside dimensions of the concrete tunnel are 7.0 m wide by 34.3 m long by 6.7 m high.

The transition from the concrete tunnel to grade is by AIL type corrugated multiplates, one (1) for the SAG mill feed conveyor and one (1) as an emergency exit.

18.8.4 Concentrator Building

The concentrator building is a conventional ore processing type insulated building. Figure 18.7 shows the main process equipment inside the concentrator building. The concentrator building houses the grinding area on the West side of the building, the flotation area and regrind area in the center, the graphite concentrate thickening and filtering area on the east-center side, the concentrate dryer and the bagging system on the east side of the building and the load out section on the southeast corner.

Provisions were made in the design to isolate the dried graphite concentrate area in order to ensure effective graphite dust control and venting. A solid block wall separates the loading area with the main plant area.

Two (2) electrical rooms are provided in the design and are located adjacent to the concentrator. Another electrical room containing the VFD's for the mills is located on the exterior West side of the concentrator next to the SAG mill area. Mechanical and electrical maintenance shops are located on the ground floor in the filter press area.

The concentrator building has been designed to be 48.8 m wide by 91.4 m long and 27 m high

18.8.5 De-Sulphurization Plant

The de-sulphurization plant is located adjacent to and south of the process plant. The tailings plant houses the equipment to separate and filter the NAG and the PAG. The equipment includes mainly flotation equipment, magnetic separators, tanks, conveyors, and filter presses. Figure 18.8 shows the de-sulphurization plant and NAG and PAG storage layout.

The de-sulphurization plant is a Norseman type dome structure measuring 42.6 m wide by 77.2 m long. The dome is insulated due to the water processing involved in the filtering process. The dome walls sit on pre-fabricated concrete walls with closed end walls with conveyor openings on each end.

Due to its close proximity to the process plant, there is no provision for offices, storage, washrooms or lunchrooms in the de-sulphurization plant area.

Figure 18.7 – Concentrator Plant – First Floor and Operating Floors

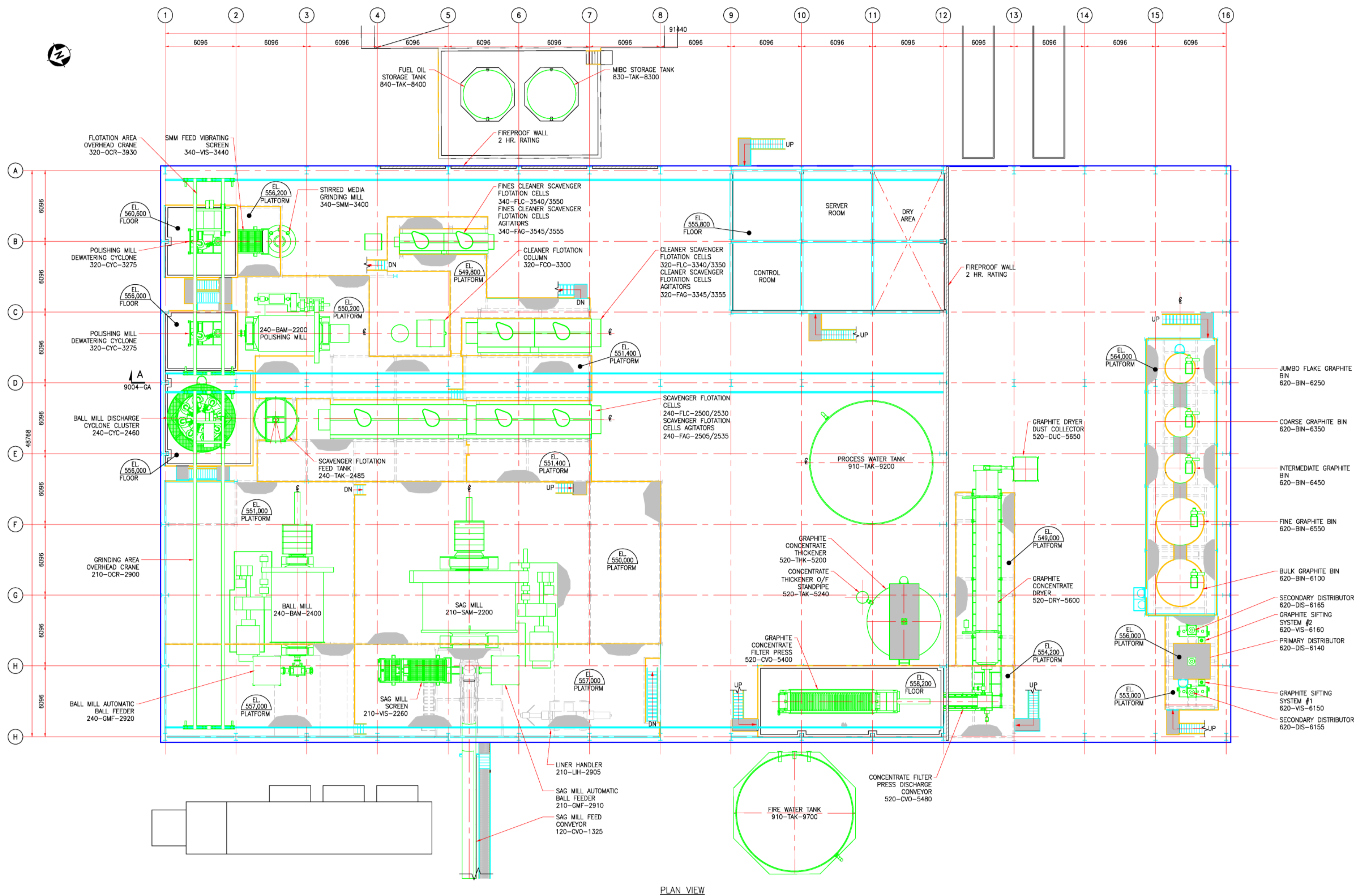
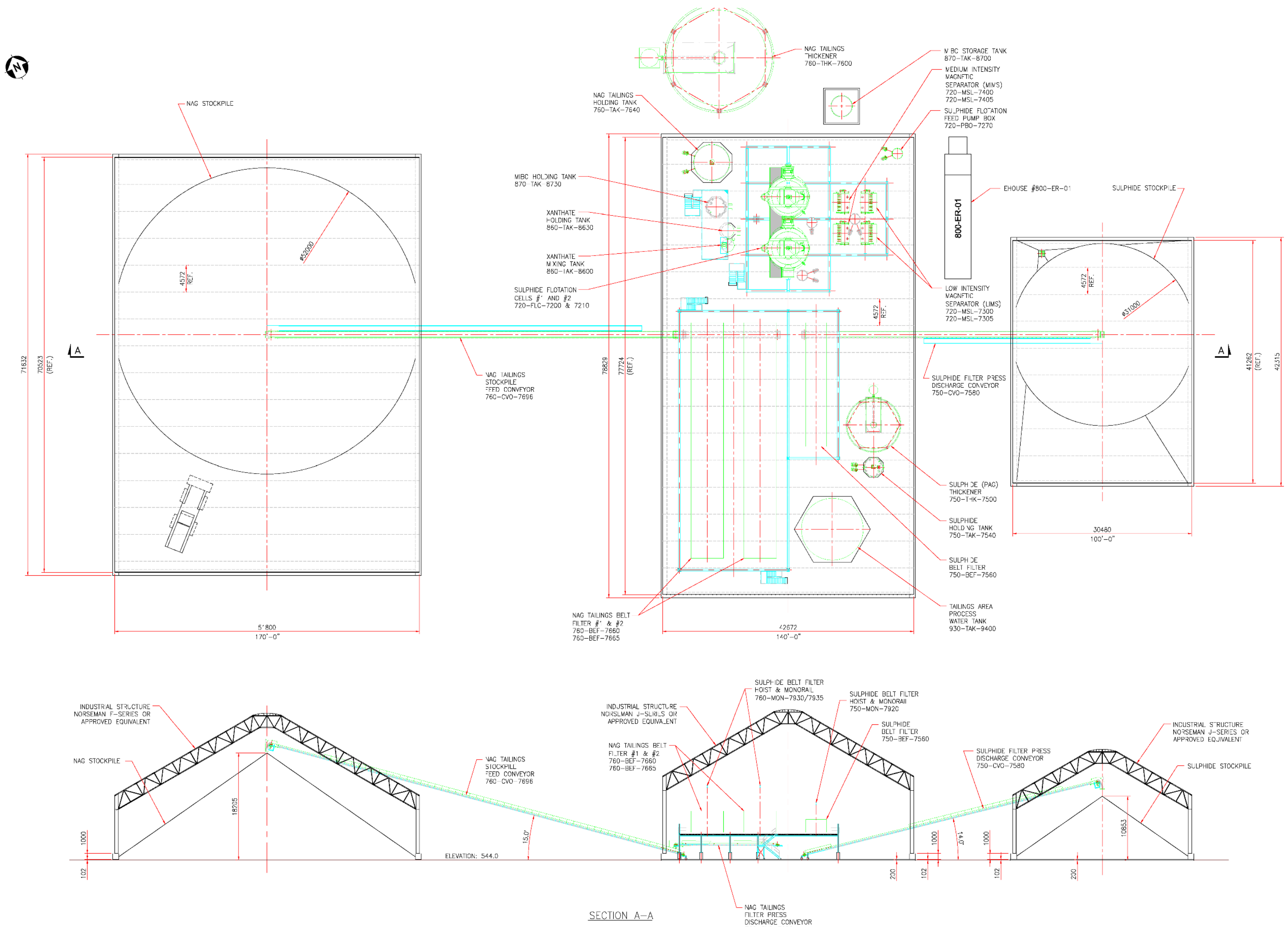


Figure 18.8 – De-Sulphurization Plant and NAG and PAG Storage Layout



18.8.6 NAG and PAG Storage

Both the NAG and PAG storage buildings will be Norseman type dome structures with allowance for material to be reclaimed by loader and truck. Both domes will be uninsulated and fully enclosed with end walls with one truck entrance in each of the domes for 40-tonne trucks.

The NAG dome will be 51.8 m wide by 70.5 m long and the PAG dome will be 31.4 m wide by 41.3 m wide. Each dome wall will sit on pre-fabricated concrete foundations. The PAG storage will have a concrete floor sloped to a catch basin to retain the PAG effluent.

18.8.7 Office Complex

Provision has been made for administration offices on the fourth floor of the concentrator building. Provision has also been made for a first aid station as well as a conference room and a lunchroom for employees. The senior management staff will have offices located in Saint Michel-des-Saints.

The employee’s changing room and cafeteria are located on the third and fourth floors of the building above the compressor room.

18.8.8 Mine Equipment Maintenance Building

The mining contractor whom will be responsible to provide ore to the crusher will also provide for the mine equipment maintenance building. Facilities provided consist typically of a light structure building that will provide maintenance bays to accommodate the largest mining equipment.

18.8.9 Product Warehousing

Storage space is allocated for in the drying/bagging area of the plant to store 1-tonne bags.

18.8.10 Cold Warehouse

The cold warehouse will be located near the concentrator in an uninsulated dome structure approximately 20 m wide by 60 m long. The warehouse will be configured to store parts and materials not susceptible to cold conditions on shelves, and lighting to maintain an inventory of spares for equipment. The mining operator will maintain his own supply of spare parts for the mining operation.

18.8.11 Dry – Change House

Provision for a change house area is provided on the third and fourth floors of the concentrator above the compressor room and laboratory. It has a floor space of 216 m² and includes showers and changing rooms, which will be ventilated. It will be able to accommodate up to 64 employees of the concentrator. A direct access to the lunchroom also located on the same floor is provided.

18.9 Site Services

18.9.1 Potable Water Treatment

Provision is made for a potable water treatment based on ultra-filtration membrane system to provide service water for the employees.

18.9.2 Sanitary Waste Water Treatment

One (1) sanitary waste water treatment system will be provided for the concentrator, designed for a maximum of about 100 people. No other sanitary waste water treatment system is required for the site.

Provision is made for a modular-type sanitary waste water treatment unit using a Rotating Biological Contactor ("**RBC**") type process. Sanitary and shower waste water are collected via underground piping and discharged into these modularized sanitary waste water treatment units. Sludge will need to be removed about twice a year by a local contractor.

18.9.3 Fuel Storage and Fueling Station

There will be no requirement for the storage of fuel oil other than for the process which will be stored in day tanks. Delivery of fuel will be supplied from the town.

18.9.4 Site Fire Protection

A fire protection loop is planned around the process facilities area to distribute fire protection water to different buildings located within the site pad area. The process facilities will be equipped with sprinkler systems where and as required. One (1) electric fire protection pump, one (1) diesel fixed pump, and one (1) jockey pump are included.

18.10 Electrical and Communications

18.10.1 MV and LV Distribution Levels, Systems Grounding and Load Ranges

The proposed distribution voltage levels for equipment and the type of motors are defined as indicated in the table below. Detailed engineering during the main project phase shall follow the CSA M421 "Use of Electricity in Mines" standard.

Table 18.2 – Voltage and Loads

Voltage	Grounding	Loads
13.8 kV, 3-Phase, 3 W	LRG (400 A)	MV main distribution
4.16 kV, 3-Phase, 3 W	LRG (100 A)	MV distribution Fixed speed and variable speed motors 5 kV
600 V, 3-Phase, 3 W	HRG (5 A)	Fixed speed and variable speed motors 575 V Process loads no larger than 600 kW
600/347 V, 3-Phase, 4 W	Solidly Grounded	Large HVAC Lighting in Process Area Welding receptacles
208/120 V, 3-Phase, 4 W or 120V, 1-Phase	Solidly Grounded	Small motors 115 V Lighting in Buildings and Small HVAC Small loads up to 6 kW

18.10.2 Hazardous Locations

The graphite concentrate and bagging system areas related to the dry screening equipment and the area around the graphite concentrate dryer is classified as a hazardous Class II, Division 2, Group F area. These areas are located in the concentrator building and separated from the rest of the building by an explosion-proof and fire-rated wall.

The electrical equipment enclosures will be rated NEMA 7 and NEMA, 9 and the motor enclosures will be as per Explosion Proof, Class II, Division 2, Group F.

The luminaries, receptacles, cable trays, cables and the electrical installation will conform to the rules of the Canadian Electrical Code, Section 18-Hazardous Locations.

18.10.3 Emergency Power

A 1.5 MW diesel generator will start automatically once the main 120 kV source is lost. The control system will shed loads, keeping only the critical process and services loads engaged.

The UPS system has been specified for 30-minute operation of the critical loads such as the LV control system. The 125 V_{DC} Battery and chargers will be designed for 8 hours of discharge for the MV and HV system control and protection.

The telecommunications system will be provided with embedded batteries in order to ensure emergency communications during a shutdown of the power line.

18.10.4 Electrical Rooms

The main electrical equipment will be installed in eight (8) electrical rooms. The electrical rooms will be pre-fabricated insulated units with necessary HVAC systems. Permanent electrical rooms will be located above ground and movable electrical rooms will be fixed on skids.

The main substation electrical room 210-ER-001 will be a walk-in outdoor type, located within the main switchyard fence, housing the 13.8 kV distribution switchgears, protection control and HQ metering panels.

Electrical rooms 501-ER-001 and 501-ER-002 will be located adjacent to the vicinity of the concentrator, and will feed power to the concentrator plant via overhead cable trays.

Electrical room 100-ER-001 will be located in the mine pit in the crusher area, housing the low-voltage equipment which will feed the semi-mobile crusher(s).

Electrical rooms 100-ER-002 and 100-ER-003 will be identical in design, housing 4.16 kV switchgears to feed in-pit mobile equipment such as electrically-cabled drills, shovels, bulldozers in addition to local auxiliary services. These electrical rooms will be moved as required depending on the stage of mining development.

Electrical room 800-ER-001 will be located adjacent to the de-sulphurization plant area and will feed the equipment in the plant.

Electrical room 970-ER-001 will be located on the west-side co-disposal area and will feed the pumps and bulldozers in the vicinity. This electrical room will be moved as required depending on the stage of mining development.

18.10.5 Motors and Starting Methods

All the motors are induction motors, high efficiency or premium efficiency. A starting method is selected depending on the motor size, on the type of starting torque, on the process needs (fixed speed or variable speed) but also on the grid reliability and on the starter cost. The retained starting methods are:

- Direct-on-line ("**DOL**") starting is the most common method. The advantage is that it is simple, reliable and less expensive. The disadvantage is that the starting line current is five to six (5 to 6) times rated current. The DOL method is used for all low voltage motors, fixed speed applications.
- The Variable Frequency Drives ("**VFD**") enables low starting currents because the motor can produce the required torque at the rated current from zero to full speed. The VFD start provides smooth, step-less acceleration of motor and load while controlling inrush current and the starting torque. As a voltage regulator, they can be used to control the stopping of the process.

18.10.6 Power Factor Correction and Harmonics Filters

Hydro-Québec's requirements concerning the connection to the power grid obligates the Project to maintain the overall power factor at 0.95 or higher. Harmonics must, therefore, be under the limits of all Hydro-Québec requirements.

Two (2) 4.5 MVAR three-step power factor correction units ("**PFC**"), synchronized to the 4.8th harmonic, have been specified and will be installed beside the main 13.8 kV substation area.

The equipment that may generate harmonics are the VFDs used for the process equipment that demand variable speed while in operation. In addition, some of the heaters, controlled by silicon-controlled resistors ("**SCR**") may also generate harmonics. Specifications of the above-mentioned PFC were made on the assumption that all medium-voltage VFDs will be of low harmonic design.

To reduce the harmonic limits, the medium-voltage VFDs supplying the SAG, Ball and Polishing mills will be of the Very Low Harmonics type (active front-end or minimum 24 pulses).

18.10.7 Grounding

For grounding systems, the neutral of the main substation power transformer and the neutrals of the distribution transformers will be resistance-grounded to provide better protection for equipment and personnel, and limit damage due to arcing faults.

For equipment grounding, a grounding system, consisting of a network of copper conductors, will be provided for each process building and substation. The ground conductors will run externally around each building with taps thermo-welded to every other column. The individual ground grids will be tied together with interconnecting ground cables.

All major electrical equipment such as transformers, switchgears, large motors, motor controllers, cable tray systems, water and fuel tanks and substation fencing will be individually connected to the ground network from two (2) points.

The grounding system will be designed to limit the overall resistance to ground to four ohms (4 Ω) or less.

A separate ground bus in electrical rooms and/or control room will be dedicated to instrumentation cables and equipment grounding. This ground bus shall be connected to an isolated grounding system and insulated from the main plant ground. An insulated green ground wire will run to the instrumentation equipment ground studs to ensure instrument grounding system integrity. The instrument ground bus will be connected to the main plant grounding system.

18.10.8 Cables and Cable Trays

The power cables will consist of single (1) conductor or three (3) copper conductors, XLPE-insulated, with aluminum or steel armor, PVC-sheathed and rated for 90 °C.

Cable trays will be ladder-type and made of galvanized steel. Cable trays for instrument cables will have a separated section. For cables of different voltage ratings, either separate trays will be provided or separating barriers will be installed if they lie in the same tray.

18.10.9 Lighting and Small Power

The necessary illumination levels will be provided for all areas as per the lighting specification prepared for the FS, in accordance with the Mining Code.

Process areas with high headroom (higher than 3 metres) will be lit by LED fixtures. Other internal areas of the plant (e.g. process areas that are less than three (3) metres high, offices, electrical and control rooms) will be lit by LED lamps as well.

Outdoor areas (e.g. exterior of process buildings, roads and parking lot) will be lit by LED roadway lighting fixtures and floodlights installed on wooden poles and structures.

Other areas such as process working zones, control and electrical rooms will be fitted with rapid restarting fixtures to provide partial or full illumination after voltage dips or normal power failure.

To permit movement of personnel during a power failure or an emergency situation, all areas will be fitted with individual battery pack units located near passages, stairwells and exits. The exit lights will have built-in batteries and energy-efficient lights; the modules will be located near the exits.

The lighting system and receptacle power will be fed by 120 / 240 V dry-type transformers and panel boards located in electrical rooms.

Lighting in the process and production areas will be switched from panel boards. Outdoor lighting will be controlled by photocells or timers.

Welding/power outlets will be installed at appropriate locations for supplying power to portable welders and similar loads.

18.10.10 Electrical Equipment Specifications

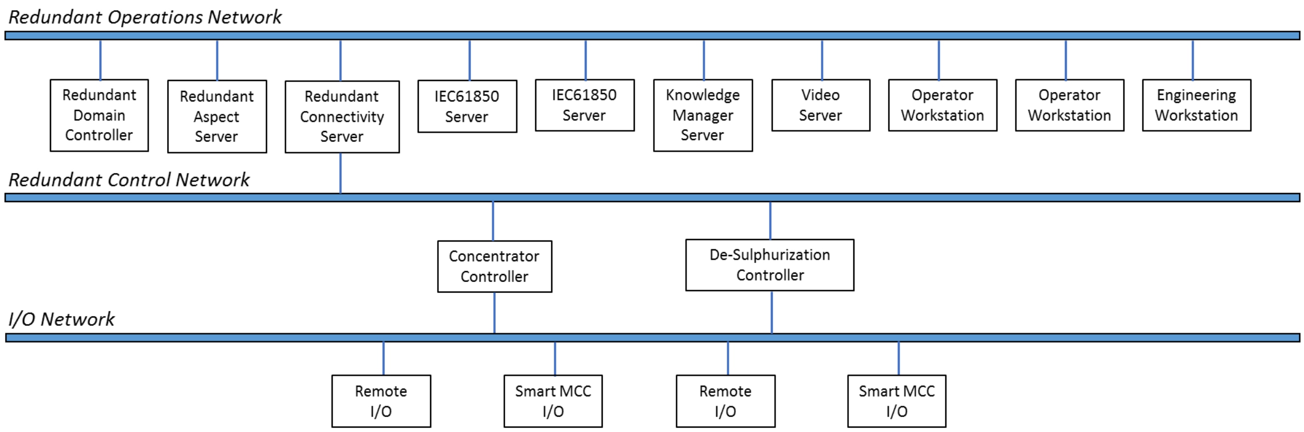
The characteristics of major electrical equipment were based on developed design criteria and then applied to the mechanical equipment list to generate documents such as electrical single-line diagrams ("**SLD**"), equipment datasheets and specifications. These datasheets and specifications were then sent to qualified suppliers in order to obtain budgetary quotations.

18.11 Automation

18.11.1 Control System Philosophy

The block diagram shown in Figure 18.8 shows the various levels of communication within the control system. It should be noted that, for this Project, all communications have been specified to be via Ethernet.

Figure 18.9 – Communication Block Diagram



The instruments and hardwired signals will be wired to the control system using remote junction box style cabinets situated throughout the process. The remote input/output (I/O) cabinets will be connected to the controller via a fibre optic Ethernet loop. The controllers will connect to the system servers via Ethernet switches installed in the control room.

Two (2) controllers have been specified for this Project; one for the concentrator process plant, and the other for the de-sulphurization plant. Both controllers will be located in the control room. No redundant controllers have been specified.

All the soft I/Os, such as the signals/commands from the smart electrical equipment or skid controls, will be linked to the controllers via a communication bus such as PROFINET or Modbus TCP.

18.11.2 Process Control System Input / Output (I/O) Count

The I/O count was based on the piping and instrumentation diagrams ("P&ID"). and is presented in Table 18.3.

Table 18.3 – Input-Output Summary

Area	AI	AO	DI	DO	VFD/MCU	MCU
Concentrator	224	64	1520	560	40	160
De-sulphurization plant	128	4	704	384	20	80

Note: Allowance is made or 6 to 8 soft I/Os per VFD and 4 to 5 soft I/Os per MCU.

Table 18.4 lists the remote I/Os to be connected to the de-sulphurization controller.

Table 18.4 – Input-Output in De-Sulphurization Controller

Area	AI	AO	DI	DO	MCU
Pit	2	0	10	0	3
Tailings	2	0	5	5	3
Garage	0	0	5	0	0
110-CVO-1010	0	0	10	0	3
110-CVO-1020	0	0	10	0	3
110-CVO-1030	0	0	10	0	3
100-ER-001	0	0	9	3	3
100-ER-02	0	0	9	3	3
100-ER-03	0	0	9	3	3
Water Treatment	0	0	9	3	4
Generator	0	0	13	3	0

Note: Allowance is made for 4 to 5 soft I/Os per MCU.

For the FS, 20 % spare I/O capacity has been considered in the design.

18.11.3 Local Control System and Instruments

One (1) local control panel will be provided for each motor or process group of motors. The associated I/Os (stop/start/remote/local) will be hardwired to the I/O cabinets. The control system will then be responsible for relaying start/stop commands to the respective cells in the smart Motor Control Centres ("**MCC**").

18.11.4 Fibre Optic Network

Within the control room, the servers, workstations and controllers will be connected using a Star topology. The fibre optic I/O network is a loop starting with the server in the control room and connected to the nodes of the network using switches and coming back to the control room.

18.11.5 System Server / Software

ABB's System 800xA will be used as the control system platform. System 800xA is based on a Client/Server architecture. Server applications presented in the block diagram above are loaded into servers configured in a Virtual environment. Operator clients will also be loaded onto servers and will connect to Thin clients using Remote Desktop Services ("**RDS**").

18.11.6 Site Telecommunications

The wireless communication system will provide service coverage to:

- Plant operation area (outdoor);
- Concentrator building (indoor);
- Entrance gate (indoor/outdoor);
- Mine operation area (outdoor).

The solution will be based on a broadband mesh communication network based on 802.11n (license-free) dual band. Routers/Access Points density shall be such that continuous connectivity service would be provided to low RF output power devices like VoIP phones, laptops and other personal devices.

Based on the design, there will be a number of Gateways connected to existing fibre or copper Ethernet backhaul network infrastructure, and Nodes that will connect to the gateways wirelessly and extend the service coverage area.

There will be a single "carrier class" Network Management System ("**NMS**") to configure, manage and control all routers of the network. It will be installed in the control room in the concentrator building.

The broadband wireless mesh network will be capable of operation without relying on NMS operation ("controller-less" network architecture).

18.11.7 Telecommunication Network and Mobile Radio System

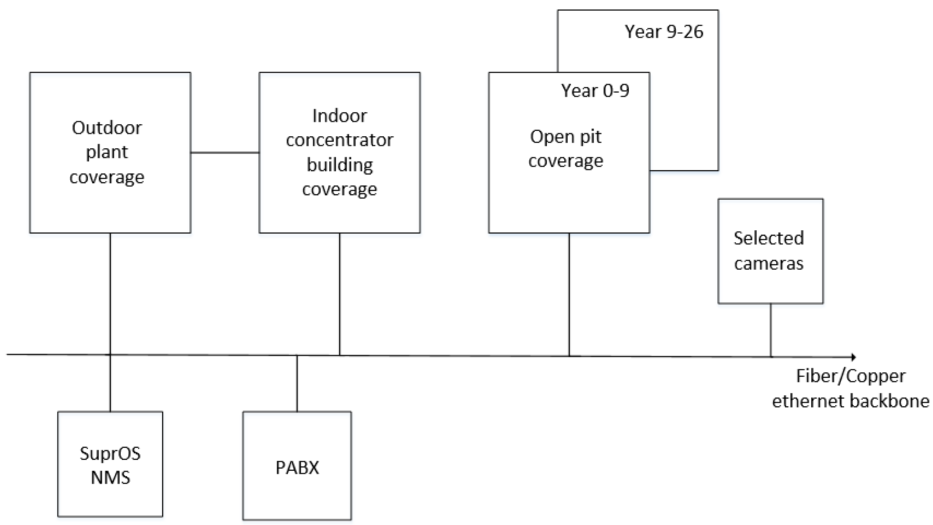
The broadband wireless solution shall be capable of supporting multiple concurrent applications with various levels of priority including traffic segmentation and VLAN, for example. The main applications that will be supported are:

- WiFi unwired remote access to the internet & company intranet;
- SCADA (mobile and stationary) and telemetry;
- Voice-over-IP (VoIP) telephony (IP PBX phone system);

- Camera and security system;
- Other applications as needed in the project, such as Access Control, RTLS (Real Time Location Service).

During construction, a mobile radio system will be used for communication between workers and staff. However, after completion of mine construction, communications will switch over to the Wi-Fi based VoIP telephony system. Aside from the communications equipment deployed outdoors or in the process areas, the key infrastructure, such as servers, will be housed in the control room in the concentrator building.

Figure 18.10 – High Level Architecture of the Wireless Network



18.11.8 Location of Devices

The diagrams below show the locations of wireless devices and the Wi-Fi coverage across the different areas of the mine. For the first nine (9) years of operation, coverage of the open pit will be limited to the co-disposal areas and the southern half of the pit. In Year 8, additional equipment will start to be installed in the north to allow for coverage in that area after Year 9.

Figure 18.11 – Outdoor Plant Coverage

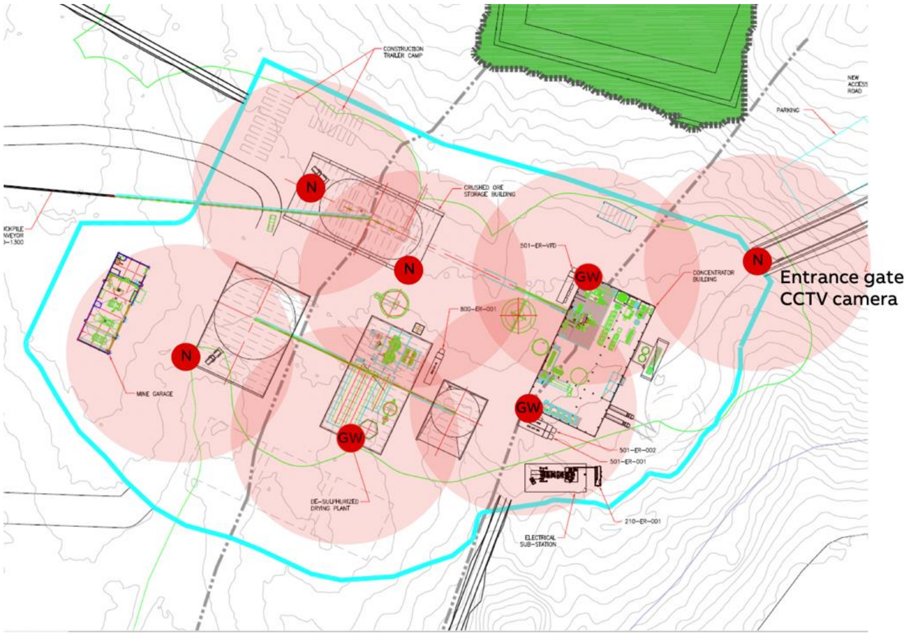


Figure 18.12 – Concentrator Building

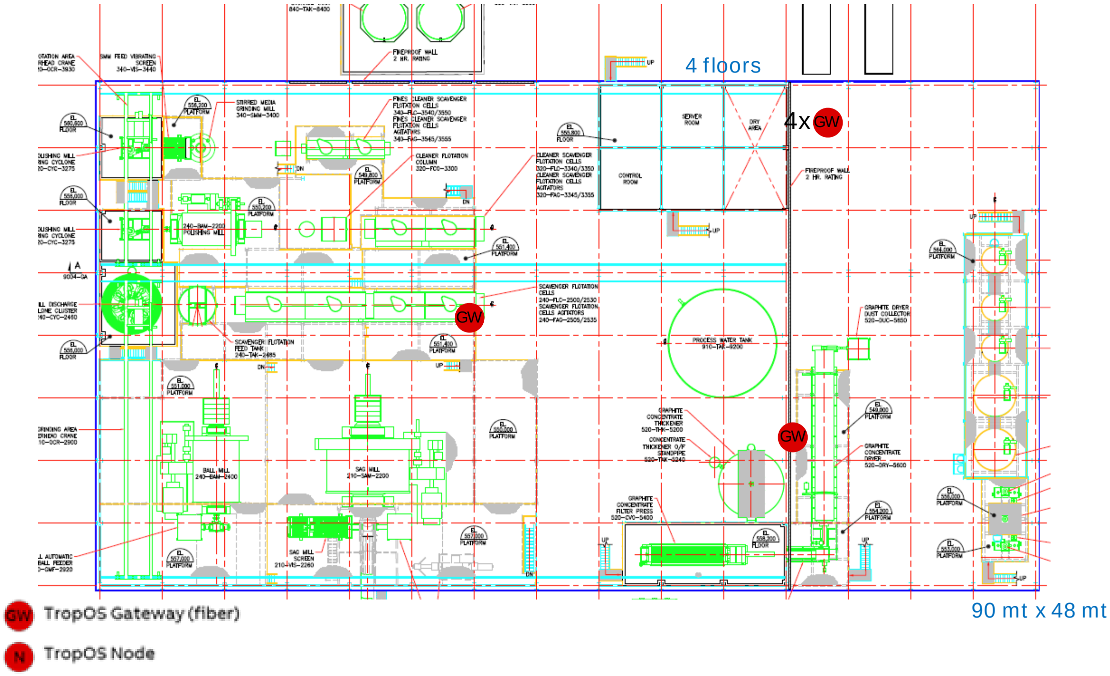


Figure 18.13 – Pit Network Coverage Year 0 to Year 9

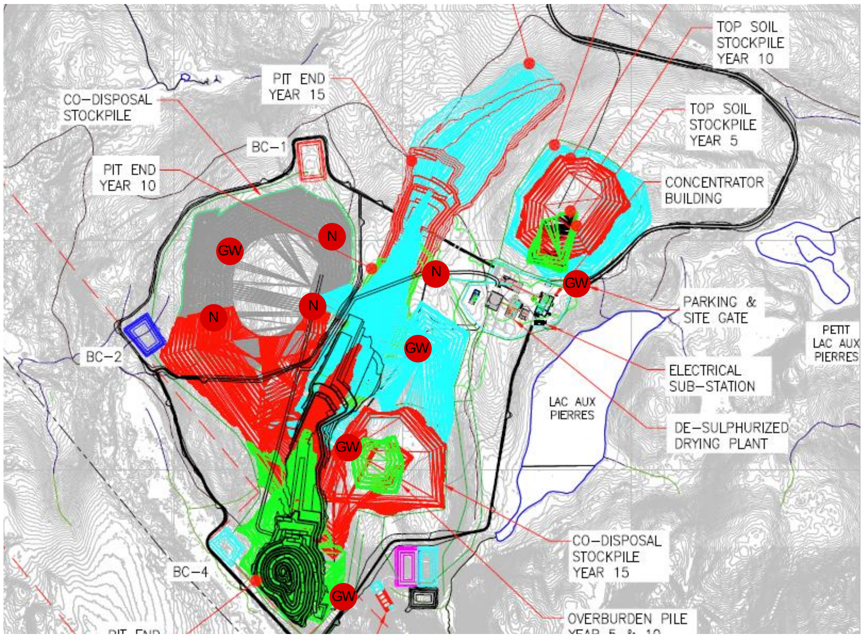


Figure 18.14 – Pit Network Coverage Year 10 to Year 26

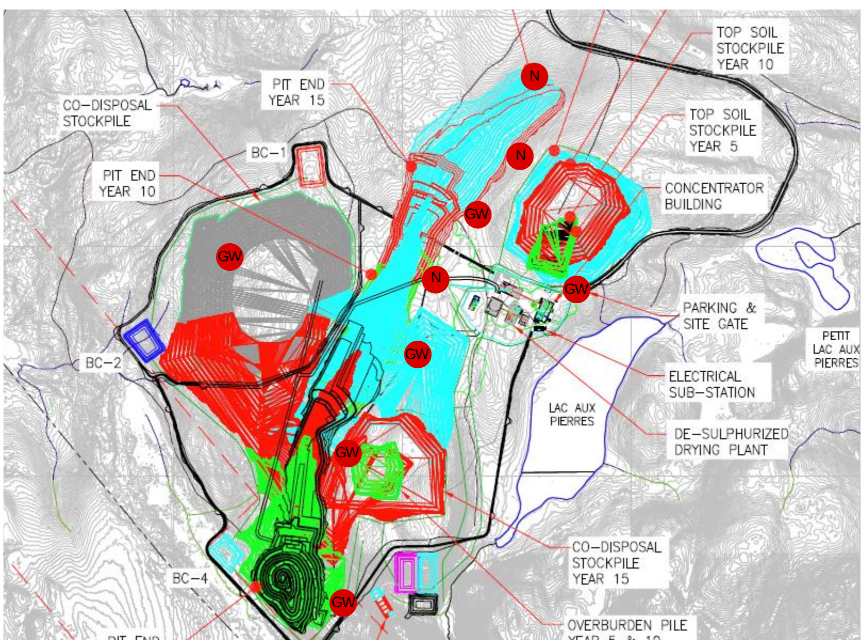
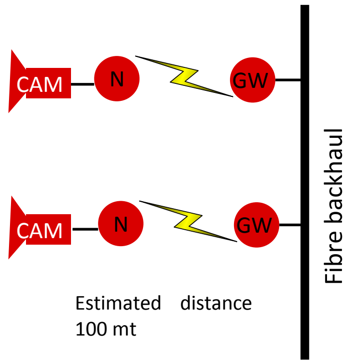


Figure 18.15 – Broadband Communication to Video Cameras not on the Fibre Network



18.11.9 Camera and Security System

The Broadband Wireless Mesh Network will support high-definition camera connectivity to the fibre backhaul via dedicated PtP links while providing WiFi access and mesh network redundancy.

18.12 Tailings and Waste Rock Storage Facility

Geochemical testing carried out on the tailings at the NMG Project shows that the tailings are PAG. The concentrator tailings are initially thickened for process water recovery and then pumped to the tailings treatment plant. The concentrator tailings are de-sulphurized in the tailings treatment plant by sulphide flotation and magnetic separation to produce NAG and PAG tailings. Tailings and waste rocks will be backfilled in the mine pit when access is available during the mining operations.

During Years 0-5, tailings and waste rocks will be managed in a co-disposal stockpile close to the open pit. Materials will be arranged in co-disposition cells to ensure the geotechnical and geochemical short and long-term stability of the stockpile. The combination of co-disposal pile and backfill is designed to manage all the waste materials produced in the 26-Year mine plan while minimizing the total footprint of the Project.

18.12.1 Design Criteria

The co-disposal areas were designed using the following parameters:

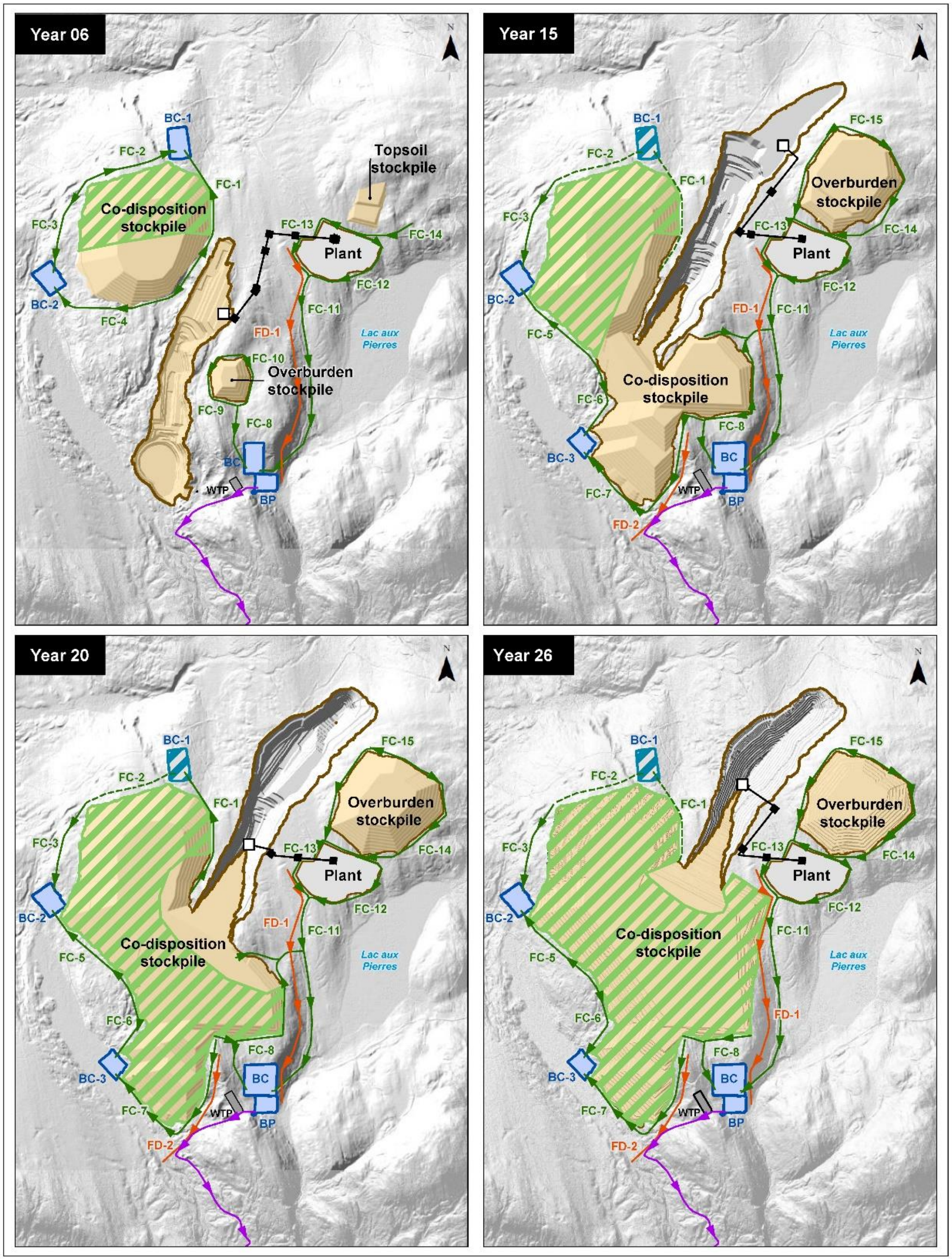
- Tailings dry density of 1.63 t/m^3 for the NAG tailings and 1.97 t/m^3 for the PAG tailings;
- Waste rock swell factor of 25 % which gives a dry density of 2.21 t/m^3;
- Standard cell dimensions of 200 m long by 100 m wide;
- Six (6) m high benches;

- 2.5:1 bench slope for operation;
- 3:1 bench global slope for reclamation (long-term);
- 140 ha of pile final footprint;
- Maximum elevation of 586 m above sea level;
- A minimum 70 m offset will be kept between the foot of the co-disposal pile and the active pit area;
- Approximately 40 % of the entire volume of mining waste produced is going to be backfilled. The co-disposal pile will then contain about 60 % of total waste material produced.

18.12.2 Co-Disposal Storage Facilities Location

The co-disposal stockpile construction will start north-west to the pit. For the first five (5) years of the exploitation all the tailings and waste rocks will go in this area. From Years 6 to 8, tailings and waste rocks will be backfilled in-pit in the available space south of the extraction operations. For the subsequent years, the co-disposal stockpile will be expanded to the south-east, covering the pit and reaching its other side north-west. Figure 18.16 shows the evolution of the co-disposal stockpile including progressive reclamation sequence.

Figure 18.16 – Evolution of the Co-Disposal Stockpile

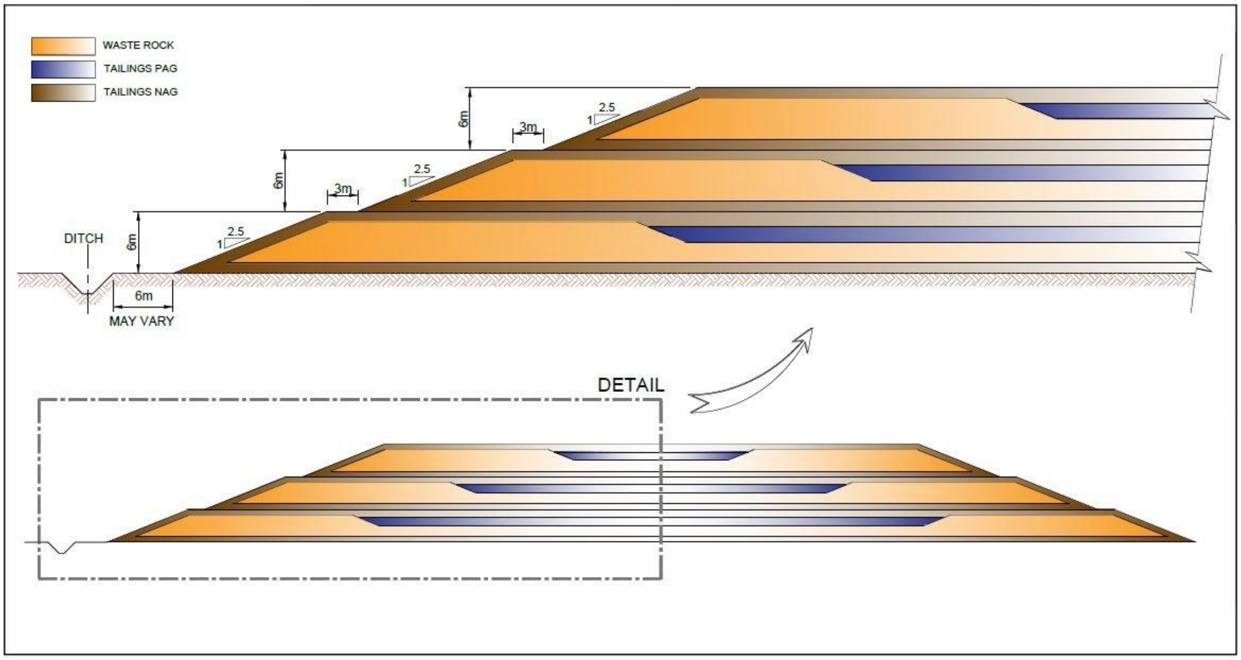


18.12.3 Construction of the CSF Facilities

All the materials will be transported by trucks from the concentrator (tailings) or directly from the mine pit (waste rocks) to the co-disposition area. Specific equipment will be dedicated to transport and dispose of the PAG tailings to avoid contamination.

PAG waste rocks will be encapsulated in a layer of fine grained material (NAG) to limit the oxygen flow. The PAG tailings will be placed and compacted in layers, and superposed on the coarser materials (waste rocks or NAG) to increase the degree of saturation in PAG tailings, limiting air diffusion and thus, reaction of sulphide minerals. Figure 18.17 shows a typical cross-section of the co-disposal pile with the arrangement of the different materials.

Figure 18.17 – Typical Cross-Section of the Co-Disposal Stockpile



The concept of the backfill is slightly different since it is based on the ground water level to keep oxygen out of the PAG tailings in long-term perspective. For waste rock, in-pit disposal will limit oxygen convection into the materials. Table 18.5 shows the quantities of material produced over the 26-Year mining plan and the amount disposed in each facility.

Table 18.5 – Tailings and Waste Material Summary

Material	Tonnage (Mt)	Volume (Mm^3)
PAG Tailings	12.57	6.39
NAG Tailings	44.89	27.47
Waste Rock	49.96	22.63
Total to Manage	107.43	56.49
Co-Disposal Pile Capacity	64.46	33.89
In-Pit Disposal Capacity	42.97	22.60

18.12.4 Reclamation and Revegetation of the CSF

The co-disposal pile will be gradually covered, using a cover with capillary barrier effect ("**CCBE**"), as soon as it reaches its final elevation in the pile. This cover will act as an oxygen barrier and is designed to ensure long-term geochemical stability within the pile. The thickness and function of each layer of the cover will be:

- 0.5 m of screened waste rock, to act as drainage layer;
- 0.4 m of NAG tailings, to act as the water retention layer;
- 0.3 m of overburden, as a protection layer;
- 0.3 m of topsoil, to promote vegetation growth afterwards.

18.12.5 Additional Requirements and Plans for Tailings and Waste Rock Management

The following additional information is required to address project design refinements and confirm the assumptions made for tailings and waste rock disposal:

- Validation of the co-disposal cells efficiency to confirm on the necessity of a multi-layer cover with CCBE as a reclamation cover;
- Additional stability analyses to evaluate the effect of the blasting activities on the pit and the co-disposal pile will have to be carried out;
- Additional validation and engineering will have to be carried out regarding a protective rock layer between the in-pit co-disposal and the northern part of the pit where a lake will form after site reclamation;
- A geotechnical investigation campaign is required to characterize the area of the co-disposal stockpile and detail the properties and the thickness of each soil in place;
- A deposition plan detailing the sequencing of deposition for each material (waste rock as well as PAG and NAG tailings) to build the co-disposal pile and confirm the volume of material to manage in the co-disposal pile concept and the pit.

19.0 MARKET STUDIES AND CONTRACTS

Mr. Armando Farhate supplied the data and elaborated the basis of this Section from the previous study. He is a mechanical engineer who graduated from UNIP – São Paulo, SP, Brazil in 1987. He obtained a postgraduate in Business Administration (MBA) from Mauá – São Paulo, SP, Brazil in 1998. He has worked as a C-Level executive in graphite mining companies in Brazil and Canada for six (6) years.

This Section has been updated with the information provided by Benchmark Mineral Intelligence (“**Benchmark**”). Benchmark is an independent credible source who compiles international graphite prices for various commercial size fractions and concentrate purities.

19.1 Introduction

Graphite is a form of carbon characterized by its bi-dimensional hexagonal crystalline structure known as graphene, stacked in several thousand layers bound by Van der Walls force. It occurs naturally in metamorphic rocks such as marble, schist and gneiss, or is obtained synthetically by the calcination of various carbon sources such as petroleum coke. When subjected to extremely high pressure and temperature, the only other existing form of crystalline carbon is generated: diamond, with its three-dimensional structure.

Graphite has unique chemical, electrical, mechanical and thermal properties, such as:

- High electric conductivity due to the free flow of electrons through the atoms forming the graphene grid;
- Heat conductivity along the molecular plane, and heat insulation in the thru plane;
- Low reactivity, due to the high stability of the hexagonal C atom structure, providing very high resistance to oxidation, thermal shock and chemical attacks;
- High sublimation point (≈4,000 °K at 1 atmosphere);
- Low expansion coefficient;
- Low friction coefficient as a result of the slipping effect between graphene layers;
- Low absorption of X rays.

This set of properties allows graphite to find demand from a very wide array of applications, from pencil lids and refractory bricks, to battery anode material.

Graphite is commercially available in four (4) types, depending on the source, particle size and crystallinity:

- Natural Amorphous [60-85 % C(g)]: Less than 200 mesh in size, low crystallinity;
- Natural Flake [> 75 % C(g)]: From large flakes (+ 50 mesh) to fine flake (- 150 mesh), high crystallinity;

- Synthetic Flake [> 99.55 % C(g)]: Fine particle size (- 150 mesh), very high crystallinity;
- Vein [> 95 % C(g)]: found in lumps that can be worked into shapes, high crystallinity.

The Matawinie deposit contains natural flake graphite. Table 19.1 shows the different types of natural flake graphite, for both primary and secondary transformation processes along with the typical purity and particle size distribution.

Table 19.1 – Different Types of Natural Flake Graphite

Type	Feed Material	Typical Purity	Type of Processes	Typical Particle Size Distribution
Flake Graphite	Ore	75 % to 98 %	Mechanical concentration and flotation	+ 50 mesh to - 100 mesh
High Purity	Flake graphite	99 % to 99.9 %	Leaching or calcination	+ 50 mesh to - 100 mesh
Micronized	Flake graphite	95 % to 98 %	Milling	< 100 µm
High Purity Micronized	High purity	99 % to 99.9 %	Milling	< 100 µm
Spherical	High purity micronized	≥ 99.95 %	Shaping	< 30 µm
Expandable	Flake graphite	95 % to 98 %	Chemical intercalation	> + 80 mesh
High Purity Expandable	High purity	99 % to 99.5 %	Chemical intercalation	> + 80 mesh
Expanded	High purity expandable	99 % to 99.9 %	Heat shock and milling	< 100 µm
Foil	Expandable	95 % to 99.5 %	Heat shock and lamination	Various

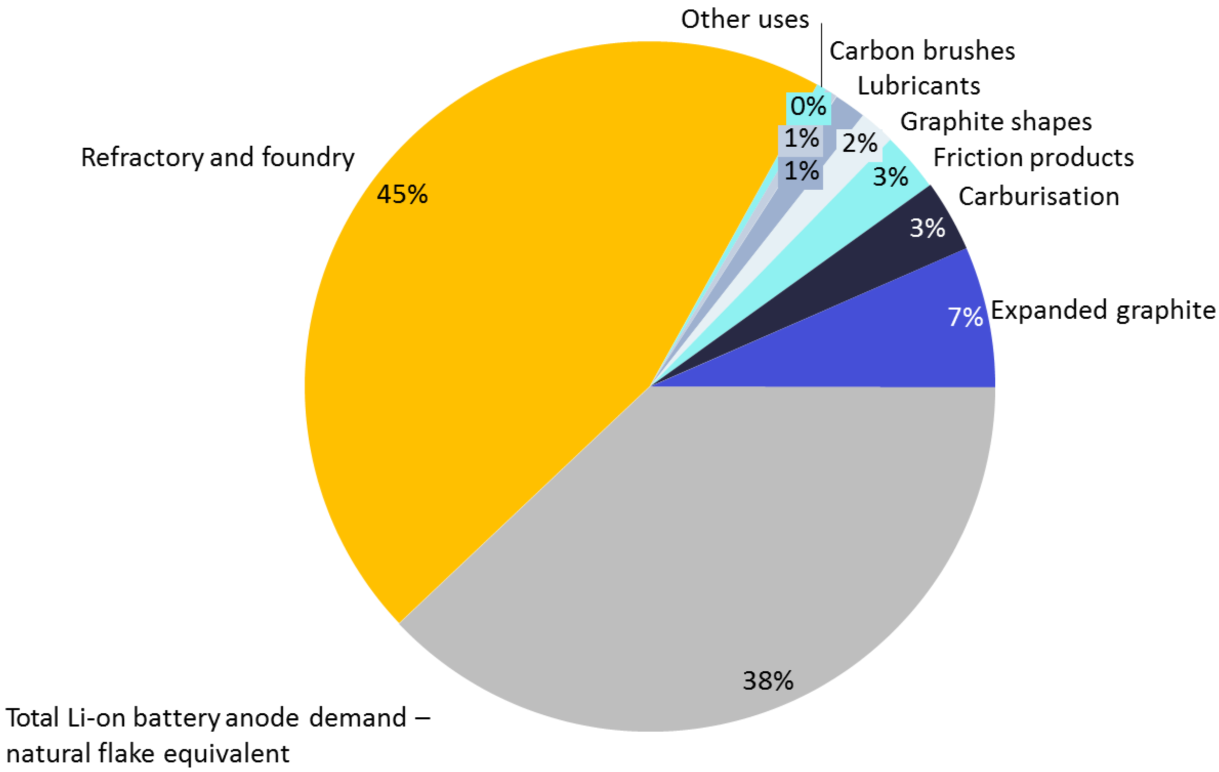
19.2 Uses and Demand Trends

The most relevant commercial uses of natural flake graphite are listed below:

- Refractories – Flake graphite;
- Batteries:
  - Alkaline – High purity micronized, expanded;
  - Lithium-ion – Spherical;
  - Lead Acid – High purity;
  - Ni-MH – High purity.
- Powder Metallurgy – Micronized;
- Gaskets and Seals – Foil;
- Thermal Management – Foil;
- Polymers – Flake graphite, micronized, high purity micronized, expanded;
- Carbon Raiser – Flake graphite;
- Friction Materials – Flake graphite, micronized;
- Carbon Brushes – High purity;
- Flame Retardants – Expandable, high purity expandable;
- Drilling Lubrication – Flake graphite;
- Seed Lubrication – Flake graphite;
- Greases and Oils – Flake graphite, micronized;
- Pencils – Micronized;
- Coatings and Paints – Flake graphite;
- Hot Metal Forming – High purity;
- Fuel Cells – High purity;
- Nuclear Cores – High purity.

Figure 19.1 summarizes the graphite market by main applications.

Figure 19.1 – Natural Graphite Demand per Application



Source: Benchmark Minerals, 2018

Table 19.2 lists the future demand trends by main applications.

Table 19.2 – Future Demand Trends by Main Applications

Application	Trend	Opportunities	Threats
Li-ion Batteries	High Growth	Advance of EV, PEV, HPEV	New anode technologies
Flame Retardants	High Growth	Stringent construction rules	
Polymers – Conductivity / Strength	High Growth	Replacement of metallic parts on automotive	Competing materials
Polymers – Insulation	GDP Growth	Stringent construction rules	EPS cost reduction
Thermal Management	GDP Growth	Growth of electronic market; New applications on construction	Downsizing of electronics

Application	Trend	Opportunities	Threats
Lead-Acid Batteries	GDP Growth	Replacement of carbon black; Start-stop vehicles	Eventual replacement for Li-ion
Friction	GDP Growth	Growth on automotive and OEM markets	Advance of alternative technologies
Gaskets and Seals	GDP Growth	Growth on automotive and OEM markets	
Powder Metallurgy	GDP Growth	Replacement of machined parts on automotive	
Carbon Brushes	GDP Growth	Electric motors, automotive	
Nuclear Cores	GDP Growth	Replacement of coal thermal generation, advancement of Pebble Bed reactors	Wind and solar power
Fuel Cells	GDP Growth	Hydrogen vehicles	
Refractories	Stable	Rebound on steel demand driven by construction and oil exploration	Improved quality and technology by the brick manufacturers reducing demand per ton of steel; Advance of monolithic
Alkaline Batteries	Stable	Replacement of synthetic graphite at lower cost	Growth of rechargeable batteries
Lubricants	Stable	Organic growth	Talc and other minerals
Foundries	Declining	New alloys	Replacement by polymers, composite materials and powder metallurgy

Natural graphite cannot be directly recycled in virtually all applications due to contamination, wear, and by becoming an intrinsic part of the alloy it composes. However, in the latter case, it undergoes secondary recycling, mainly for steel. This means that even in mature markets, recycling is not a demand-limiting factor for primary natural graphite mining.

Possible future influences on graphite demand from the high growth trending applications are described below.

19.2.1.1 Lithium-Ion (Li-Ion) Batteries

Under the existing technology, graphite is the most suitable material for anodes of Li-ion batteries, and this type of battery is steadily replacing all other types of small rechargeable batteries. The consumption of graphite for this application was 100,000 tonnes in 2014, with a split of 40 % of Natural Graphite, and 60 % of synthetic graphite. The estimated usage of natural graphite in 2015 was 52,000 tonnes, which corresponds to a growth of 30 % year-over-year. There are many different projections for growth of graphite demand for Li-ion batteries; the most pessimistic growth projections are already in the range of significant 15 % Compound Annual Growth Rate ("**CAGR**") per year.

The development of vehicle electrification is the primary factor generating demand growth for this type of material. This is further made evident through the latest announcements of major car companies who recently committed to produce electric vehicles ("**EV**") in greater numbers, with the announcement of 120 new models to be launched from now until 2020[3]. Even modest replacement of the internal combustion engine ("**ICE**") vehicles by EVs will have a substantial effect on the graphite market. One million (1 M) EVs, which represent less than two per cent (< 2 %) of annual new car sales, require up to 50,000 tonnes per year of anode graphite to produce the batteries.

19.2.1.2 Flame Retardants

New and more stringent fire prevention rules have been implemented in most of the advanced countries, and may be implemented in emerging countries as well. The application of a layer of expandable graphite (large flake natural graphite intercalated with acid molecules) with a bonding agent, around the edges of building doors, is used as a sealing agent triggered by high temperatures. In case of fire, the heat causes the salt particles to decompose and form gases, increasing volumes over 200 times, and thus sealing the gap between the door and the frame, preventing smoke from the fire to propagate through the building.

Expandable graphite is also used as additives to rubber and foams, causing these materials to improve their fire-retardant properties.

This application requires large graphite flakes (> 80 mesh), which has demonstrated to be present and retrieved from NMG's West Zone Deposit.

19.2.1.3 Thermal Management

The introduction of flat screens for electronic appliances created the need to evenly dissipate the heat generated by electronic components. The screens are sensitive to heat, and eventual hot spots behind them in the electronic components cause dark spots on the screen. In case of very thin appliances, high purity foils are required since they allow lamination to lower thickness.

Other applications for the heat dissipating foils, mainly in construction, are under development, and can boost demand in the near future.

[3] Article from Tom Randall, April 25, 2017. https://www.bloomberg.com/news/articles/2017-04-25/electric-car-boom-seen-triggering-peak-oil-demand-in-2030s.

19.3 Producer

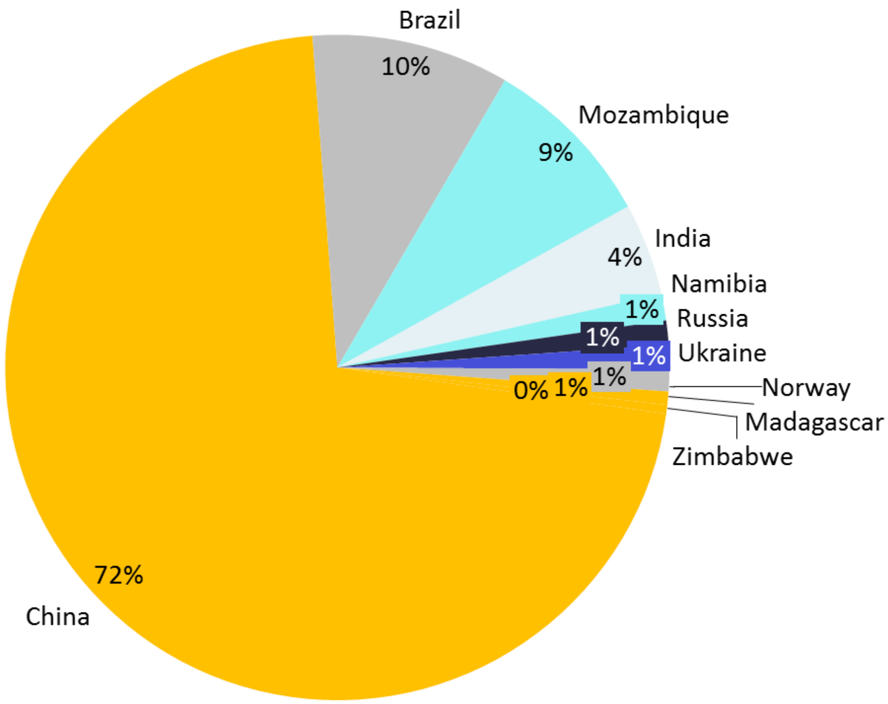
China is the largest producer of natural graphite, followed by Brazil and Mozambique.

Besides being the largest producer, China also has extensive reserves for future exploration. Such dominance is reflected overall in the market, as Chinese price fluctuations affect the global market. The Chinese government, as in any relevant economic activity, dictates the strategy and to ensure alignment to the country's long-term projection.

For example, China introduced a 20 % export duty on raw natural graphite in 2010, in order to force replacement of low value-added exports by using of this material for higher value-added applications within China, anticipating the then emerging demand for lithium-ion batteries. This duty caused a strong inflation on international prices in 2010 and 2011. In parallel, new restrictive environmental regulatory measures were implemented in China, forcing the older and more outdated producers to either go out of business or to consolidate with larger producers, which initially caused a reduction in total production of around 30 %. Consequently, many graphite exploration projects were initiated or resumed worldwide.

Since 2012, however, the decrease of commodity prices and reduction on China's growth pace has had a negative impact on demand, and consequently on price, which reached a record low at the end of 2016, when the Chinese government dropped its export duty.

Figure 19.2 – 2018 Natural Flake Graphite Production per Country



Source: Benchmark Minerals, 2018

19.4 Second Transformation

NMG is currently studying possible second transformation processes in order to serve more profitable value-added markets. It should be noted that NMG already possesses a market mapping which is comprehensive to all-natural graphite applications, including those of added-value products.

19.4.1 Shaping and Purification

The main targets for second transformation are shaping and purification, in order to produce uncoated spherical purified graphite ("**SPG**") for anode material manufacturing.

Currently, most of the production of spherical graphite is made in China. The shaping process consists of consecutive milling steps, which is an energy-intensive process, and provides a yield of 30 to 50 %, meaning that 50 % to 70 % of the raw material is rendered useless for this application during processing. In the case of natural graphite, the shaping must be followed by purification. In China, this is carried out by chemical leaching using hydrofluoric acid, with its consequent wastewater contamination. The graphite by-product generated due to the low yield is also a liability, and either it is discarded in the environment, or sold at marginal prices to low-end applications.

The above scenario is a tangible risk for the battery manufacturers who aim to serve the western world markets. Tesla Motors, the most prominent electric vehicle manufacturer in the United States, is in the process of building a "gigafactory" of batteries in Nevada, with investments in the range of US$ 5 billion. They have already announced that their objective is to acquire all minerals in North America, from environment-friendly suppliers.

As natural graphite deposits are rare and small in the United States and Mexico, this represents an excellent competitive position for Canadian producers, particularly in Quebec, where the energy cost is low enough to allow purification by thermal processes instead of leaching. There is also an opportunity for the application of more modern and effective shaping techniques. In pilot production scale, yields between 50 and 70 % have already been achieved by means of higher capital demanding equipment, but with payoffs in energy consumption and by-product generation.

NMG aims to produce high purity flake graphite, which has been proven possible by its metallurgical test results, which are consistent with the Li-ion anode raw material needs (private communications between Li-ion battery manufacturers and NMG). NMG is currently focusing its efforts towards this market.

19.4.2 Purification

Using the same purification installation required for Section 19.4.1 above, other more profitable value-added markets can be served. Purified large natural graphite flakes serve the high-end foil and refractory applications, and prices range from $ 2,000 to 2,500 US/tonne. Purified fines are used in pencils and carbon brushes. Other markets, such as fuel cells, require for high purity jumbo flakes as well. Selling prices can reach around $ 6,000 US /tonne for this product.

19.4.3 Micronization

Non-purified materials from this second transformation serve different end markets such as powder metallurgy and polymers. Purified materials serve mainly the traditional alkaline battery market.

19.4.4 Intercalation

This second transformation produces expandable graphite salt, used in the application of flame retardants. It also allows for the production of feed material for expanded graphite. The latter is used to produce foils and gaskets.

19.5 Price Forecast

The graphite concentrate sales price used for the FS was established at $ 2,261 (1,730 USD) per tonne. The selling price was calculated using price forecasts provided by Benchmark as of July 2018 for Matawinie flakes mesh basket composition. The Tony Block's West Zone graphite concentrate value was calculated based on the weighted average of each size fraction and purity obtained during the metallurgical testing presented in Table 17.3. The sales price conditions were based on ex-works mine site. However, due to its strategic location close to two (2) seaports (approximately 160 km to Montréal and Trois-Rivières by paved roads) and proximity to North American end users (mostly based in the Great Lakes area), customers will benefit of low transportation cost to their manufacturing facilities. Table 19.3 presents graphite concentrate prices in USD for various size fractions calculated for years 2022 through 2047.

Table 19.3 – Price per Size Fraction

Size Fraction	Weight (%)	Purity [% C(g)]	Price C(g), Ex-Works ($ US/tonne)	First 5 years Average Price ($ US/tonne)
+ 50 mesh	15	94 - 97	2,710	2,548
+ 80 mesh	33	94 - 97	1,907	1,643
+ 140 mesh	28	94 - 97	1,547	1,263
- 140 mesh	24	94 - 97	1,091	1,065
Weighted Average	**100**	**94 - 97**	**1,730**	**1,532**

For more details on pricing, please visit http://benchmarkminerals.com/.

19.6 Contracts

No contracts have been established by NMG at the issuance of the Report. NMG has not hedged, nor committed any of its production pursuant to an offtake agreement.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Studies

Several environmental studies have been completed since 2015. Fieldwork to describe the receiving environment started in June 2016 and continued through 2018. The following Section describes reports the main findings of these studies.

20.1.1 Physical Environment Baseline Studies

20.1.1.1 Climate and Meteorology

The climate of the study area is continental subarctic (or boreal) according to the Köppen-Geiger climate classification system (SNC-Lavalin 2018). Winters are long and cold and summers are short. Rainfall is moderate without a dry or wet season. The hottest month is July (17.8 ºC) and the coldest month is January (-14.0 ºC). The temperature is above the freezing point approximately 270 days annually.

Total annual precipitation is approximately 940 mm, of which 78 % is rain and 22 % is snow. The direction of prevailing winds is west from September to April, and southwest during the summer, from May to August.

20.1.1.2 Air Quality

The initial air quality was assessed based on regional air quality data from Quebec’s monitoring network and on regional air emission sources (SNC-Lavalin 2017b). The initial air quality of the project site is considered to be good.

NMG has also conducted a preliminary atmospheric dispersion modelling of total particulate matter and fine particulate emissions from mining operations (Consulair 2017). The main objective of this study was to identify the main sources of impact on air quality and provide guidance for the Feasibility Study and the Social and Environmental Impact Assessment Study. Current mitigation measures for fugitive dust emissions were considered in the analysis. Preliminary results show potential exceedances of ambient air quality standards for fine particles and total particulate matter at the limit (300 metres from the mine site infrastructure) of application of the *Clean Air Regulation*, as well as at a sensitive receptor (residence) for total particulate matter. Consulair suggested additional mitigation measures.

In addition, concentrator emissions were not considered, nor were emissions of other air contaminants (engine exhaust, metals in particulate emissions). The modelling remains very conservative (cautious) since it did not take into account dust deposition. Integrating this phenomenon into the modelling would have a significant positive impact on the results, as it would considerably reduce the estimated concentrations in the ambient air.

In light of available studies on air quality, it appears that air quality could be an environmental issue for the residents located very close to the mine site, but there is no indication at this time that the project could have a large enough impact on air quality to jeopardize its implementation.

Air emission modelling, performed in accordance with the MELCC guidelines, should be available by the beginning of 2019. These results as well as appropriated mitigation measures will be integrated in the Environmental Impact Assessment Report.

20.1.1.3 Soil Characterization

A soil characterization study was conducted in 2016 and 2017 on the Tony Block's West Zone (SNC-Lavalin 2017c, 2018). The objective of this study was to determine the baseline conditions of the soils in areas potentially impacted by the project, including the pit site, mining infrastructure and tailings and waste rock storage areas. A total of six (6) exploratory trenches and manual test holes were sampled during the 2016 campaign. In 2017, 26 exploratory trenches were sampled on the future mine site and its periphery to determine the soil type, granulometry, and concentration of selected chemical parameters. Selected analytical parameters included metals (Ag, As, Ba, Be, Cd, Co, Cr III, Cr VI, Cu, Mn, Hg, Pb, Sb, Ti, Tl, V, Zn, Zr) in 2016 and metals (Ag, As, Ba, Ca, Cr, Co, Cu, Sn, Mn, Hg, Mo, Ni, Pb, Se, Zn) pH, sulphur, total cyanide, polycyclic aromatic hydrocarbons (PAHs) and petroleum hydrocarbons (C_{10}-C_{50}) in 2017.

Granulometric analysis confirmed field observations and indicated that the soil is generally a silty sand type with some gravels. The analyses showed that all soil samples had metal, sulphur, total cyanide, PAHs, and petroleum hydrocarbons (C_{10}-C_{50}) concentrations below criteria "A" of the *ministère de l'Environnement et de la Lutte contre les changements climatiques*' (MELCC) as described in its *Guide d'intervention* (Beaulieu 2016). Soil pH is neutral, between 6.2 and 7.7, to slightly acidic (pH 5).

20.1.1.4 Sediment Characterization

Surface sediment sampling was conducted in the summer of 2016 to determine its quality (SNC-Lavalin 2017d). Sediments were collected at 11 stations located in ten (10) lakes of the study area, including the *lac aux Pierres* (two (2) stations). Analysis parameters included total extractable metals, pH, total phosphorus, total sulphur, total organic carbon, and petroleum hydrocarbons. The results were compared to the Criteria for the Assessment of Sediment Quality in Quebec and Application Frameworks: Prevention, Dredging and Remediation (Environment Canada and *ministère du Développement durable, de l'Environnement et des Parcs* [MDDEP] 2007). According to these analyses, cadmium, mercury, lead and zinc exceeded the established criteria's. There is no issue associated with these exceedances that is likely to have an impact on resource extraction. Additional sampling was carried out in summer 2018 to further assess sediment quality in the *ruisseau à l'Eau Morte* (which is the most likely to receive the final effluent from the Project). Analysis of the 2018 data will be completed in December 2018.

Geomorphology and Topography

The landscape of the northern part of the Lanaudière region has been shaped over the years by glaciations and movement of the Earth's crust, several million years ago. It is dominated by the presence of the Laurentians, which constitute old mountains whose summits softened or eroded over time.

High hills dominate the natural landscape of the study area, more specifically the *lac Sawin*, *lac Saint-Servais* and *lac Saint-Elphège* high hills. Also, present are the hills of *lac Riopel* in the north, in the *rivière Matawin* area, and the hills of *lac de la Bouteille* in the east. These two (2) formations have smaller differences in elevation. The average elevation of the hills in the study area varies from 400 to 740 m, with a minimum elevation on the banks of *réservoir Taureau* (360 m).

20.1.1.5 Geomorphology and Topography

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20.1.1.6 Geochemistry

The following soil and rock materials will be disturbed by mining activities (SNC-Lavalin 2017e): overburden; waste rock that is predominated by mixed forms of paragneiss and followed by smaller amounts of charnockite, biotite paragneiss, meta-gabbro and graphitic paragneiss. Processing of the graphitic ore will produce both a sulphurized and a de-sulphurized tailings stream.

Representative samples of overburden, waste rock and tailings materials were subject to the following geochemical tests (SNC-Lavalin 2017e): mineralogy (XRD and QEMSCAN); acid-base accounting (ABA) (Mining Environment Neutral Drainage Program [MEND] 2009); elemental analysis (*Centre d'expertise en analyse environnementale du Québec* [CEEAQ] 2012); and TCLP, SPLP and CTEU-9 static leachate tests (CEEAQ 2012).

In relation to waste rock and overburden, ABA data suggests up to 81 % of waste rock will be potentially acid generating (PAG) and includes graphitic paragneiss and mixed paragneiss. The non-PAG materials appear to be the overburden, charnockite, meta-gabbro and biotite paragneiss waste rock. No waste rock type or overburden is considered "high risk" according to *Directive 019* criteria for TCLP leachable metals (MDDEP 2012). The graphitic paragneiss waste rock showed a leaching potential for zinc, and a lower leaching potential for copper and cadmium. Kinetic test on waste rocks using humid cells showed exceeding of *criteria résurgences des eaux souterraines dans les eaux de surface* ("**RES**") and *Directive 019* criteria for iron, nickel and zinc in late rinse (55 to 65 weeks) (SGS, 2018). The kinetic column test done on the same kind of waste rock also showed exceeding of RES and *Directive 019* criteria for iron, nickel, cadmium, manganese and zinc. Every single lithology showed at least one exceeding of criteria at one time during these column tests.

In relation to tailings, ABA and mineralogical data sets suggest the sulphurized tailings will be PAG and the de-sulphurized tailings will be non-PAG. The PAG tailing showed a leaching potential for cadmium and nickel. The NAG tailing did not show any leaching potential. Neither the sulphurized tailings nor the de-sulphurized tailings can be considered "high risk" according to *Directive 019* criteria for TCLP leachable metals (MDDEP 2012). Kinetic test performed on PAG tailings showed an excess of regulation (*Directive 019*) in cadmium, cobalt, iron, manganese, nickel and zinc. The same kinetic tests done on NAG tailings did not show any excess of regulation for this material.

20.1.1.7 Hydrology

Several watercourses drain the northern part of the Lanaudière region, including the *rivière Matawin* which drains almost the entire territory of Saint-Michel-des-Saints (SNC-Lavalin 2018). The water of the area is drained into the *réservoir Taureau*, less than ten (10) km northeast of the study area. Ultimately, the *rivière Matawin* ends in the *rivière Saint-Maurice*, a major subwatershed of the St. Lawrence River.

The drainage system is well -developed in the study area with several water bodies and streams. Several large lakes are present near the study area: *lac England* (135 ha), *lac du Trèfle* (203 ha), *lac Kaïagamac* (195 ha), *lac Saint-Servais* (198 ha) and *lac Sawin* (324 ha).

The mineralized zone of the Matawinie Project is located on a high point, at the head of three (3) small watercourses. Two (2) of these watercourses flow to the northwest and eventually empty into the *rivière Matawin*. The third watercourse is connected to the *lac aux Pierres* and flows south into the *ruisseau à l'Eau Morte*, which is a tributary of the *rivière Matawin*. The *ruisseau à l'Eau Morte* watershed has an area of 85 km^2. This watercourse will receive the effluent of the Matawinie Project's treated water plant. The water quality and sediments have been characterized in 2017 and 2018 in order to prepare a request for the determination by the MELCC of the environmental objective for the effluent in this particular watercourse.

20.1.1.8 Hydrogeology

Preliminary investigations to establish the baseline hydrogeologic conditions on the future mine site (Tony Block, West Zone) and its surrounding areas took place during the period ranging from the fall of 2016 to the summer of 2017 (SNC-Lavalin 2016a, 2017f). This work included an inventory of existing private wells in the area, groundwater quality determination, piezometric survey of private wells, exploratory boreholes, hydrogeological wells, permeability tests, pumping tests, as well as hydraulic borehole tests. The main conclusions of this study are as follows:

a. Private Well Inventory

The inventory of private wells identified 25 private wells within 3 km of the future mine site. Most of these wells are located north of the Project site and are bored in the rock. Fifteen (15) private wells and two (2) surface water sources were sampled and analyzed in the laboratory. Water quality is generally good. The majority of total metal concentrations are below the potable water criteria's.

b. Pit Area

- Two (2) hydrogeological units were identified, i.e. unconsolidated deposits composed of sandy-silty till especially northeast of the future mine site, reaching 40 m in thickness, and the underlying fractured rock mainly composed of paragneiss and gneiss.
- Groundwater depth in the rock unit is very variable, ranging from the ground surface to nearly 38 m below it, corresponding to water elevation variation between 481 and 572 m above sea level ("**asl**"). Artesian condition is observed in the roc aquifer in the areas where groundwater table intersects ground level (particularly northeast and southwest of the deposit).

  This variation of water levels is typical of environments with a variable topography. At the site scale, there is a piezometric dome oriented northeast-southwest, due to the topography of the site, where groundwater flows towards each side of this dome axis.

  At the subwatershed scale, groundwater hydrology is controlled by the general topography and surface drainage of this subwatershed; it flows from south to north towards the *rivière Matawin*. Three (3) test wells in the deep bedrock, 15 boreholes and observation wells in the overburden and/or shallow bedrock were sampled and analyzed in the laboratory. Water quality is generally good.

- Three (3) pumping tests conducted in the area of the deposit, with constant rates between 1,2 and 5,2 L/s during 24 to 48 hours, showed a radius of influence (groundwater drawdown) between 270 m and 600 m from the pumping well.
- The hydraulic conductivity is relatively variable from low to moderate permeability, ranging from 1 x 10^{-9} m/s (solid rock) to 2 x 10^{-5} m/s (fractured rock). The hydraulic conductivity of surface till ranges from 1 x 10^{-8} to 3 x 10^{-6} m/s. The hydraulic conductivity variability decreases with depth and is centred around an average value of 2 x 10^{-7} m/s. Higher permeability is generally found within the mineralized zone.
- The bedrock transmissivity ranges between 6 x 10^{-6} and 2 x 10^{-4} m^2/s. The storage coefficient varies between 1 x10^{-3} and 6 x10^{-5}, which is characteristic of fractured roc aquifer.

A regional hydrogeological conceptual model was developed based on fieldwork results and some assumptions that allowed building a 3D model calibrated for the natural groundwater flow condition. The pit dewatering simulations are in progress in order to evaluate dewatering flow rate and drawdown for different pit phases.

20.1.1.9 Surface Water Quality

Initially, surface water sampling was conducted during two (2) periods, i.e. in the summer of 2016 and in the spring of 2017, to determine its quality (SNC-Lavalin 2017d). Surface water was sampled at 16 stations located in ten (10) lakes and six (6) watercourses.

In addition, surface water quality sampling was completed during 7 months from November 2017 until October 2018 in *ruisseau à l'Eau Morte* and during four (4) months in *rivière Matawin* with the objective to provide water quality data to the MELCC that are required to define the Environmental Objectives of treated water release in the watercourse (*Objectifs environnementaux de rejet*).

The analysis was performed on four (4) main parameter groups: basic physicochemistry and nutrients; anions-cations; extractable trace metals; and petroleum hydrocarbons and phenols. The results were compared to the provincial criteria for surface water and the Canadian Council of Ministers of the Environment's (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life at the federal level.

Surface water quality is generally good, although some exceedances were observed for iron and aluminum in some lakes and watercourses, as well as for lead in two (2) lakes. However, according to the MELCC, natural concentrations can sometimes be higher than the water quality criterion for these parameters. There is no issue associated with these exceedances that is likely to have an impact on resource extraction.

Additional sampling was carried out in summer 2018 to further assess sediment quality in the *ruisseau à l'Eau Morte*. Analysis of the 2018 data will be completed in December 2018.

20.1.1.10 Groundwater Quality

The groundwater quality of the future mine site and neighboring areas was determined to establish the baseline conditions that prevail before the onset of the future mine's activities (SNC-Lavalin 2017f). Groundwater samples were collected in six (6) exploratory boreholes, 15 private wells and two (2) surface water sources, and then analyzed by a certified laboratory. The findings were as follows:

- Groundwater in the area is described as freshwater given its low dissolved solids concentration, which varied between 38 mg/L and 240 mg/L;
- The geochemical signature of groundwater in the area is characterized by the presence of water essentially of the calcium (Ca) and carbonate (HCO_3) type. More specifically, the groundwater in private wells located in surface deposits has a geochemical signature rich in Ca and HCO_3, whereas the groundwater in wells located in the rock has a more variable signature with magnesium (Mg) or sulphate (SO_4) proportions;
- The concentrations of the parameters analyzed (inorganic, phenols, hydrocarbons [PAH and C_{10}-C_{50}]) meet the provincial criteria for drinking water and/or seepage into surface water (*Guide intervention – Protection des sols et réhabilitation des terrains contaminés*). Only point concentrations for manganese and iron were observed exceeding the threshold values. It should be mentioned, however, that both iron and manganese are aesthetic criteria for drinking water, as recommended by Health Canada.
- Atypic bacteria concentrations exceed the drinking water criterion (200 CFU/100 ml) in three (3) private wells and two (2) water sources sampled. One of the water sources has E. coli concentrations.
- Few other dissolved metals (Cu, As, and Al) exceeded the seepage into surface water criteria locally in two (2) to three (3) wells.

A hydrogeological conceptual model was developed based on fieldwork results and some assumptions that allowed creating a 3D model simulation (FEFLOW) calibrated for the natural groundwater flow condition. Modelling of contaminant transport for the tailings and waste co-disposal pile is also in progress in order to evaluate the potential contaminant impacts on neighbouring wells and receptors. Preliminary results show no contamination flow to receptors. These results as well as appropriated mitigation measures (if required) will be integrated in the Environmental Impact Assessment Report.

20.1.1.11 Noise Environment

A baseline noise survey was conducted on September 15 and 16, 2016 on the project site and on sites that could eventually be impacted by the project (SNC-Lavalin 2016b). The objective of the noise survey was to determine the initial day and night sound level prior to the implementation of the Project.

On the project site, the noise level was 32 dBA (24-hour noise level) whereas it varied from 32 to 34 dBA in the nearby recreational sites. In Saint-Michel-des-Saints, measurements at one site indicated a noise level of 42 dBA. Additional noise measurement was completed on August 13, 14, 15 and 16, 2017 (Soft dB 2017) in Saint-Michel-des-Saints and results varied from 62 dBA (24-hour noise level), near industrial site to 50-53 dBA in the village. In the Domaine Lagrange, the noise level varied from 38 to 44 dBA according to the day of measurement.

The *Règlement relatif aux nuisances* (421-2000) of the *MRC de Matawinie* and the Municipality of Saint-Michel-des-Saints prohibits the making of noise likely to disturb the peace and well-being of the neighbourhood by carrying out construction work and other activities between 10 pm and 7 am. The MELCC guidelines and instructions include noise limits for construction and operation phases of the Project. These limits will be used to assess the conformity of the Project, determine the impacts and develop mitigation measures.

Noise modelling is under preparation (November – December 2018) and will be carried out according to the guidelines of the Ministry responsible for the Environment (MELCC). These results as well as appropriated mitigation measures will be integrated in the Environmental Impact Assessment Report.

20.1.2 Vegetation and Wildlife Baseline Studies

20.1.2.1 Vegetation, Wetlands and Special Status Plant Species

a. Vegetation

Forest habitats were characterized in the field during the last two (2) weeks of July 2016 (SNC-Lavalin 2017g). Overall, 20 characterization stations were placed taking into account the forest types present in the study area and focusing on the areas that could be impacted by the Project. The objective of the characterization study was to inform on the plant associations and identify the main plant communities for each stand.

Hardwood stands are the most widespread in the study area and cover an area of 1,824.3 ha. The main plant communities are white birch and sugar maple stands. Mixed stands cover an area of 831.6 ha and are mainly represented by balsam fir–white birch stands. Coniferous stands are scarce in the study area (277.4 ha) and are almost exclusively represented by balsam fir stands. A tamarack – balsam fir stand was also characterized along the *rivière Matawin*. The remaining of the study area is composed of wetlands (456.9 ha), agricultural land (9.4 ha), disturbed areas (natural or anthropogenic; 93.5 ha), water (213.1 ha) and islands (1.9 ha).

b. Wetlands

Wetland characterization was conducted between July 19 and August 11, 2016 (SNC-Lavalin 2017g). Characterization stations were placed in all wetlands potentially impacted by the project (project footprint of July 2016) to portray the diversity throughout the study area. Wetland characterization and delineation were performed following MELCC's guidelines (Bazoge *et al*. 2014). The ecological value of wetlands was then estimated using field data and cartographic analysis. Additional wetland characterization was conducted in early fall of 2018 to document the wetlands along the new access road; data analysis will be completed in December 2018.

Wetlands include swamps, marshes, peatlands, as well as shallow waters. They represent an area of 456.9 ha in the study area. The most abundant wetlands are riparian shrub swamps (204.6 ha) and wooded swamps (102.2 ha). Peatlands cover 80.6 ha in the study area and are divided into two (2) types: bogs (41.5 ha) and fens (39.1 ha). Marshes represent 56.3 ha of the study area. Those characterized are located on old beaver dam sites or existing beaver ponds. Finally, shallow water with grass beds are mainly located in water bodies of the *rivière Matawin* floodplain and cover 13.6 ha in the study area.

The ecological value of characterized wetlands is generally high. Some isolated wetlands (wooded swamps and peatlands) have a medium ecological value. None of the wetlands have a low ecological value.

Considering that some wetland areas overlap the project footprint, specific mitigation measures could be required by the MELCC. In addition, a Certificate of Authorization ("**CA**") under section 22 of the *Environment Quality Act* (EQA) must be received from the MELCC prior to the start of work. According to section 46.0.5 of the *Act Respecting the Conservation of Wetlands and Bodies of Water,* the CA issuance is conditional on the payment of a financial contribution based on the wetland area impacted by the project.

c. Special Status Plant Species

All potential habitats identified using the *Guide de reconnaissance des habitats forestiers des plantes menacées ou vulnérables : Outaouais, Laurentides et Lanaudière* (Couillard *et al*. 2012) and potentially impacted by the project were visited during the summer, at the same time as the plant surveys in forested habitats (SNC-Lavalin 2017g). A specific survey was also conducted on July 28 and 29, 2016 to inform on the non-forested habitats likely to be impacted by the project and that may contain threatened, vulnerable or likely to be so designated plant species.

Occurrences reported in the region by the *Centre de données sur le patrimoine naturel du Québec* (CDPNQ) are the wild leek (vulnerable in Quebec), northern adder's-tongue (likely to be designated as threatened or vulnerable in Quebec) and Vasey's pondweed (likely to be designated as threatened or vulnerable in Quebec).

Wild leek is associated with forests, but its habitat is absent from the study area. Terrestrial and palustrine habitats associated with northern adder's-tongue, i.e. sandy shores, wet meadows, fens and rocky outcrops/escarpments, sand dunes and exposed sands, were explored. Vasey's pondweed habitats, i.e. sunny areas in open water and aquatic grass beds in medium and large rivers or lakes, were also explored. No special status plant species were observed in the study area.

d. Invasive Alien Plant Species

During the 2016 plant surveys, an invasive alien plant was detected in the study area. This species, the common reed, had a colony northeast of the Project location. A survey of invasive alien plant species was carried out in early fall 2018 to further document the presence of such species in the study area. No additional invasive alien colony was identified.

20.1.2.2 Aquatic Fauna and Fish Habitat

Information on the fish fauna present or likely to be present in the study area comes from existing data (*Ministère des Forêts, de la Faune et des Parcs* [MFFP] 2015), as well as from specific field surveys conducted in 2016 and 2017 (SNC-Lavalin 2017h) and 2018. Field surveys targeted the watercourses and water bodies likely to be impacted by the project. Fish habitat was characterized using the homogeneous segments method and experimental fisheries (electrofishing, net, shore seine, fyke net, and bait trap) in two (2) water bodies, i.e. the *lac aux Pierres* and the *Petit lac aux Pierres*, as well as in 38 unnamed watercourses, the *rivière Matawin* and the *ruisseau à l'Eau Morte*.

The 2016-2017 surveys confirmed the presence of 12 fish species in the study area. In shallow watercourses, the number of species is fairly low, with five (5) species. The brook trout was caught in one of these watercourses. The creek chub, however, dominates catches. In water bodies, the *rivière Matawin* and the *ruisseau à l'Eau Morte*, which have been fished with fixed fishing gear, the diversity is 12 species. The creek chub is the most abundant species. The *lac aux Pierres* contains only the brook trout whereas the *Petit lac aux Pierres* is inhabited by two (2) species, i.e. the brown bullhead and the creek chub. The *rivière Matawin* has a larger diversity with seven (7) species, including the yellow perch and the smallmouth bass which, like brook trout, are species of fishing interest. No special status species was observed in the study area.

Watercourses where fish presence was confirmed and other watercourses with potential fish habitat are considered to be a fish habitat, i.e. a regulated wildlife habitat. These habitats benefit from a legal status of protection under the *Regulation Respecting Wildlife Habitats* at the provincial level and under the *Fisheries Act* at the federal level. Authorizations will, therefore, be necessary to comply with these legislations if these habitats were to be impacted by the Project.

The data analysis of the 2018 fish fauna inventory will be completed in December 2018.

20.1.2.3 Terrestrial Fauna

a. Big Game

No field survey was conducted for this group of species due to the absence of a particular issue. The information comes from existing data (Lamontagne *et al*. 2006, Hénault 2015, MFFP 2015, Government of Quebec 2016).

The white-tailed deer population in hunting Zone 15 is located at the northern limit of its range. In 2008, the density was estimated at 2.4 deer/km^2 of habitat for Zone 15 West (Huot and Lebel 2012). Harvest varied from 63 to 247 deer between 2011 and 2015 (Government of Quebec 2016). Note that there is no statistical data for the Zone 15 East, where the Project area is located, since white-tailed deer hunting activities are banned. The MFFP (2015) reports the presence of white-tailed deer yards at the same latitudes of the study area, but outside of the Project's study area. White-tailed deer are frequently observed in the Project's study area.

Moose are relatively abundant in hunting Zone 15, especially because of a good quality habitat (Hénault 2015). The last estimate of the population in Zone 15 was 1.8 moose/10 km^2 (Hénault 2015). In addition, the total moose harvest in hunting Zone 15 varied from 231 to 256 moose between 2011 and 2015 (Government of Quebec 2016). MFFP (2015) reports the presence of a few moose yards within the study area.

The black bear is also relatively abundant in hunting Zone 15 (Lamontagne *et al*. 2006). Population density was estimated at 2.4 bears/10 km^2 (Lamontagne *et al*. 2006). Besides, the bear population in Zone 15 is quite harvested, as the number of black bears harvested was 309 in 2015 (Government of Quebec 2016).

There is no issue associated with this group of species that is likely to have an impact on resource extraction.

b. Furbearers

No field survey was conducted for this group of species due to the absence of a particular issue. The information comes from existing data (Prescott and Richard 2013, Government of Quebec 2016).

Overall, 16 furbearer species are likely to frequent the study area (Prescott and Richard 2013). The study area overlaps two (2) furbearer management units (UGAF), i.e. UGAF Nos. 26 and 27. The main furbearers trapped in this UGAF in 2015-2016 were the American beaver, the muskrat, weasels, the American marten and the raccoon (Government of Quebec 2016). All these species are common in Quebec. There is no issue associated with this group of species that is likely to have an impact on resource extraction.

c. Small Mammals

The information used to describe the small mammals that inhabit or are likely to inhabit the study area come from a review of existing data (Desrosiers *et al*. 2002, MFFP 2015), as well as from a small mammals-specific survey conducted from August 17 to 22, 2016 (SNC-Lavalin 2016c). This survey was conducted using Victor snap traps placed at four (4) sites and focused on the southern bog lemming and the rock vole, two (2) special status species.

Overall, 203 small mammals belonging to at least nine (9) species were caught. The main species caught was the southern red-backed vole, with 47 specimens. The southern bog lemming was caught at each of the four (4) sites, for a total of 11 specimens. There was no rock vole among the specimens captured and its habitat seems rare in the study area. The other species caught are the short-tailed shrew, the masked shrew, the smoky shrew, the meadow vole, the meadow jumping mouse, the woodland jumping mouse, and the deer mouse. According to Desrosiers *et al*. (2002), the American water shrew, the pigmy shrew, the Eastern heather vole, the hairy-tailed mole and the star-nosed mole could also use the study area.

Considering the presence of a special status species in the study area, i.e. the southern bog lemming, specific mitigation measures could be required by the MFFP.

d. Amphibians and Reptiles

The information used to describe the amphibians and reptiles that inhabit or are likely to inhabit the study area come from a review of existing data (*Atlas des amphibiens et des reptiles du Québec* [AARQ] 2015, MFFP 2015), as well as from targeted field surveys conducted in 2016 and 2017 (SNC-Lavalin 2017i). The surveys consisted in listening to anuran breeding calls, active searches for pickerel frogs, stream salamanders, forest salamanders and snakes, monitoring artificial shelters for snakes, and in a boat-based turtle survey along the *rivière Matawin*, which has a high potential for the presence of wood turtles. Survey protocols were previously approved by the MFFP.

The listening sessions conducted on August 2, 2016, May 11 and June 6, 2017 identified four (4) anuran species, i.e. the Northern spring peeper, the Eastern American toad, the wood frog and the green frog. The bullfrog was observed during active searches and adds to these species. The active searches conducted between May 10 and June 21, 2017 identified four (4) salamander species, i.e. the blue-spotted salamander, the yellow-spotted salamander, the Eastern redback salamander and the Northern two-lined salamander. Despite a significant survey effort, only two (2) snake species were observed in 2017: the Eastern common garter snake and the Northern redbelly snake. No turtle was observed during the three (3) surveys along the *rivière Matawin* on May 24 and June 7 and 22, 2017. However, the potential presence of other species, such as turtles, cannot be excluded. The CDPNQ (MFFP 2015) and the AARQ (2015) report occurrences of two (2) other anurans (Eastern newt and mink frog) and four (4) other reptiles (smooth greensnake, Eastern painted turtle, common snapping turtle and wood turtle) near the study area. The gray treefrog was also reported during the 2018 bird survey along the eastern access variant.

Of all the species mentioned above, three (3) have a special status: the smooth greensnake, the wood turtle and the common snapping turtle. The smooth greensnake was targeted by specific surveys, but was not detected. The two (2) turtle species have also been the subject of specific surveys; they were not inventoried, but survey conditions were not optimal. However, the habitats used by these turtles (lakes, water bodies, large watercourses, shorelines) do not overlap the current Project footprint. There is no issue associated with this group of species that is likely to have an impact on resource extraction.

20.1.2.4 Bats

The presence and nocturnal activity of bats were characterized with a fixed acoustic survey using eight (8) recording stations located near water bodies and wetlands (Fabianek 2016). The survey ran from June 29 to July 19, 2016, i.e. during the birth and lactation periods of bats in Quebec. In addition, field searches for hibernacula were carried out from June 29 to 30, 2016. The survey protocol was previously approved by the MFFP.

This survey confirmed the presence of five (5) bat species already reported in the Lanaudière region. The hoary bat was the most active, followed by the silver-haired bat, the little brown bat, the big brown bat and the red bat. All these species have a special protection status, except the big brown bat. Passes of *Myotis* bats, bats of the big brown/silver-haired complex and unidentified bat species were also detected. This 20-night survey recorded a total of 296 cumulated passes, all species combined. This activity index is comparable to other study areas sampled after the arrival of the white-nose syndrome in the province of Quebec. A visual inspection of rocky outcrops visible from the road yielded no evidence of bat hibernacula in the area visited. Two (2) cottages located in the vicinity of the *lac aux Pierres* were also inspected for signs of bats. However, no guano deposit was visually identified in the areas explored.

Considering the presence of special status species in the study area, specific mitigation measures could be required by the MFFP.

20.1.2.5 Birds

a. Waterfowl and Other Waterbirds

A ground-based survey of waterfowl and other waterbirds frequenting the main water bodies of the study area (*lac de la Dame, lac à l'Île, lac aux Pierres, lac du Brochet, lac England, Petit lac aux Pierres, lac Séverin, lac Saint-Grégoire, rivière Matawin*) was conducted on May 15 and 19, 2017 (SNC-Lavalin 2017j). The survey protocol was previously approved by the MFFP. Ten waterfowl species, including eight (8) local breeders, and three (3) other waterbird species were observed in the study area. Since no special status species belonging to this group were observed in the study area, there is no issue associated with this group of species that is likely to have an impact on resource extraction.

b. Birds of Prey

Bird of prey surveys were conducted on June 23 and 28, 2017 using eight (8) 500-m transects located along access roads (SNC-Lavalin 2017j). The survey protocol was previously approved by the MFFP. No bird of prey nest was found, but four (4) species were detected: the turkey vulture, the bald eagle, the broad-winged hawk, and the merlin. The bald eagle is designated as vulnerable in Quebec under the *Act Respecting Threatened or Vulnerable Species.* Since an adult of this species was observed twice in the *lac England* area, where its potential habitat is present, it was deemed possible the bald eagle would nest there. To confirm this, a helicopter survey was carried out in early May 2018 along the shore of *lac England*, of *Lac aux Pierres* and all other large waterbodies of the study area. No bald eagle nest was found, confirming that this species doesn't nest in the study area.

c. Land Birds

Land birds were inventoried from June 1 to 9 and from June 22 to 28, 2017 using 70 point counts located in the main habitats of the study area (SNC-Lavalin 2018). On June 18 and July 4, 2018, six (6) new point counts were carried out in potential special status species habitats to double verify the presence of such species in the study area, as well as along a potential access road east of the study area. A nighthawk survey was also performed at five (5) stations on July 3, 2018 to detect the presence of the common nighthawk. The survey protocols were previously approved by the MFFP. The presence of 53 land bird species has been noted in the study area, mainly common species in Quebec, except for the willow flycatcher and the bobolink. The bobolink is threatened according to the Committee on the Status of Endangered Wildlife in Canada, but the species has no legal protection status. Its habitat is rare in the study area and does not overlap the current Project footprint. The SOS-POP

(2015) database reports the presence of known nesting sites of olive-sided flycatcher and Canada warbler in the study area, but these are located outside the current project footprint. There is no issue associated with this group of species that is likely to have an impact on resource extraction.

20.2 Requirements and Plans for Waste and Tailings Disposal, Site Monitoring, and Water Management

Mandatory environmental monitoring activities are addressed at Section 20.3.4. Additional environmental monitoring activities may be required according the results of the EIA process.

20.3 Regulatory Context and Permitting

There are three (3) levels of government with laws, regulations and guidelines which could be applied to the project, i.e., federal, provincial and municipal (including MRC and local municipalities). The federal and provincial regulations concern mainly the environmental aspects, while the municipal regulations concern mainly the land use planning and cohabitation aspects. The federal and provincial regulations could impact the schedule of the project because of their environmental impact assessment process. The environmental assessment and approval process will be described first and then the list of permits required will be presented in a table.

20.3.1 Federal

Under the *Canadian Environmental Assessment Act*, only projects designated by the *Regulations Designating Physical Activities* are subjected to the environmental assessment procedure. Graphite mines are not considered as a physical activity under this Regulation. Therefore, the project would not be subjected to the process.

The *Metal Mining Effluent Regulations* does not apply to graphite mines.

20.3.2 Provincial

Note: The EQA has been updated on March 23, 2018 and the Regulation Respecting Environmental Impact Assessment and Review was replaced at the same time by the Regulation Respecting the Environmental Impact Assessment and Review of Certain Projects. The description below is based on the current environmental assessment process.

The Matawinie Project – Tony Block should be subjected to an environmental impact assessment under Quebec's LQE. According to Schedule 1, Part II of the *Regulation Respecting the Environmental Impact Assessment and Review of Certain Projects*, the following projects are subject to the environmental impact assessment and review procedure:

- (22) Mining activity:
  - (2) the establishment of a mine whose maximum daily capacity for extracting any other metal ore is equal to or greater than 2,000 metric tons;
  - (3) the establishment of any other mine whose maximum daily ore extraction capacity is equal to or greater than 500 metric tons;
- (23) Ore treatment:
  - (1) the construction of a treatment plant for
    - (c) any other metal ore whose maximum daily treatment capacity is equal to or greater than 2,000 metric tons;
    - (d) any other ore whose maximum daily treatment capacity is equal to or greater than 500 metric tons;

A graphite mine is considered as "any other mine that has a production capacity of 500 metric tons or more per day and any other ore, where the processing capacity of the plant is 500 metric tons or more per day." The nominal production rate is 6,700 metric tons per day at the concentrator. Therefore, the Quebec Environmental Assessment Process will be triggered.

The environmental assessment process for southern Quebec is briefly described in the following sentences. The process (from the moment the ESIA Report is submitted to the MELCC and the MELCC/BAPE's recommendation to authorize the Project) should be carried out within 13 months.

Step 1: Project Notice / ESIA Guidelines

- The proponent submitted a Project Notice to the MELCC to initiate the process on January 18, 2018.
- The MELCC provided the proponent with an official Project Guidelines specifying the scope and requirements of the ESIA in February 2018.

Step 2: ESIA Preparation (Expected Deposit Date: Winter 2019)

The environmental consultant and the proponent prepare the EIA report according to the guidelines.

- Upon completion, the ESIA report is submitted to the MELCC.
- The ESIA report is reviewed by various departments through a ministerial consultation. The MELCC is responsible for consulting different governmental agencies likely to be interested in the Project and to integrate their comments and questions.

- The MELCC issues a set of questions and comments which must be addressed promptly in the form of an addendum.
- The MELCC might also verify the compliance of the project with other guidelines published since March 30, among others the guidelines regarding climate change and environmental authorization.
- This phase ends with the official notice of admissibility by MELCC.

Step 3: Public Participation (Expected Duration: 6-8 Months)

- If the Minister considers the impact assessment statement to be admissible, the Minister so informs the project proponent in writing and direct the proponent to hold, on the date set by the Minister, the public information period provided for in section 31.3.5 of the Act. That period is to last 30 days.
- After having received from the Minister the indications regarding the public information period but before it begins, the project proponent publishes a notice announcing that period in a daily or weekly newspaper circulated in the region where the project is likely to be carried out. The project proponent must also send to the Minister, within the time prescribed by the first paragraph of Section 11, a summary of the essential elements of the proponent's impact assessment statement and its conclusions, including, if applicable, a summary of the supplemental information that have been added to the statement since its publication in the public register.
- The public has 30 days to review the documentation and officially asks for public hearings or mediation on the project.
- The Minister sends to the BAPE, within 10 days of the end of the public consultation period, the applications for public consultation or mediation that were made to the Minister during that period, except those that are considered to be frivolous. The BAPE takes a decision within 25 days; the time periods allotted to the BAPE to carry out the mandates conferred on it and to report to the Minister are as follows:

  (1) in the case of a public hearing: 4 months;

  (2) in the case of a targeted consultation: 3 months;

  (3) in the case of mediation: 2 months.

Step 4: Government Decision (Expected Duration: 3 Months)

- Based on the report from the BAPE and on the environmental analysis report, the MELCC prepares a draft of the decree authorizing the project to be signed by the government. By Order in Council, the government can authorize the project (with or without modifications and conditions) by a Decree or reject it.

- It is important to note that the Cabinet of the Government who issues the decree is not committed to any delay.

Step 5: Permitting: CA (Expected Duration 1.5 – 3 Months per Authorization)

- Once the decree is obtained, the Developer must still comply with the different regulatory requirements.
- Several applications for a Certificate of Authorization's ("**CA**") following the different stages of the design or the construction activities will be required. A delay of 75 days is usually contemplated by the MELCC for the review of an application and issuance of CAs, including the time to answer their questions, if need be.
- In granting a CA, the MELCC certifies that the project is developing according to the ESIA commitments and in conformity with applicable regulations.
- At that stage, it is expected to provide more accurate technical information on the project activities as well as engineering drawings that must be stamped, signed and dated by an engineer with a right of practice in Quebec.

Numerous other permits and authorizations will have to be obtained according to various sections of the EQA as indicated in Table 20.1. Permits and authorizations must also be obtained from other ministries, mainly the *ministère de l'Énergie et des Ressources naturelles* (MERN) and potentially by the MFFP.

Besides the EQA, the *Mining Act* is of prime importance with regards to project permitting. The *Mining Act* provides a legal framework for developing, operating and closing mines, as well as for the mining site restoration process. It provides for the obligation for companies to submit a site restoration plan to the MERN prior to project approval, and to provide financial guarantees.

Table 20.1 – Permits and Authorizations Required for the Project

Legal Act or Regulation	Section	Permit or Authorization
Federal		
Fishing Act, Fisheries and Oceans Canada (DFO)	Section 35	Demand of DFO review and potentially a permit for activities in water susceptible to result in serious harm to fish that are part of a commercial recreational or Aboriginal fishery, or to fish that support such a fishery
Explosive Act	Section 7	Certificate for carrying or storing explosives
Provincial		
Regulation respecting the environmental impact assessment and review of certain projects	Schedule 1, Part II, Item 22	Establishment and operation of the mine (including all surface and underground infrastructures necessary for the extraction of ore, including ore storage areas, handling areas, mine tailings accumulation areas, deposits of overburden and mining wastewater treatment and retention basins). *Directive 019* for the mining industry will provide for various limits and environmental performance specifications.
Environment Quality Act	Section 31.75	Withdrawal of more than 75,000 L of water per day and mine dewatering
	Section 31.11	Industrial depollution attestation for the operation of an ore treatment facility
	Schedule A and Regulation respecting pits and quarries	Exploitation of borrow pits with areas of or over 3 hectares
An Act respecting the conservation of wetlands and water environment	Sections 23, 46.0.3, 46.0.5, and 46.0.6	Request for authorization
Mining Act under the MERN	Section 241	Authorization for the localization of the waste rock pile
	Section 100	Mining lease for the mine exploitation
Act Respecting the Lands in the Domain of the State under the MERN	Division II	Land lease for infrastructures located on the domain of the State
Sustainable Forest Development Act under the MFFP	Section 73	Forestry permit for activities carries out by a holder of mining rights in exercising those rights (tree cutting, road works)
Act Respecting the Conservation and Development of Wildlife	Section 128.7	Authorization to conduct an activity susceptible to affect a wildlife habitat (fish habitat)
	Section 26.1	Permit for wildlife management (beaver or beaver dams), if needed.
Regulation respecting threatened or vulnerable wildlife species and their habitats		
Regulation Respecting Wildlife Habitats		
Explosive Act under the *Sûreté du Québec*	Sections 2,3, and 11	Permit of possession, storage and transportation of explosives
Building Act, *Régie du Bâtiment*	Section 35.2	Permit to store petroleum products
Municipal		
Chapter 3.2 – Permits and certificates	-	Construction Permit

20.3.3 Municipal

20.3.3.1 MRC de Matawinie

The *MRC de Matawinie*'s development plan includes several standards and development guidelines that could apply to the project, e.g. those related to the location of roads along lakes or watercourses, to riparian and littoral zone protection, to areas at risk of flooding or ground movement, to water, to gravel and sand pits, to sites of interest as well as to recreation and tourism routes. The certificate of compliance of the project for the development plan of the *MRC de Matawinie* has been delivered on March 7, 2016.

20.3.3.2 Municipality of Saint-Michel-des-Saints

The municipality of Saint-Michel-des-Saints regulations have no particular provision applying to mining projects, and the project does not contravene with planning regulations of the municipality. The certificate of compliance of the project to Saint-Michel-des-Saints' regulations has been delivered on January 27, 2016.

20.3.4 Monitoring

During operation, NMG will have to develop and maintain a sample and measurement network for the mining effluent approved by the MELCC and complying with the instruction given in the *Directive 019*. In addition, a groundwater monitoring system will be implemented around infrastructures presenting an environmental risk. The final effluent groundwater concentration of specific parameter will have to respect acceptable concentration given in Table 2.1 (D019).

Starting at Year 4 of the mining operation, progressive restoration of the co-disposable pile will be carried out as it reaches its final high. Closure of related infrastructure will also be undertaken. For these specific areas, the post-restoration monitoring program will be implemented following the recommendation of Table 2.9 of the *Directive 019*.

At the end of the mining operation, a monitoring program of surface and underground water quality will be implemented for the entire site according to Table 2.9 of the *Directive 019*.

20.4 Social Context and Stakeholder Engagement

20.4.1 Brief Description of the Local Social Context

The north part of the MRC de Matawinie[4] ("*Haute-Matawinie*" in French) area is historically a forest-based economy. In the last decades, most of the Crown lands

4 This large area corresponds to the northern part of the Matawinie MRC. It includes Saint-Michel-des-Saints, Saint-Zénon, the Atikamekw First Nation of Manawan and the non-organized territory managed by the MRC.

overlapping the claims have been harvested. These activities have significantly decreased in the recent past. Recently, the sawmill St-Michel has reopened after having been closed for several years.

The permanent population of this area is 6,048 people, including 2,354 people in Saint-Michel-des-Saints, 1,120 in Saint-Zénon, 85 people living in the non-organized territories and 2,489 people from the Manawan First Nation[5], located about 85 km to the north-west of Saint-Michel-des-Saints.

Located less than a two-hour drive from Montréal, the Haute-Matawinie region is known for its cottages and recreational tourism. The area is also recognized for its hunting, fishing, boating, hiking, snowmobiling and all-terrain vehicle (ATV) riding activities. The Haute-Matawinie has many ATV and snowmobile trails, outfitters and ZECs ("*Zone d'exploitation controlée*" in French). The southwest part of the Tony Block site is located within the Lavigne ZEC.

Cottage activities are significant (on private or public land) in the Haute-Matawnie area and many lakeshores are well developed. Within the one (1) kilometre buffer area around the projected pit, two (2) cottage areas have been identified: the *lac aux Pierres* and the *Domaine Lagrange*. Lands dedicated to private forestry activities are also located within this buffer zone, on the Bellerose area. These are discussed further below.

20.4.2 Social Acceptability and Stakeholder Engagement

The concept of social acceptability is hard to define, as it is intangible and multi-dimensional. In 2016, NMG has published a position statement[6] on its website to publicly define its view of this concept. Several definitions of social acceptability exist, and NMG has adopted the following:

> *"The result of a process by which the concerned parties build the conditions to be put in place together, for the harmonious integration of a project, a program or a policy, at a given time in its natural and human environment."*[7]

NMG does not wish to oppose the "majority against the minority" which would lead to social polarization. Instead, NMG intends to respect minority rights and to work closely with those who may be directly affected by the Project to address their concerns and expectations. This is achieved through the establishment of a continuous dialogue and should not be seen as a "licence" to be obtained (usually referred to in the industry as the Social Licence to Operate "SLO").

5 Source : Population of Saint-Michel-des-Saints and of Saint-Zénon : Statistics Canada, 2016 (http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=F); Population of the non-organized territory : MRC Matawinie, 2014 (http://www.mrcmatawinie.org/index.jsp?p=102); Atikamekw Nation of Manawan : Registered population living on reserve, INAC, 2017 (http://fnp-ppn.aandc-aadnc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=78&lang=eng).

6 https://nouveaumonde.ca/wp-content/uploads/Positionnement-social.pdf

7 Free translation. Extracted from: Caron-Malenfant, Julie and Thierry Conraud, *Guide pratique de l'acceptabilité sociale : pistes de réflexion et d'action*, Édition DPRM, 2009.

NWG has taken several steps to engage with a range of stakeholders, holding various meetings (see Section 20.4.2.1 below) in addition to implementing several measures in response to stakeholder concerns (see Section 20.4.3 below).

20.4.2.1 Stakeholders

The process of engaging with stakeholders and the public was initiated in June 2015, at the same time as the exploration activities. NMG has since met and interacted with a range of stakeholders including municipal and political organizations, economic actors, environmental groups, as well as with nearby cottagers and homeowners (importantly those located within the one (1) kilometre buffer zone around the mineralized area), and with the Atikamekw First Nation of Manawan and the Council of the Atikamekw First Nation.

The Project is facing some opposition, mainly from cottagers who want to protect their tranquility and investment, but also from environmentalists who question the overall impacts of such a project. This opposition is mostly embodied by the *Coalition des opposants à un projet minier en Haute-Matawanie* (COPH) and by the *Association pour la protection du lac Taureau* (APLT). NMG has engaged with these groups, and has invited them to meetings on several occasions, and has also taken part in activities proposed by this group. In addition, representatives from this group were invited by NMG to take part in the Stakeholder Committee, presented in Section 20.4.2.2 below On the other hand, the Project is supported by local organizations, by neighbouring municipalities, by the business community, and by a solid base of permanent residents.

Table 20.2 provides a summary of the key stakeholders with whom NMG has communicated in the recent past.

Table 20.2 – NMG Key Stakehoders

Proximity (1 km from the projected pit)	*Lac aux Pierres* cottagers/Owners
	Domaine Lagrange cottagers/Owners (south part)
	Others Isolated cottagers, owners and land users
Other Owners/Cottagers/Land users related to the exploration zone (2015 works)	*Lac du Trèfle* cottagers/ Owners
	Domaine Lagrange Cottagers/Owners (north part)
	Lac England cottagers/owners
	Others Isolated cottagers, owners and land users
	Real estate proponents
First Nation	*Conseil des Atikamekw de Manawan* (Atikamekw First Nation of Manawan)
	Conseil de la Nation Atikamekw (Council of the Atikamekw First Nation)
Political	Federal MP (Gabriel Ste-Marie, BQ)

	Provincial MNA and Tourism Minister (Caroline Proulx, CAQ)
	Minister for the Lanaudière Region
Municipal	MRC de Matawinie
	Municipality of Saint-Michel-des-Saints
	Municipality of Saint-Zénon
Governmental	MERN — Mauricie-Lanaudière Regional Direction
	MERN — *Direction du développement et du contrôle de l'activité minière*
	MFFP — *Direction de la gestion des forêts Lanaudière - Laurentides*
	MELCC — Strategic and Environmental Assessments Regional Direction
	MELCC — Montréal, Laval, Lanaudière and Laurentides Regional Direction
Environmental	Saint-Maurice Watershed (BVSM)
	Lanaudière Environmental Regional Council (CREL)
Socio-economic	Chamber of Commerce of Haute-Matawinie
	Regional Tourism Association of Lanaudière
	Service de développement local et régional (MRC)
	Société d'aide au développement de la collectivité Matawinie (SADC)
	Centre local d'emploi
	Carrefour jeunesse emploi Matawinie
	Commission scolaire des Samarres / Centre multiservices des Samarres
	CISSS de Lanaudière / Direction de la santé publique
Others	*Coalition des opposants à un projet minier en Haute Matawinie* (COPH)
	Association pour la protection du lac Taureau (APLT)
	Lavigne Hunting and Fishing Association (Lavigne ZEC)

NMG has met with these stakeholders and with members of the public on several occasions since 2015, as illustrated in Table 20.3.

Table 20.3 – Information and Consultation Meetings and Number of Stakeholders Met

Year	Individual Meetings, Meetings with Small Groups (On Invitation)	Public Meetings (Open to All)	Number of Stakeholders*
2015	17	0	At least 105
2016	11	2	At least 470
2017	18	2 **	At least 340
2018	9 ***	1 ****	At least 280

* Some individuals or representatives may have taken part to more than one meeting.
** One of them was organized by the COPH.
*** These meetings were held with various working committees on employment, stakeholder committee, liaison with the municipality and a committee for the integration plan, as described below. Many more individuals will also meet in the context of the Environmental and Social Impact Assessment (ESIA) in November and December 2018.
****The meeting was organized by the COPH. Another public meeting will be held on December 8, 2018.

In the course of these meetings, stakeholders have expressed a number of expectations and concerns. Invariably, discussions focused on the potential mine impacts and benefits. NMG was able to integrate some of these concerns into the project design, or to anticipate effects that could be minimized or avoided through a range of measures (see Section 20.4.3 for details on stakeholder concerns and associated measures taken by NMG).

20.4.2.2 Stakeholder Committee

Given people’s desire to be active in their community, the development of a mining project should include local input from the outset of the exploration stage. To this end, NMG has set up a Stakeholder Committee, with the objective to encourage the involvement of the local community in the development of the projected graphite mine. The role of the committee is to support the development of the mine with regards to the protection of the environment and the optimization of the regional economic benefits of the project. The committee also aims at facilitating the implementation of an open and ongoing dialogue between key stakeholders and NMG’s team

The composition of the committee includes representative from several organizations (NMG, the Atikamekw First Nation of Manawan, the municipalities of Saint-Michel-des-Saints and of Saint-Zénon, the Chamber of commerce, the MRC, the recreotouristic sectors, environmental organizations, the public health sector, land users from the ZEC Lavigne and members of the local communities). The COPH has been invited to sit on the committee by the members on several occasions, but the invitation has been declined by this organization.

The first meeting of the Stakeholder Committee took place in May 2017, and since then, three (3) meetings have been held in 2017 (June, August, and October 2017) and two (2) in 2018. Several themes were discussed in the course of these meetings, such as:

- The organization of the committee and its composition;
- Follow-up on the overall project's advancement and ongoing studies;
- Exploitation modalities of the mine (work schedules, waste and tailing management, environmental issues, etc.);
- The creation of thematic work committees;
- The project's integration plan.

It is NMG's intention to maintain this committee throughout the mine development process to ensure the inclusion of the local community's vision as much as possible.

20.4.2.3 Public Meetings

Two (2) public meetings were organized by NMG in 2016 (February, September). NMG has taken part to public meetings organized by the COPH in August 2017 and August 2018. NMG has also held a public meeting on November 25th, 2017, during which the public was provided information on project advancement and provided an opportunity to ask their questions to NMG representatives.

A number of subjects were discussed during these meetings, ranging from economic benefits to hydrogeological studies and other nuisances and concerns, and including environmental concerns (noise, dust emissions, waste management, etc.). Potential mitigation measures that could be put in place by NMG were also discussed. The next public meeting will be held on December 8th, 2018 to present the project advancements and Environmental and Social Impact Assessment (ESIA) process.

20.4.2.4 Meetings with the Atikamekw Nation of Manawan

NMG has met with the Band Council of the Manawan Atikamekw First Nation in July 2016, and with the Grand Chief of the Council of the Atikamekw First Nation in May 2017. It was agreed by all parties to reach an agreement. At least six (6) meetings were also held in the course of 2017 and 2018.

In August 2017, a working group was formed and a first meeting was held. In September 2017, a work plan was adopted and a framework agreement that establishes the terms of discussions and negotiations leading to the conclusion of a predevelopment agreement was signed in March 2018[8]. It should be mentioned that NMG has been keeping an open communication with the Atikamekw in the past few months and that one representative

8 http://nouveaumonde.ca/conseil-des-atikamekw-de-manawan-conseil-de-la-nation-atikamekw-nouveau-monde-graphite-announce-signing-framework-agreement-regarding-matawinie-project-2/

from Manawan and one from the Council of the Atikamekw First Nation are sitting on the Stakeholder Committee.

20.4.2.5 *Agreement with the Municipality of Saint-Michel-des-Saints*

In August 2018, NMG signed an agreement in principle with the Municipality of Saint-Michel-des-Saints[9]. The agreement enhances the collaboration between both parties, clearly defining the environmental social and economic impacts and taking into account the concerns and needs of the community of Saint-Michel-des-Saints in the development of the Project. Among other elements, the agreement aims at fostering a sustainable project that takes into account the environmental protection, social responsibility and economic development of the community.

Note should be taken that the liaison committee with the municipality has been formalized through this agreement and has met twice in 2018.

20.4.2.6 *Other Meetings and Committees*

As mentioned above, there is some opposition to the project, and most opponents have grouped under the COPH or the APLT. On August 20th, 2017, NMG took part in a public meeting organized by the COPH to answer questions on the project. Approximately 200 people took part in this meeting. NMG also took part in another meeting organized by the COPH on August 25th, 2018 to which approximately 50 people participated. NMG presented advancement on the project and water management has been discussed more specifically.

NMG is also participating in the new Employment Committee of the *Haute-Matawinie*, launched by the mayor of Saint-Michel-des-Saints in October 2017, to discuss and find solutions for the shortage of workers in the region. This committee is composed of many municipal and regional organizations; eight (8) local companies, including NMG, also participate. Two (2) meetings with the Employment Committee were held in 2018, as well as two (2) meetings with a sub-committee working specifically on finding solutions to labour shortages.

Finally, a committee has been created to work on the integration plan of the project to the territory. This committee, composed of seven (7) participants, has met once in 2018.

9 http://nouveaumonde.ca/nouveau-monde-graphite-and-the-municipality-of-saint-michel-des-saints-sign-agreement-in-principle-regarding-the-matawinie-project-2/

20.4.3 Socio-Economic Issues and Measures

20.4.3.1 Summary of Stakeholder Concerns

The numerous interactions mentioned above with stakeholders and the public have allowed the identification of eight (8) main social, economic and environmental issues:

- Preservation of air quality, fight against climate change, and reduction of GHG;
- Noise environment;
- Environmental quality and preservation of water resources;
- Maintenance of biodiversity;
- Socio-economic development;
- Physical and psychosocial health;
- Land and resource use and protection of landscapes;
- Relations with communities.

Local and regional organizations are supporting the project, mainly because of the anticipated economic benefits to the region brought by long-term job creation and business opportunities. Some concerns were expressed regarding the environmental matters, especially water management, post-mining heritage (environmentally and socially) and the impact that a mine could have on the region's nature-based reputation. According to the feedback obtained from local people and businesses, most of the local population seems to welcome the project. The reaction of the people in the public information meetings held between 2016 and 2018 in Saint-Michel-des-Saints confirmed this, and the progressive work undertaken at the Stakeholder Committee also supports this conclusion.

While the Project is well received at the local level, there are cottagers who understandably oppose the project given the anticipated effects on their property. Generally, cottagers expressed concerns related to the loss of quality of life, property devaluation and potential environmental impacts. Consequently, some cottagers and homeowners expressed anger towards the Project and NMG. Some of these cottagers do not live there on a permanent basis and while they are aware that the Project will be beneficial for the local economy, they are concerned about losing their tranquility and investment. Some owners have openly expressed their opposition to the Project, while others are interested in a job or employment opportunities related to the Project.

As for the Atikamekw Nation, their concerns with regards to the Project may be summarized as follows:

- Be able to leverage economic benefits from this Project. They are interested in qualified jobs, but want to ensure that training needs are identified ahead of time. Job opportunities for youth should be targeted;

- Ensure economic benefits for local Aboriginal businesses, and perhaps participate financially in the Project;
- Potential impacts on the health of their members;
- Make sure that the Atikamekw are respected throughout the project phases.

In addition to social and environmental concerns expressed by stakeholders summarized herein, a range of expectations towards NMG were formulated:

- Transparent communication and hold public consultations;
- Involvement in finding solutions;
- Listening and empathize;
- Maximizing the benefits for the region, opportunities for local businesses, employment and training, where applicable;
- Minimizing impacts, preserving the current situation to the extent possible;
- Maintain enjoyment and use of the land;
- For Owners impacted, possibility to easily sell their property without any devaluation;
- Respect of the environmental and social commitments.

20.4.3.2 Measures Taken by NMG

The information and consultation process that has been put in place in the course of the past two (2) years has aimed at unpacking these concerns and at designing adequate measures to minimize adverse effects or to avoid them where possible. NMG wishes to design a mining operation with as little impact as possible. What follows describes the main measures taken so far by NMG. Most of these measures are presented in Table 20.4 below.

a. Maintain Communications with Stakeholders, the Public and the Atikamekw

As discussed in Section 20.4.2.1 above, NMG has engaged with a great number of stakeholders, including with project opponents. Another public meeting open to all will take place on December 8th, 2018. It is NMG's intention to continue to communicate with stakeholders and the public, and to maintain the Stakeholder Committee and its participation in other committees or to ad hoc events. In addition, NMG is following its work plan to reach a pre-development agreement or an Impact and Benefit Agreement (IBA) with the Atikamekw First Nation in the near future. As many stakeholders as possible will be met in the context of the ESIA, and stakeholders will also have the opportunity to express their opinion on the project during the BAPE process that shall take place in the course of 2019.

b. Development of an Acquisition Procedure

NMG has developed a proactive acquisition procedure for the homes or cottages and lands located within one kilometre of the mine pit boundary. The procedure includes provision for the independent evaluation of the property value, and promotes dialogue leading to consensual agreements. Home or cottage and land owners within the area are divided into three (3) groups:

- *Lac aux Pierres*: Owners were invited to five (5) meetings since July 2014, and group representatives were met at several other moments. Properties have been evaluated and a meeting was held in 2017 to present the results and to begin the negotiation process. Within the 1-km area, 5 out of 11 properties have been acquired and NMG continues to discuss with the other owners.
- *Domaine Lagrange*: An initial meeting was held with the owners back in 2015. Since then, NMG has acquired two (2) properties, and an agreement was signed to acquire a third property in 2020. NMG continues discussions with other interested owners.
- Bellerose: Two (2) forestry land parcels are located along the future mine site, one of which encroaches the planned open pit over an area of approximately 7,250 square metres according to a public land use database acquired from the MRC in 2015. Owners have been met and their properties have been evaluated.

c. Development of an Integration Plan to the Receiving Environment

NMG has developed a conceptual integration plan of the project to the territory, and is looking forward for collaboration with stakeholders to improve it. The plan aims at ensuring proper integration of the project in its receiving environment, using the properties acquired from the Domaine Lagrange. This is also a way to give back to the community, to ensure its sustainable development, and to maintain the value of the nearby properties. In short, the integration plan aims at making this project "*more than just a mine*" and is articulated around 4 axes:

- Enhance possibilities for contact with nature (trails, viewpoints, rest areas, protection of ecological zones, valorization of historical and archaeological sites, etc.);
- Reveal and educate on the historical local forestry activities, and provide incentives to discover the natural topography of the area (trails, ATV trails, viewpoints, etc.);
- Develop public access to the mining exploitation and local geology and provide guided tours, interactive activities, and a research and development center;
- Develop interactive installations featuring the use of future and cutting edge technologies for the benefit of the public (services and commodities,

phytotechnologies, creation of an innovative and sustainable housing sector, etc.).

Mitigation measures included in the project design and/or operational measures aim at minimizing environmental and social. Most of these measures are presented in Table 20.4.

Table 20.4 – Summary of Concerns and of Measures Taken by NMG

Main Concerns	Measures Taken[10]
Preservation of air quality, fight against climate change, and reduction of GHG	• Progressive reclamation of the mining waste areas (revegetation). • Proactive acquisition process of properties located within 1 km from the projected mine pit boundary. • Covered conveyor and mineral stocked in dome. • Development of an open mine pit that is 100 % electric. • Valorization of a strategic resource for the electrification of transportation, based on hydropower (low carbon footprint).
Noise environment	• Work schedule adapted to the context of cottagers, no mining operations at nights or during weekends. • Crusher located below the level of the natural topography. • Proactive acquisition process of properties located within 1 km from the projected mine pit boundary. • Development of an open mine pit that is 100 % electric.
Environmental quality and preservation of water resources	• Co-disposition waste management and development of the mine waste area according to the geochemical characteristics of the waste. • De-sulphurization of mine waste. • Responsible use of water and proper treatment of waste water before discharge into the environment. • Dry tailings and waste rock piles, no submerged material requiring dikes or water-retaining structures on the site. • Progressive restoration of the mining waste areas (cover and revegetation). • Create a research group in partnership with the University of Quebec in Abitibi-Témiscamingue. • Agreement in Principle with the Municipality of Saint-Michel-des-Saints. • Framework Agreement with the Council of the Atikamekw First Nation and with the Atikamekw First Nation of Manawan.

10 Some measures address more than one concern.

Main Concerns	Measures Taken[10]
	• Re-circulation of the water required for the treatment of the minerals. • Collect and treat all surface water on mine site, and underground water into the mine pit before discharge into the environment. • Where applicable and possible, divert clean water (diversion ditches or wells) from mine site.
Maintenance of biodiversity	• Progressive reclamation of the mining waste areas (revegetation). • Minimization of the project footprint by progressive backfilling of the pit. • Responsible use of water and proper treatment of waste water before discharge in the environment.
Socio-economic development	• Proactive acquisition process of properties located within 1 km from the projected mine pit boundary. • Preparation of an integration plan to the local environment. • Prioritization of local workforce and local businesses. • Agreement in Principle with the Municipality of Saint-Michel-des-Saints. • Framework Agreement with the Council of the Atikamekw First Nation and with the Atikamekw First Nation of Manawan. • Development of added-value products using the Project's graphite concentrate is being considered.
Physical and psychosocial health	• Proactive acquisition process of properties located within 1 km from the projected mine pit boundary. • Reduction of air emissions and of noise levels. • Responsible management of water and of mine waste. • Propose a structuring and long-term project that will mobilize the community, including through the integration plan to the local environment.

Main Concerns	Measures Taken[10]
Land and resource use and protection of landscapes	• Identification of an optimal route for the site access road in collaboration with the municipality. • Proactive acquisition process of properties located within 1 km from the projected mine pit boundary. • Minimization of the project footprint by progressive backfilling of the pit. • Propose a structuring and long-term project that will mobilize the community, including through the integration plan to the local environment.
Community relations	• Multiply meetings and opportunities for dialogue with stakeholders, ever since the beginning of the exploration phase (including a website, Facebook, local newspapers, etc.). • Setting up of a Stakeholder Committee, Liaison Committee with the Municipality, Employment Committee, and Integration Plan Committee. • Opening of an office on Brassard Street (Saint-Michel-des-Saints' main street). • Agreement in Principle with the Municipality of Saint-Michel-des-Saints. • Framework Agreement with the Council of the Atikamekw First Nation and with the Atikamekw First Nation of Manawan.

20.4.4 Next Steps

In the next few weeks, NMG will proceed with the consultations in the context of the ESIA with a range of stakeholders and will hold another public meeting to provide information on the overall project advancement (December 8th, 2018), The submission of the ESIA is expected to be followed by the BAPE hearings in the course of 2019 or early 2020. In addition, NMG will continue to be proactive and work with the Community, with the Stakeholders and with the Atikamekw First Nation.

In fact, a key element of the Project's critical path is the undertaking of the ongoing ESIA. This encompassing assessment will be the occasion to obtain an overview of the project's potential environmental and social effects and to maintain dialogue with stakeholders and the public. Further mitigation measures will be prepared to ensure that the project responds to environmental requirements and to the concerns expressed by stakeholders and the public.

20.5 Closure Plan

Section 232.1 of the Mining Act states that a rehabilitation and closure plan is a requirement and must be approved before the mining lease is issued and a financial guarantee to cover all reclamation cost is provided in the two (2) years following the approval of the plan. Hence, a reclamation and rehabilitation plan is in preparation as part of the Project progress activities and will be presented to the MERN in early 2019. The rehabilitation and reclamation plan will be developed following the provincial Guidelines for Preparing a Mining Site Rehabilitation Plan and General Mining Site Rehabilitation Requirements (2017) which provides to the proponents the rehabilitation requirements.

Reclamation will include all activities carried out during the mining operations (progressive reclamation) and at the end of mining activities covered by the closure plan.

Progressive reclamation activities will be carried out during the mining activities. The final reclamation cover will be placed on the co-disposal pile as soon as an area of the pile will have reached its final elevation. It will reduce the volume of water to treat (after post-closure follow-up) from the co-disposal pile and minimize the visual impact of such structures.

At the end of the mine life, surface infrastructure and equipment will be dismantled and removed from the mine site. This includes, but is not limited to: electricity transport equipment, e-houses, semi-mobile crusher and conveyors, site buildings, storage sheds and other mine structures. Concrete slabs will be removed and/or covered to enable the growth of vegetation. Backfilling and levelling of ditches and the implementation of wetlands in the collection basin footprint are planned and part of the reclamation activities. A lake is expected to form at the northern portion of the pit. At the end of the monitoring phase, if applicable, access and site roads will be scarified and revegetated.

Reclamation and rehabilitation details as well as Financial Security will be covered in the ESIA’s Closure Plan Section.

21.0 CAPITAL AND OPERATING COSTS

The Matawinie Graphite Project is a greenfield mining and processing facility with average mill feed capacity of 2,350,600 tonnes per year of ore to produce 100,000 tonnes per year of graphite concentrate. The Project has been developed on the basis of an all electric mining operation with charging stations strategically located throughout the site.

The capital and operating cost estimates related to the mine, the concentrator and all required facilities and infrastructure have been developed by MC-DRA or consolidated from external sources as listed below.

- MC-DRA prepared the capital cost estimates for all facilities except for the incoming power line, the electrical distribution, the water treatment facility, consisting of the waste water treatment plant and the sewage treatment plant;
- Hydro-Québec only verbally mentioned the capital cost estimate for the incoming 120 kV power line. At the time of writing this Report, no written estimation has been received. Nevertheless, MC-DRA is in the opinion that the cost estimate is in line with Hydro-Québec recent historical rate for that type and length of overhead power line;
- SNC prepared the design layouts and quantities for the initial and sustaining capital cost estimates for the tailings co-disposition storage facilities and their respective reclamation cover as well as for the water management infrastructure. Unit rates for the tailings co-disposition area as well as for the water management infrastructure were developed by MC-DRA, except for geotextile and geomembrane which were under SNC's responsibility. SNC has also prepared the initial and sustaining capital cost estimates for the water treatment plant, including HDPE piping and equipment;
- ABB prepared the capital cost and sustaining cost estimates for all electrical and automation requirements for the Project. MC-DRA has reviewed and is in agreement with ABB's estimates; and
- The pre-development costs for the mine is based on a contractor furnished mining operation.

All costs provided by external sources were free of contingency and escalation.

The operating cost estimates ("**Opex**") were prepared by MC-DRA with the contribution of SNC for the waste water treatment plant and the sewage treatment plant.

21.1 Capital Costs Estimate

The capital cost estimate ("**Capex**") consists of direct and indirect capital costs as well as contingency. Provisions for sustaining capital are also included, mainly for CSF expansion. Amounts for the mine closure and rehabilitation of the site have been estimated as well. The working capital is discussed in Section 22.0.

21.1.1 Scope of the Estimate

The Capex includes the material, equipment, labour and freight required for the mine pre-development, processing facilities, tailings storage and management, as well as all infrastructure and services necessary to support the operation.

The Capex prepared for this FS is based on a Class 3 type estimate as per the American Association of Cost Engineers ("**AACE**") Recommended Practice 47R-11 with a target accuracy of ± 15 %. Although some individual elements of the Capex may not achieve the target level of accuracy, the overall estimate falls within the parameters of the intended accuracy.

The reference period for the cost estimate is Q3 2018.

21.1.1.1 Major Assumptions

The Capex is based on the Project obtaining all relevant permits in a timely manner to meet the Project Schedule.

The Capex reflects an Engineering, Procurement, and Construction Management ("**EPCM**") type execution wherein one (1) EPCM contractor will provide the design and construction management activities for all elements of scope pertaining to the process and related infrastructure as well as procurement activities for the entire Project and one (1) EPCM contractor will provide the design and construction management activities for the elements of scope pertaining to co-disposal and water management of the Project. All sub-contracts would be managed by either one of the EPCM contractors.

All backfill materials will be available from gravel pits or other sources located close to the site. Mine waste rock is not suitable for use in the road construction due to its possibility of being acid generating. All excavated material will be disposed of within the site battery limits.

Temporary power during the construction phase would be provided through a temporary hook-up to the Hydro-Québec grid until the permanent power is provided by Hydro-Québec.

21.1.1.2 Major Exclusions

The following items have not been included in the Capex:

- Provisions for inflation, escalation, and currency fluctuations;
- Provisions for risk and mitigation plans;
- Interest incurred during construction;
- Project financing costs;
- All duties and taxes.

The last two (2) items are considered in the Economic Analysis.

21.1.2 Capital Costs Summary

Table 21.1 presents a summary of the initial capital and the sustaining capital costs for the Project.

Table 21.1 – Summary of Capital Cost Estimate

Summary of Capital Cost Estimate ($000 CAD)			
Description	**Initial Costs**	**Sustaining Costs**	**LoM Costs**
Direct Costs			
Mining	16,833	4,155	20,988
Processing Plant	105,017	-	105,017
Infrastructure	11,420	-	11,420
Tailings and Water Management	48,177	38,760	86,937
Electrical Distribution	23,486	8,085	31,571
Sub-Total Direct Costs	**204,933**	**51,000**	**255,933**
Indirect and Owner's Costs			
Project Development Costs	2,327	-	2,327
EPCM Costs	21,703	957	22,660
Owner's Costs	14,732	-	14,732
Sub-Total Indirect Costs	**38,762**	**957**	**39,719**
Contingency	31,476	8,731	40,207
Closure Costs	6,250	6,250	12,501
NSR Buyout	2,000	-	2,000
Total Costs	**283,421**	**66,938**	**350,360**

Totals may not add up due to rounding

21.1.2.1 Initial Capital Cost

The initial capital cost for the Project as outlined in the previous sections of this Report is $ 283.4 M of which $ 204.9 is direct costs, $ 38.8 M is indirect costs, $ 31.5 M is for contingency, $ 2.0 M is for NSR buyout and $ 6.3 M is for closure costs.

An amount of $ 66.9 M has been provided to cover the sustaining capital over the life of mine. This amount excludes any requirement for working capital which is included in the economic analysis.

21.1.2.2 Sustaining Capital

Sustaining capital is the amount required to periodically invest in the operations phase to maintain the functionality of the mining and processing operations. The Capex was developed to minimize outlays in the pre-production phase and delay any capital expenditures to later periods during Project revenue streams.

For this Project, the sustaining capital mainly centers on the co-disposition system and water management. The initial period covers the development of preliminary drainage ditches, collection ditches, initial preparation of the west area for the co-disposition system, the main catch basin, polishing basin and BC-2. All other work is scheduled for Years 2 through 26.

Allowances have also been provided for the removal and repositioning of the mine e-houses, power lines and charging stations as the mine advances to the north. Other sustaining capital consists of the replacement of the main transformers after periods of ten and twenty years.

21.1.2.3 Closure and Rehabilitation Costs

Based on site layouts, a provision of $ 12.5 M was estimated for the closure and rehabilitation of the mine site. Requirements were established, and cost estimates were prepared based on material take-offs and unit rates from recent databases. Quantities for the CSF reclamation cover were provided by SNC and priced by MC-DRA.

The closure and rehabilitation costs include for the dismantling and removal of all facilities and services and revegetation of the area. Part of the cover placement is included in the Opex as will be part of the operation. Possible revenue from the salvage of equipment and materials was not considered in the closure costs.

21.1.3 Currency

The Capex base currency is Canadian dollars. The Capex consists of items quoted in various foreign currencies which have been converted into Canadian dollars using average exchange rates over a three (3) months period from July 3rd to September 28th, 2018. The vast majority of pricing for equipment and bulk materials is based in Canadian dollars. Table 21.2 shows the currency exchange rates used in this Report.

Table 21.2 – Currency Exchange Rates and Percent Content

Currency Name	Currency Code	$ Canadian
Canadian Dollar	CAD	1.0000
US Dollar	USD	1.3070
European Euro	EUR	1.5202
South African Rand	ZAR	0.0931

21.1.4 Basis of Estimate - General

The capital cost estimate covers the facilities included in the scope of the work described in previous Sections.

The Capex is based on the following key assumptions:

- The proposed construction work week is based on 40-hour per week with no construction work during the weekend or on official holidays;
- Fluctuations to nominated currency exchange rates are excluded;
- Allowances for industrial disputes or lost time arising from industrial actions is excluded;
- Project financing costs and interest during construction are not included in the Capex;
- No allowance is provided for acceleration or deceleration of the Project schedule;
- Project insurances are included in the Owner's costs.

The Project Schedule is presented in Section 24.0.

21.1.4.1 Material Take-Off and Unit Rates

All quantities generated for the estimate are mainly based on material take-offs ("**MTO**") and deliverables which exclude contingencies of any kind. The MTO's were developed using the general layout drawings and cross sections and general arrangement drawings.

Based on quantities generated by the MTO's, MC-DRA received quotations from qualified contractors for structural steel and architectural features as well as prices for the four (4) dome structures required for the Project. Prices were also received for pre-fabricated concrete foundations for the domes, the overland conveyor supports and the support for the apron feeders beneath the ore storage dome and the main conveyor and the escape tunnel.

The rates included the material, transportation, and direct labour to perform the work. Mobilization and demobilization, as well as indirect costs such as site management, construction equipment, and office trailers, were provided as separate costs and included in the Capex.

21.1.4.2 Construction Labour, Productivity Loss Factor

For works other than earthwork, concrete, structural steel and building cladding, as well as piping, the labour costs were estimated based on man hours and hourly rates developed for a typical crew from detailed tables of current rates developed by the *Association de la construction du Québec*.

The all-inclusive hourly rate of $ 110 includes the basic hourly rates for the tradesman, social benefits and employer's burden, industrial site premium as required, direct supervision, small tools, personal protection equipment, consumables, and contractor's overhead and profit.

Indirect supervision and site establishment as well as contractor's mobilization/ demobilization are excluded from the hourly rate but are provided for as indirect costs in the construction contractor's site management provision as described further below.

The productivity loss factor of 1.21 was established in consideration of the working calendar, the work rotation, the climatic conditions and remoteness of work site.

The working calendar was defined as one (1) shift per day, eight (8) hour per shift and five (5) days per week for a total of 40 hours per week. Some contractors stated their preference for 10-hour days, 4-day per week which was deemed acceptable. No weekend work was permitted due to possible interruptions to the local community.

It is assumed that sufficient lodging would be available in the nearby areas; therefore, no construction camp is required, and the Quebec construction regulations would apply. The provision for per diem allowances to cover room and board and traveling of workers is included in the hourly rate.

21.1.4.3 Construction and Contractor's Costs

Provisions also cover for construction contractor's site management including supervision and support staff such as administration and procurement, coordination and scheduling, quality and safety.

The construction allowance based on delivered equipment cost was established from similar projects to cover for construction material, sub-contract and mobile cranes. This allowance varied from 2 to 12 % depending on the trade.

The estimate is based on the assumption that construction contracts will be attributed on the base of a competitive bidding process amongst qualified contractors. It is assumed that construction contracts will be cost plus or unit rates; hence, this Capex does not consider any time and material type contract.

Availability of local qualified contractors and skilled workers is assumed. It is also assumed that an average level of site management, contract administration, quality control and adequate safety requirements will be required from the contractors by the construction management.

A realistic schedule, proper logistics and appropriate construction management are also assumed as well as good site conditions, limited number of contractors on site, limited work outside in winter and also limited work disruption due to changes, interferences or delays.

21.1.4.4 Freight, Duties and Taxes

Based on recent surveys and studies and when not included in the cost, the freight was accounted for by adding a factor to the value of the goods; a factor of 10.0 % is applied.

All duties and taxes were excluded from the capital cost, but relevant factors were considered for the after tax economic analysis.

21.1.5 Base of Estimate - Mining

The mining operation has been estimated on the basis of an initial phase of development where the mining contractor will prepare the mine for the production. This includes clearing the mine area and transporting topsoil to the topsoil stockpile, transporting the initial overburden material to its dedicated stockpile and the waste rock to the co-disposition area.

The mine development phase will be carried out by a mining contractor who will provide the major mine equipment, semi-mobile crushers, service equipment and mine support equipment necessary to supply the required quantity and quality of material to the overland conveyors feeding the process plant. The mine development work is costed as a value per tonne of material moved.

The mine development cost therefore, includes all necessary mine and service equipment, supply of explosives and blasting, and mine dewatering to the main basin provided as part of the water management system.

Mine roads will be required during this pre-production phase. One mine road will be constructed along the east side of the pit and will be sized to encompass mine trucks, the overland conveyor system and the electric distribution system to the mine. The other mine roads will be required along the west side of the pit for the delivery of the overburden and waste material to the co-disposition area. Approximately 3.6 kilometres of mine roads will be required during this initial phase.

The mine development cost attributed to the contractor accounts for the activities that will be carried out during a five (5) month pre-production period to prepare the mine for operations. Any ore encountered during the pre-production phase will be stockpiled close to the crushers.

The mine will be using an all-electric mobile equipment fleet, consisting of electric battery-driven 40-tonne mining trucks, battery-driven front-end loaders, cable reel excavators and bulldozers, and battery-driven service vehicles. The mine will also be using electric in-pit mobile crushers and overland conveyor system to feed ROM to the plant.

Three (3) E-houses and three (3) charging stations will be provided in the pit area and will require re-location at various intervals during the mine life. Three (3) e-houses and two (2) charging stations will be required to start the mine and included in the Capex with the third charging station arriving in Year 2 and included in sustaining capital.

Table 21.3 presents the cost breakdown for the mine Capex.

Table 21.3 – Mining Capex

WBS	Description	Cost ($)
110	Mining Equipment	-
115	Mine Roads	5,692,181
116	Crusher Access Ramp Including Pad	-
120	Mine Dewatering	-
130	Mine Pre-Production	4,244,147
150	Mine Explosives Storage	-
160	Mine Charging Stations and Electrical	6,893,972
180	Mine Communications Hardware and Software	2,400
	Total Mine Capex	**16,832,700**

21.1.6 Base of Estimate - Main Electrical Distribution and Communications

21.1.6.1 Basis of Electrical Estimates

The design and estimate for the electrical and automation / instrumentation was provided by ABB Inc. ABB based the design and the MTO's of their electrical and automation equipment and materials on the mechanical equipment list, layouts, P&IDs, instrument lists and flow diagrams prepared by MC-DRA. For equipment and materials not provided internally by ABB, quotations were received from equipment manufacturers.

21.1.6.2 Sources of Estimates

Where ABB was the supplier of an electrical equipment, ABB's in-house price for that equipment was used. For all other major equipment, ABB prepared specifications and obtained pricing from outside sources.

The equipment covered by ABB in-house pricing included the following:

- Low voltage VFDs;
- 600 kW EV-Charging stations;
- Medium and Low voltage MCCs;
- Power transformers;
- Medium and low voltage switchgear;
- Pre-fabricated electrical rooms.

Bids were received from qualified contractors for the supply of electrical and automation materials such as cable tray, cables, lighting, grounding, etc. and the installation of the materials and supplied equipment.

21.1.6.3 Scope of Electrical Distribution and Communications

The main electrical distribution and communications covers the incoming power requirements, the main substation, site power distribution, the main electrical room associated with the main substation and the control room.

The power line, which will be furnished by Hydro-Québec from their *Poste Provost* station, will be based on a 120 kV line which terminates at the main substation located adjacent to the processing plant.

Based on the power demand and site layout, requirements were established for the main sub-station and for the site distribution power lines. Equipment budget prices and costs for material and installation were established based on qualified suppliers' budgetary proposals and in-house databases from recent similar projects.

The main electrical room located adjacent to the main substation was designed and estimated by ABB. The electrical room will be furnished to site as a complete unit with all equipment incorporated and wired for use. The foundation design and support platforms are designed and estimated by MC-DRA as well as the below ground systems and foundations for the main substation equipment.

Requirements were also established for emergency power supply. A budgetary price was estimated based on qualified suppliers' budgetary proposals.

The site power distribution estimate consists of a diesel generator for emergency power, 13.8 kV overhead lines to the pit, to the co-disposition area, and to the water treatment plant, and power cable systems from the substation to the processing plant and to the de-sulphurization plant.

The control room estimates include DCS operator panels, workplace panels, collaboration tables, control room equipment, computers and network equipment and switchgear and configuration.

The communications estimate consists of the overall telecommunications network and fibre optic cabling. The communication needs and costs estimates for the communications infrastructure were based on a budgetary proposal from ABB's wireless networks product group (previously known as Tropos Networks).

Table 21.4 presents the cost breakdown for the electrical distribution and communication Capex.

Table 21.4 – Electrical Distribution and Communication Capex

WBS	Description	Cost ($)
210	Main SubStation	2,901,708
220	Power Line (Hydro Québec)	14,000,000
225	Communications	1,469,696
250	Site Power Distribution	1,992,269
260	Main Electrical Room	1,686,043
270	Control Room (All Inclusive)	1,436,189
	Total Electrical Distribution Capex	**23,485,905**

21.1.7 Basis of Estimate – Infrastructure

Infrastructure for the Project covers those areas that are required for a mining project but are not process nor mining related. Infrastructure includes the main access road and parking lot, sewage treatment plant, fresh water pumphouse, fire protection and other facilities described in this Section.

Table 21.5 presents the cost breakdown for the infrastructure Capex.

21.1.7.1 Main Access Road, Parking Area, and Gate House

The main access road is designed as a Class 1 road measuring 8.5 metres wide and 10.5 kilometres long of significant depth to support the mining and trucking operation.

Table 21.5 – Infrastructure Capex

WBS	Description	Cost ($)
310	Main Access Road	4,632,409
312	Parking Area and Gate	234,953
313	Gate House	-
320	General Plant Site (Including Tailings Plant)	2,981,324
330	Mine Maintenance Shop (Office, Dry, Warehouse)	406,395
334	Fuel Storage (Not Required)	-
342	Plant Site Warehouse	557,031
348	Surface Support Mobile Equipment	-
362	Fresh Water Pumphouse / Potable Water	186,081
366	Sewage Water Treatment and Distribution	335,310
390	Fire Protection - Pumping Station and Pipeline Loops	2,086,153
	Total Infrastructure Capex	**11,419,656**

Adjacent to the access road as it nears the plant site, a parking area is provided for the operations personnel and guests. Only operations vehicles will be permitted onto the Project site.

An electronic gate will be provided to deter vehicle movement on the Project Site. Operators of authorized vehicles will be required to use the gate communication system to be permitted on site.

21.1.7.2 General Plant Site

The general plant site cost includes site preparation, grading, excavation and backfill of the industrial site to a working elevation of 544 m. The area of over 100,000 m^2 covers the process plant, the de-sulphurization plant and storage areas, the ore storage building, the mine maintenance facility, the cold warehouse, the substation and electrical rooms and the construction laydown and office areas.

21.1.7.3 Mine Maintenance Shop, Warehouse, and Office

The mine maintenance shop, warehouse, offices and dry is provided by the mining contract and included in the operations costs. The estimated costs shown for the mine maintenance shop simply covers the power line to the facility, and charging units for equipment being repaired or being charged.

21.1.7.4 Plant Site Warehouse

The plant site warehouse will be a dome structure, 20 metres by 60 metres, which will be used to store non-sensitive material. The warehouse will be a cold storage facility with shelving units and interior laydown areas for pallet stacked materials.

21.1.7.5 Support Mobile Equipment

All mobile vehicles such as pick-ups, emergency vehicles, buses, boom trucks etc. will be leased and all associated costs will be included in the operating cost estimate. As much as possible, all mobile vehicles will be electric to minimize the carbon footprint.

21.1.7.6 Fresh Water Pumphouse

The fresh water and makeup water will be provided by two (2) artesian wells located adjacent to the concentrator. Two (2) pumps, one (1) for each well, will be housed in a pre-fabricated structure.

Process water make-up will be supplied by the polishing basin and the costs for this operation is included in the water management section.

21.1.7.7 Sewage Water Treatment Plant

The sewage treatment plant is a self-contained unit which is located adjacent to the concentrator. The effluent is distributed to the environment. The capital cost estimate for this treatment plant was provided by SNC as a part of their water management system.

21.1.7.8 Fire Protection

The fire protection system Capex includes for an insulated fire water tank, pumps, buried water lines with fire hydrants placed at strategic locations around the plant site, and a diesel generated fire pump in case of power outages. Any fire protection system located within each facility, is included in that facility.

21.1.8 Base of Estimate – Processing Areas

21.1.8.1 Process Equipment

The process equipment list was derived from the flow sheets. For major equipment, based on data sheets, data tables or technical description, prices were obtained from qualified suppliers. The prices received and incorporated in the Capex represent more than 85 % of the process equipment value. The remaining equipment was estimated from databases from recent similar projects or in-house cost estimation.

The areas shown in Table 21.6 under WBS 520 to 598 inclusive cover only mechanical equipment costs. All other associated costs such as building structures, electrical, piping and automation are covered elsewhere.

Labour for installation of process equipment was estimated for each piece of equipment based on in-house database or industrial publications. Provision was also added to cover for special lifts, sub-contracts or construction material.

21.1.8.2 Main Process Plant

The main process plant includes the building structure, foundations, process and service piping, electrical rooms and equipment, and instrumentation / automation.

The estimated costs for the foundations were based on the layout drawings and factored based on experience on other similar projects. Unit cost for concrete supply was obtained from a qualified contractor. The estimated costs for structural steel were based on the layout drawings and factored based on experience on other similar projects. Unit costs for steel supply and installation were obtained from qualified contractors. The cost estimation for interior finishes, tools and storage racking, furniture, accessories and supplies was based on preliminary requirements and budget prices from industrial catalogs or in-house databases.

Process piping cost was established by factorization on delivered process equipment based on recent similar projects.

The estimated costs for electrical and instrumentation equipment was provided by ABB based on Sections 18.10 and 18.11.

ABB also provided the estimated costs for the HVAC and fire protection requirements for the process facilities.

Preliminary requirements were also established for some tooling and storage racking, interior finishing and living quarter's supplies. Cost estimation was based mainly on recent industrial catalogues and also on in-house databases.

21.1.8.3 Crushing and Overland Conveying

Primary crushing will be performed by semi-mobile crushing units provided by the mining contract. The overland conveyors from the semi-mobile crushers to the ore storage building, including transfer towers, are included in the crushing and overland conveying section. The crushing and overland conveying system terminates at the shuttle conveyor located at the top of the storage building.

The conveyor foundations are based on prefabricated concrete units set at a distance of 13 metres from each other. The mine road from the process area to the mine entry will be widened to include the land preparation for the overland conveyor and the power line. Three (3) transfer towers will be required to divert the conveyors along the existing terrain. Weba type chutes will be used in each transfer tower to minimize the dust and to avoid using expensive dust collection systems.

21.1.8.4 Ore Storage

The ore storage building will be a megadome type building with its walls sitting on prefabricated foundations. The apron feeder foundations are also prefabricated. The conveyor tunnel and emergency tunnel are based on corrugated metal sleeves set on concrete bases.

21.1.8.5 Process Plant Capex

Table 21.6 presents the cost breakdown for the Process Plant Facilities Capex.

21.1.9 Base of Estimate – Tailings Management Facilities

The tailings management facilities cover areas within the process plant complex such as the de-sulphurization facility and the NAG and PAG storage buildings, the access road and return water pipeline from the water treatment plant to the complex, the water treatment plant, the collection ditches and basins and the tailings and wastes rocks co-disposition area.

The de-sulphurization plant and storage facilities were estimated by MC-DRA. All other areas in the tailings management were designed and estimated by SNC as described in Section 21.1.9.

Table 21.6 – Process Plant Capex

WBS	Description	Cost ($)
501	Main Building Process Plant	45,875,187
510	Crushing and Overland Conveying	13,159,474
515	Ore Storage	9,352,744
520	Grinding (including Rougher Flotation)	13,465,593
525	Polishing (Cleaner Flotation)	7,754,661
530	Concentrator Dewatering	5,213,996
535	Product Size Classification	2,291,043
550	Product Packaging	776,940
560	Tailings Area	1,697,270
580	Reagent Area	1,274,036
590	Water Services	2,406,167
595	Air Services	1,151,783
597	Plant Metallurgical Laboratory	298,389
598	Plant Tools, Mobile Equipment and Vehicles	300,000
	Total Process Plant Capex	**105,017,283**

21.1.9.1 De-Sulphurization Plant and Storage Facilities

The three (3) buildings comprising the de-sulphurization plant and two (2) storage buildings were based on megadome type structures. Formal quotations for the supply and installation of the domes were received from qualified sources.

Originally, the de-sulphurization plant and storage facilities were to be located away from the process area and therefore, allowances were provided for site preparation. The current positioning of the de-sulphurization plant and storage facilities, adjacent to the process plant, allows for the site preparation to be part of the overall site preparation work included in Area 420. The initial study allowed for a tailings line going from the process plant to the de-sulphurization plant with a reclaim water line returning to the plant with fresh water. The reclaim water line in currently included with the water management system.

These facilities were estimated by MC-DRA based on general layout drawings and MTO's. Unit prices were obtained from qualified contractors and suppliers and incorporated into the Capex.

21.1.9.2 Co-Disposal Tailings and Waste Rocks Storage Facilities

The design and quantities estimate for the tailings storage facilities were prepared by SNC. The design criteria and information are provided in Section 18.0. The Capex was prepared on the basis of immediate requirements to start the CSF and defer what could be delayed to future years. On that basis, the construction work was limited to the initial start of the CSF, initial work on BC-1 and BC-2, the main basin and the polishing basin. The estimates for the enlargement of the CSF, and the basins were developed on a year by year basis and included in the sustaining capital.

The Capex, was based on the design layouts and quantities provided by SNC. Geomembrane and geotextile cost estimation are based on SNC's extensive cost from the existing demonstration plant project at NMG.

The CSF also comprised an E-house and an EV charging station for charging the haul trucks. The power distribution line from the main substation to the E-house was included in the electrical distribution system (Area 250).

21.1.9.3 Tailings and Water Management Access Roads

The access roads to the CSF and to the water infrastructure and WTP were designed and estimated with layouts provided by SNC. The plant roads were designed at six (6) metres and, during the initial period, covered only from the processing area to and around BC-1 and terminating at BC-2. The other plant roads were from the mine road to the WTP and from the WTP to the process area. The water treatment plant to process area road was designed at nine (9) metres to allow for the reclaim water pipe from the polishing basin to the process plant and for the electrical poles carrying 13.8 kV power to the WTP.

21.1.9.4 Water Treatment Plant

The WTP is only required at the beginning of the second year of operations and all costs have been included in Year 1 of the sustaining capital totals. However, the initial WTP requirement for the first year will be provided by the existing demonstration plant.

21.1.9.5 Tailings Management and CSF Capex

Table 21.7 presents the cost breakdown for the CSF Capex.

Table 21.7 – Tailings Management and CSF Capex

WBS	Description	Cost ($)
805	Fresh Water Pumping Station and Pipeline (Area 362)	-
810	**Tailings Management Facilities**	**47,782,293**
815	Reclaim Pipeline From Polishing Basin	-
820	Tailings Plant Area General Preparation	-
825	De-Sulphurization Plant	25,812,208
830	Tailings Storage Facility (NAG/PAG)	**4,401,356**
831	*Tailings Storage Facility (NAG)*	3,040,684
832	*Tailings Storage Facility (PAG)*	1,360,672
840	**Tailings Storage Area**	**8,168,492**
841	*Access Roads*	839,000
842	*Tailings Co-Disposition Area*	4,799,278
843	*Diversion Ditches*	514,254
844	*Collecting Ditches*	2,015,960
850	**Basins**	**9,400,237**
851	*Main Basin*	3,632,044
852	*Polishing Basin*	2,313,741
853	*Basin 1*	284,527
854	*Basin 2*	3,169,925
860	**Water Treatment Plant**	**394,879**
	Total Tailings and CSF	**48,177,172**

21.1.10 Base of Estimate – Indirect Costs

The indirect cost covers for Project costs not directly associated with the physical construction work such as EPCM costs, temporary power and facilities, vendor representatives during commissioning and training, Owner's costs, future studies, closure costs and contingency.

21.1.10.1 Project Development

An allowance is provided to cover the costs of advance engineering work, geotechnical. hydrology and hydrogeology studies, metallurgical test work, and condemnation drilling. The advance engineering or bridge engineering covers work to advance the Project so at the time of the "green light", the detail engineering work can commence. This bridge work includes firming up of the process, preparation and issuance of specifications for long lead and major equipment, and development of other project requirements necessary to immediately start detailed engineering with heavy focus on civil and structural work.

21.1.10.2 EPCM Costs

EPCM services have been estimated based on engineering deliverables and a breakdown of manpower per discipline as per the Project schedule. The EPCM costs include for engineering, project management, procurement and construction management activities.

21.1.10.3 Construction Indirect Costs

The construction field indirect costs include site power, temporary facilities, QA/QC (incl. survey, soil, concrete, X-Ray, etc.), travel to site and contractor mobilization and demobilization. A construction camp is not required as there are available facilities in the nearby town.

21.1.10.4 Commissioning and Vendor Representatives

Dry and wet commissioning includes vendors' representatives and contractor's workers. Cost estimation is based on requirements and unit hourly rates. No provision is included for rework.

21.1.10.5 Other Owner's Costs

The Other Owner's costs were provided by NMG. The estimate has been reviewed by MC DRA prior to the integration in the Capex.

Other Owner's costs include the following:

- Owner's EPCM support team;
- Owner's safety cost (personnel, equipment and consumables);
- Owner's project expenses on site during construction;
- Owner's vehicles during construction;
- Land acquisitions;
- Project insurances;
- Environmental permits/government approvals;
- Vendors tests works;
- Safety training;
- Third -party consultants;
- Project external audit and due diligence;
- First fills;
- Trainings, and;
- Operational readiness.

21.1.10.6 Spares and Consumables

Spare parts, liners, and media for the process and electrical equipment are included in the working capital.

No provision is included for mining equipment spares and consumables since the mining will be executed by a contractor.

21.1.10.7 Indirect and Owner's Costs

Provisions for indirect costs are summarized in Table 21.8.

Table 21.8 – Indirect and Owner's Costs

WBS	Description	Cost ($)
950	Project Development	2,326,728
901	EPCM Costs	21,703,080
	Owner's Costs	
910	Construction Indirect Costs	4,565,262
925	Spare Parts and First Fills	597,750
930	Commissioning and Start up c/w Vendor Reps	943,813
955	Owner`s Cost by NMG	10,625,500
	Total Indirect and Owner's Costs	**40,762,132**

21.1.11 Contingency

Contingency is an integral part of the estimate and can best be described as a provision for undefined items or cost elements that will be incurred and will be spent, within the defined Project scope, but that cannot be explicitly foreseen due to a lack of detailed or accurate information.

Contingency factors do not include for Project risk associated with currency fluctuations, labour interruptions, changes in Government policies, changes in Project scope, market conditions and other items outside normal Project activities.

An analysis of each estimate line item was performed and the overall percentage allocated to contingency was 13.6 % which is generally in line with this category of estimate.

21.1.12 Closure Costs

The closure costs include the expenditures necessary to dismantle the Project's facilities at the end of the life of the mine and to prepare the land back to a natural state. Material quantities were derived from the drawings and cost estimation was based on unit rates from recent similar projects. Quantities for the CSF reclamation cover were provided by SNC and priced by MC-DRA.

The initial topsoil will be stored and redistributed over the property at intervals during the mine life and at the end of the mine life. A revegetation program will be developed to cover the mine site during the mine life and at the end of the mine life.

The closure costs include the following:

- The co-disposal stockpile will be gradually covered, using a cover with capillary barrier effect, as soon as it reaches its final elevation in the pile;
- The overburden stockpiles will be revegetated;
- Roads will be scarified and revegetated;
- All buildings will be dismantled sold or disposed as per regulatory requirements. The surface will be covered with overburden and revegetated;
- All machinery, equipment, pipeline and tanks will be sold and removed from the site;
- Power transmission lines, poles, substations, transformers and associated electrical infrastructure will be removed from the site and sold;
- The open pit section, not fill up with waste rock and overburden, will be fenced for safety purposes.

21.1.13 NSR Buyout

As mentioned in Section 4.3, the mineral claims are subject to a 2 % NSR royalty held by 3457265 (1.8 %) and Éric Desaulniers (0.2 %). Nouveau Monde can buy back the NSR Royalty for the sum of $ 1,000,000 for each 1 % at any time. The buyback is indicated in Table 21.1 as a separate item as an initial cost of $ 2 M.

21.1.14 Sustaining Capital Expenditures

As depicted in Table 21.9, the sustaining capital expenditure of $ 66.9 M was estimated by activity which is further described in this Section. The cost estimation for the sustaining capital was based on quantity take-off and unit prices as for the initial construction.

Table 21.9 – Sustaining Capital

WBS	Description	Cost ($)
S1	Crushing and Mining	4,154,880
S2	Electrical and Automation	8,085,147
S3	Co-Disposition	9,157,059
S4	West Area	26,255,718
S5	Pumping and Piping	3,347,534
S6	Closure Costs	4,125,362
S7	Demolition Costs	2,125,000
S8	Engineering for Co-Disposal Area (EPCM and Indirects)	956,574
S9	Contingency	8,731,091
	Total Sustaining Costs	**66,938,366**

21.1.14.1 Crushing and Mining

As the mining activities move from the south to the north, the overland conveyor must be dismantled to allow for the co-disposition area to increase. Over a twelve-year period, Conveyor 2 will be dismantled, Conveyors 3 and 4 will be shortened and then dismantled, Transfer Towers 1 and 2 will be dismantled, a new mine road constructed from the existing mine road network to the north pit, and a new conveyor to the north pit.

One (1) new access road will also be required from BC-2 to BC- 4 and then to the water treatment plant.

21.1.14.2 Electrical and Automation

The sustaining capital for the electrical and automation work covers the following activities:

- Addition of EV-03 Charging Station in the mining area at Year 2;
- Relocation of the mine electrical rooms and charging stations as the mining operation proceeds from south to north;
- Shortening and removal of the 13.8 kV line along the mine road as the mining operation proceeds from south to north;
- New power line to the north pit;
- Replacement of the UPS and battery chargers every ten (10) years and replacement of the transformers every 20 years;

- Construction of a new 13.8 kV power line to from the main substation to the water treatment plant to replace the removal of the line along the mine road.

The cost estimation for the expansion was based on quantity take-offs using the same unit prices as for the initial construction and was prepared by ABB.

21.1.14.3 CSF and Water Management Area

The sustaining expenditures for the CSF and water management area cover the enlargements, diversion ditches and collection ditches on the mine site. The activities covering this Section include:

- New Diversion Ditch FD-02;
- Expansion of Collecting Ditches FC-03, FC-08, FC-9 and FC-10;
- New Collecting Ditches FC-01, 04, 05, 06, 09, 10, 14, 15, 16 and 17.

The work required in future years for the West and South West areas comprises the expansion of the initial west area to encompass the annual requirement of tailings product and waste rocks. The work includes the clearing and grubbing of the area, scraping, placing and compacting of sand, installing geo-membrane (PEHD, 1.5 mm) and geotextile for Years 1 through 16 inclusive and Years 21 and 25.

The cost estimation for the expansion was based on quantity take-off for geotextile and geomembrane liner as for the initial construction and was prepared by SNC.

21.1.14.4 Pumping and Piping

The work included under this Section covers the expansion of the water treatment plant in Year 1 and in Year 7. Water treatment will already be in place from Year 0 and 1 from the demonstration project. Additional water pipeline requirements for mine dewatering and new pumping and pipelines for the new basins as the mine footprint increase when the open pit operation proceeds from south to north.

21.1.14.5 Closure and Demolition Costs

The closure and demolition costs are detailed in Section 21.1.12. Fifty percent (50 %) of this cost is included in the sustaining Capex.

21.1.14.6 Engineering for CSF and Water Management Area

Engineering has been prepared by SNC for the design and construction management for CSF and water management facilities to be delayed to future years. These facilities include the CSF area, water treatment plant, catch basins, and new collecting and diversion ditches.

21.2 Operating Costs Estimate

This Section provides information on the estimated operating costs of the Matawinie Project and covers mining, processing, general administration and site services. Table 21.10 presents the operating costs summary.

The sources of information used to develop the operating costs include in-house databases and outside sources particularly for materials, services and consumables. All amounts are in Canadian dollars (CAD), unless otherwise specified.

Table 21.10 – Operating Costs Summary

Description	Cost per Year ($)	Cost /tonne of concentrate ($/t concentrate)	Total Costs (%)
Mining (Average over life)	17,776,100	177.76	35.6
Tailings (Average over life)	5,872,892	58.73	11.8
Ore Processing	23,270,908	232.70	46.6
Site Services	886,080	8.86	1.8
General and Administration	2,123,010	21.23	4.3
Total Opex	**49,928,990**	**499.29**	**100.0**

*Totals may not add up due to rounding

21.2.1 Mining Operating Costs

The mine operating cost was estimated based on budgetary pricing from local contract mining companies. The mine plan was provided to several firms to assist them with their estimate in order to ensure the accuracy of their pricing.

Table 21.11 presents the average unit rates that were applied to the tonnages of the mine plan to arrive at the total expenditures for the mining contractor. These rates include operator manpower, the cost of operating equipment, the supply of explosives, equipment maintenance/replacement and support services.

Table 21.11 – Mining Average Operating Costs – Contractor Rates

Activity	Rate	Units
Drill and Blast	$/t	1.01
Overburden Excavation	$/t	3.17
Ore Excavation	$/t	2.05
Waste Excavation	$/t	2.45
Clearing and Grubbing	$/t	1.18
Pit Dewatering	$/month	8,971.00
Road Maintenance	$/month	32,451.00
Garage (Tool and Service)	$/month	4,776.00

The mining rates were provided by a local mining contract for the life of the mine.

The mine operating costs do not account for the salaries that will be paid to the mine owner's team which includes a senior mining engineer, a geologist, a mine planner and a surveyor. This owner management cost is accounted for as a G&A cost as described in Section 21.2.5.3. The mine management team is required to supervise the contractor and provide engineering and geology support. Table 21.12 presents a summary of the mine operating costs by type of material.

Table 21.12 – Summary of Estimated Mine Operating Costs by Type of Material

Type of Material	Total ($/t concentrate)	Total (%)
Crushing	30.16	16.96
Ore	63.86	35.93
Overburden / Topsoil	16.87	9.49
Waste	66.87	37.62
TOTAL	**177.76**	**100.00**

*Totals may not add up due to rounding

21.2.2 Water and Tailings Management Costs

Geotextile and geomembrane, pump and HDPE piping, and water treatment plant were priced; based on informal quotes requested by SNC from vendors. It includes the chemical products, electricity, geotube and spare parts. Pricing for bulk material is based on SNC's extensive cost database from recent projects or allowances.

Table 21.13 presents the average unit rates that were applied to the tonnages of the tailings plan to arrive at the total expenditures for the mining contractor. These rates include operator manpower, the cost of operating equipment, equipment maintenance/ replacement and support services. The mining contractor rates were provided by a mining contractor for the life of the mine.

Table 21.14 presents a summary of the water and tailings management operating costs.

Table 21.13 – Water and Tailings Disposal Management Average Operating Costs – Contractor Rates

Activity	Rate	Units
Water Management	$/ tonne of conc.	12.87
Tailings PAG Load and Haul	$/t	2.22
Tailings NAG Load and Haul	$/t	1.48

Table 21.14 – Summary of Estimated Water and Tailings Operating Costs

Type of Material	Total ($/t concentrate)	Total (%)
Water Management	12.87	21.9
Tailings Load and Haul	45.86	78.1
TOTAL	**58.73**	**100.0**

*Totals may not add up due to rounding

21.2.3 Ore Processing Operating Costs

For a typical year at 100,000 t/y of graphite concentrate, the estimated process operating costs are divided into seven (7) main components: Manpower, electrical power, grinding media and reagent consumption, consumables consumption, bagging system, material handling and spare parts and miscellaneous. The breakdown of these costs is summarized in Table 21.15 below.

Table 21.15 – Summary of Estimated Annual Initial Process Plant Operating Costs

Operating Cost Area	Cost ($/year)	Cost ($/tonne of mill feed)	Cost ($/tonne of graphite concentrate)	Total Costs (%)
Manpower	4,324,219	1.84	43.24	18.6
Electrical Power	5,835,130	2.48	58.35	25.1
Grinding Media and Reagent Consumption	5,619,787	2.39	56.20	24.1
Consumables Consumption	3,402,431	1.45	34.02	14.6

Operating Cost Area	Cost ($/year)	Cost ($/tonne of mill feed)	Cost ($/tonne of graphite concentrate)	Total Costs (%)
Bagging System	3,168,607	1.35	31.69	13.6
Material Handling	201,480	0.09	2.01	0.9
Spare Parts and Miscellaneous	719,254	0.31	7.19	3.1
Total Operating Costs	**23,270,909**	**9.91**	**232.70**	**100.0**

1. The totals may not add-up due to rounding errors.
2. Based on production of 100 000 t/y of graphite concentrate.
3. Spare parts, estimated as 1.5% of total equipment capital costs

21.2.3.1 Manpower Costs

It is estimated that there will be 59 employees. This includes supervisory staff for the overland conveying system and process plant, process plant operations and maintenance, as well as mechanical, electrical and instrumentation personnel. The total annual cost for the manpower is estimated at $ 4.3 M per year. This corresponds to $ 43.24 per tonne of concentrate produced.

Table 21.16 depicts the necessary manpower for the process facilities.

Table 21.16 – Concentrator Plant Manpower Operating Costs

Area	Number of employees	Total Cost ($/y)	Unit Cost ($/tonne of graphite concentrate)
Mill Administration	2	205,856	2.06
Mill Operations	33	2,314,967	23.15
Mill Maintenance	18	1,317,933	13.18
Mill Metallurgy	6	485,464	4.85
Total Manpower	**59**	**4,324,219**	**43.24**

21.2.3.2 Electrical Power Costs

Electrical power is required for the equipment in the processing plant such as grinding mills, conveyors, screens, pumps, agitators, bagging system, services (compressed air and water), etc. The unit cost of electricity was established at $ 0.051/kWh. The total annual cost for the process plant electrical power is estimated at $ 5.8 M per year. This corresponds to $ 58.35 per tonne of graphite concentrate produced.

The estimated electrical operating costs provided in Table 21.17 are based on the plant operating 24 hours per day, 7 days per week, the overland conveying system operating at 12 hours per day, 5 days per week, and an annual production of 100,000 tonnes of graphite, The electrical power consumption was developed from the mechanical equipment list and from power requirements from equipment suppliers.

Table 21.17 – Concentrator Plant Electrical Operating Costs

Area	Process Description	Power		Cost	
		Operational (kW)	Consumption (kW-h/y)	Total Cost ($/y)	Unit Cost ($/t)
1100	Overland Conveying and Storage	808	1,831,801	93,422	0.93
1200	Grinding and Flotation	6,367	50,200,582	2,560,230	25.60
1300	Polishing	1,801	10,249,375	522,718	5.23
1400	Graphite Tailings Dewatering	192	1,342,733	68,479	0.68
1500	Graphite Concentrate Dewatering	2,839	19,888,673	1,014,322	10.14
1600	Screening and Bagging	353	1,857,865	94,751	0.95
1700	Tailings De-sulphurization	1,991	13,949,424	711,421	7.11
1800	Reagent Systems	51	354,976	18,104	0.18
1900	Utilities – Water and Air Services	1,935	14,738,890	751,683	7.52
	TOTAL	**16,337**	**114,414,319**	**5,835,130**	**58.34**

The totals may not add-up due to rounding errors.

21.2.3.3 Grinding Media and Reagent Consumption Costs

Processing costs for grinding media and reagent consumption have been divided in two (2) components:

a. Grinding Media

The grinding mills (SAG and ball mill) will need a regular addition of steel balls to replace the worn media and exercise the proper grinding action on the material. Similarly, polishing mills (polishing and stirred media mills) will require addition of ceramic media to replace worn media. The media consumption has been estimated from the abrasion index of the ore, power consumption and from experience.

Grinding media is added using automated systems as these allow reducing the grinding media consumption. In general, grinding balls are added every day to maintain the steel load in the mills.

The total cost of grinding media for the mills is estimated at $ 2.7 M per year or $ 26.86 per tonne of graphite concentrate.

b. Reagents

Diesel, MIBC and xanthate are the reagents required throughout the various stages of flotation. Flocculant is required for thickener operation. Lime will be added at the polishing basin as required. The annual quantities were determined based on the test work performed on the representative samples.

The total cost for plant reagents is $ 2.9 M per year or $ 29.33 per tonne of graphite concentrate.

Table 21.18 – Grinding Media and Reagent Costs

Description	Cost	
	($/y)	($/tonne)
Grinding Media		
SAG Mill Balls	970,705	9.71
Ball Mill Balls	1,086,167	10.86
Polishing Mill Ceramic Media	314,751	3.15
SMM Ceramic Media	314,751	3.15
Sub-Total Grinding Media	**2,686,373**	**26.86**
Plant Reagents		
Collector - Diesel	190,822	1.91
Frother - MIBC	1,239,339	12.39
Flocculant	441,238	4.41
Sulphides Collector - Xanthate	941,263	9.41
Lime	120,753	1.21
Sub-Total Plant Reagents	**2,933,414**	**29.33**
TOTAL	**5,619,787**	**56.20**

The totals may not add-up due to rounding errors.

21.2.3.4 Consumables Costs

The consumption and costs for the overland conveying system, screen deck panels, grinding mill liners, polishing mill liners, flotation cell wear parts, pump wear parts, filter cloths, dryer wear parts, etc. for different equipment was obtained from the equipment suppliers and from experience with similar operations. The costs of consumables and wear parts are estimated at $ 3.4 M per year or $ 34.02 per tonne of concentrate produced.

21.2.3.5 Bagging System Costs

Bagging system costs have been calculated based on discussions with consumable suppliers and experience with similar operations. The total cost is estimated at $ 3.2 M per year or $ 31.69 per tonne of concentrate produced.

21.2.3.6 Material Handling Costs

Material handling costs include rental and maintenance costs for mobile equipment in the process plant. The total cost is estimated at $ 201 k per year or $ 2.01 per tonne of concentrate produced.

21.2.3.7 Spare parts and Miscellaneous Costs

Spare parts and miscellaneous costs were estimated as 1.5 % of the total equipment capital costs. The total spares and miscellaneous costs are estimated at $ 719 k per year or $ 7.19 per tonne of concentrate produced.

21.2.4 Site Services

Site services include power for heating, electrical rooms, warehouse, parking and gate. It also includes the power losses in the line, in electrical equipment and in distribution. Maintenance of the building and the infrastructure at the site, the sewage and hazardous material removal, and potable water supply are included. No provision for mobile equipment operations and maintenance has been included since all the equipment is leased. Table 21.19 summarizes the site services operating costs.

Table 21.19 – Site Services Operating Costs

Description	Total Cost ($/y)	Unit Cost ($/tonne of graphite concentrate)
Power	254,000	2.54
Power Line and Subs losses and Distribution	182,000	1.82
Onsite Building and Infrastructure Maintenance	400,000	4.00
Hazardous Material Removal	20,880	0.21
Potable Water Consumables	29,200	0.29
TOTAL	**886,080**	**8.86**

The totals may not add-up due to rounding errors.

21.2.5 General and Administration Operating Costs

The General and Administration ("**G&A**") operating costs include all materials, services and personnel costs associated with the site administration and technical services.

The G&A costs for the Project, are estimated at $ 2,123,010 year of operation or $ 21.23/tonne of graphite concentrate, as summarized in Table 21.20.

Table 21.20 – G&A Operating Costs Summary

Description	Number of employees	Total Cost ($/y)	Unit Cost ($/tonne of graphite concentrate)
Administration – Manpower	7	476,500	4.77
Administration – Material and Services		923,260	9.23
Sub-Total		**1,399,760**	**14.00**
Technical Services – Manpower	4	453,250	4.53
Technical Services – Material and Services		270,000	2.70
Sub-Total		**723,250**	**7.23**
TOTAL	**11**	**2,123,010**	**21.23**

The totals may not add-up due to rounding errors.

21.2.5.1 Administration – Manpower

It is estimated that seven (7) employees will be required for materials management, human resources and environmental. The employees working in finance and administration are under the corporate cost and not included in the Project operating costs. The unit cost for the administration manpower is $ 4.77/tonne of graphite concentrate. Table 21.21 shows the summary of administration manpower costs.

Table 21.21 – Administration – Manpower Costs

Description	Number of employees	Total Cost ($/y)	Unit Cost ($/tonne of graphite concentrate)
Environmental and Materials Management	4	268,500	2.69
Human Resources	3	208,000	2.08
Total Manpower	7	**476,500**	**4.77**

The totals may not add-up due to rounding errors.

21.2.5.2 Administration – Material and Services

The unit cost for the administration – material and services is estimated at $ 9.23 /tonne of graphite concentrate. The estimated annual costs for administration – material and services are provided in Table 21.22. The mining association fees and legal fees are under the corporate budget.

Table 21.22 – Administration – Material and Services Costs

Sector	Total Cost ($/y)	Unit Cost ($/tonne of graphite concentrate)
Mining Leases	75,000	0.75
Municipal Taxes	166,660	1.66
Site Insurance	150,000	1.50
Telecommunications	36,000	0.36
Janitoring	41,600	0.42
Office supplies and Misc. Costs	24,000	0.24
Transport of Goods	12,000	0.12
IT Maintenance and Supplies	50,000	0.50
Purchasing and Warehousing – Supplies	20,000	0.20
Recruiting	25,000	0.25
Training	55,000	0.55
Safety – Equipment and Supplies	24,000	0.24
Medical and First Aid	5,000	0.05
Employee Relations	2,000	0.02
Community Relations	75,000	0.75

Sector	Total Cost ($/y)	Unit Cost ($/tonne of graphite concentrate)
Employee Transportation (on site)	12,000	0.12
Contingency	50,000	0.50
Environmental – Supplies	100,000	1.00
TOTAL	**923,260**	**9.23**

21.2.5.3 Technical Services – Costs

It is estimated that four (4) employees will be required for engineering and geology. Those employees are a senior mining engineer, a surveyor, a mine planner and a mine geologist. The unit cost for the technical services manpower is $ 7.23 /tonne of graphite concentrate.

A provision of $ 270,000 for external engineering services, consulting, surveying and others is included in the technical services costs. The unit cost for external engineering services is $ 2.70 /tonne of graphite concentrate.

Table 21.23 shows the summary of technical services costs.

Table 21.23 – Technical Services – Manpower and Services Costs

Description	Number of employees	Total Cost ($/y)	Unit Cost ($/tonne of graphite concentrate)
Engineering and Geology	4	453,250	4.53
External Engineering Services		270,000	2.70
TOTAL Manpower	**4**	**723,250**	**7.23**

22.0 ECONOMIC ANALYSIS

The economic assessment of the Matawinie Project of Nouveau Monde Graphite Inc. is based on Q3-2018 price projections in U.S. currency and cost estimates in Canadian currency. An exchange rate of 0.7651 USD per CAD (1.307 CAD per USD) was assumed to convert USD market price projections and particular components of the cost estimates into CAD. No provision was made for the effects of inflation. The evaluation was carried out on a 100 %-equity basis. Current Canadian tax regulations were applied to assess the corporate tax liabilities while the Quebec mining tax regulations adopted in 2013 were applied to assess the mining tax liabilities.

The financial indicators under base case conditions are presented in Table 22.1.

Table 22.1 – Base Case Financial Results

Base Case Financial Results	Unit	Value
Pre-tax NPV @ 8 %	M CAD	1,286.8
After-tax NPV @ 8 %	M CAD	750.8
Pre-tax IRR	%	40.6
After-tax IRR	%	32.2
Pre-tax Payback Period	years	2.2
After-tax Payback Period	years	2.6

A sensitivity analysis reveals that the Project’s viability will not be significantly vulnerable to variations in capital and operating costs, within the margins of error associated with FS estimates. However, the Project’s viability remains more vulnerable to the USD/CAD exchange rate and the larger uncertainty in future market prices.

22.1 Assumptions

22.1.1 Macro-Economic Assumptions

The main macro-economic assumptions used in the base case are given in Table 22.2. The weighted-average annual price forecast for the Project’s basket of graphite concentrate product is based on size-purity-dependent price projections provided by Benchmark Mineral Intelligence. Details on the derivation of this price forecast are given in Section 19 of this Report. The sensitivity analysis examines a range of prices 30 % above and below this base case forecast.

Table 22.2 – Macro-Economic Assumptions

Item	Unit	Base Case Value
Average Graphite Concentrate Price† (EXW mine site)	USD/tonne	1,730
Exchange Rate	USD/CAD	0.7651
Discount Rate	% per year	8
Discount Rate Variants	% per year	6 and 10

† Weighted average over total sales

An exchange rate of 0.7651 USD per CAD (1.307 CAD per USD) was used to convert the USD market price projections into Canadian currency. The sensitivity of base case financial results to variations in the exchange rate was examined. Those cost components which include U.S. content originally converted into Canadian currency using the base case exchange rate were adjusted accordingly.

The deposit has been certified a "Mineral Resource" by the Canada Revenue Agency. Thus, the current Canadian tax system applicable to Mineral Resource Income was used to assess the Project's annual tax liabilities. These consist of federal and provincial corporate taxes as well as provincial mining taxes. The federal and provincial corporate tax rates currently applicable over the Project's operating life are 15.0 % and 11.5 % (the current 2018 rate of 11.7 % will decrease by 0.1 % per year to 11.5 % in 2020) of taxable income, respectively. The marginal tax rates applicable under the Quebec mining tax regulations are 16 %, 22 %, and 28 % of taxable income and depend on the profit margin. As the final product of the mine for the purpose of this assessment consists of sorted graphite flake concentrates, a processing allowance rate of 10 % is assumed.

The assessment was carried out on a 100 %-equity basis. Apart from the base case discount rate of 8 %, two (2) variants of 6 and 10 % were used to determine the Net Present Value ("**NPV**") of the Project. These discount rates represent possible costs of equity capital.

22.1.2 Royalty and Income and Benefit Agreements

This Project incorporates a "NSR" royalty agreement. This agreement calls for annual payments of 2 % of FOB (EXW mine site in this case) sales. The agreement contains a buyout clause in which each percentage point of royalty can be purchased for a lump sum amount of $ 1 M. As the buyout option is more economical, the present economic analysis considers an additional initial investment of $ 2 M representing the complete buyout of the royalty agreement. Despite the fact that the mineral property lies within the limits of the municipality of Saint-Michel-des-Saints, a future agreement with the regional First Nations community must be envisioned. Preliminary discussions with local groups are under way, but it is, however, too early to establish any dependable provision for the purpose of this economic assessment.

22.1.3 Technical Assumptions

The main technical assumptions used in the base case are given in Table 22.3.

Table 22.3 – Technical Assumptions

Item	Unit	Base Case Value
Open Pit Resource Mined	M tonnes	59.9
Average Mill Head Grade (includes mining dilution)	% Cg	4.35
Design Milling Rate	k tonnes/year	2,350
Average Stripping Ratio	w : o	1.06
Mine Life	years	25.5
Process Recovery	%	94.0
Concentrate Grade	% Cg	97.0
Average Concentrate Production (excludes Year 1) †	tonnes/year	99,849
Average Mining Costs	($/tonne milled)	7.49
Average Processing Costs (includes tailings transport)	($/tonne milled)	12.30
Average Site Services Costs	($/tonne milled)	0.38
Average General and Administration Costs	($/tonne milled)	0.90
Average Total Costs	($/tonne concentrate)	500.39

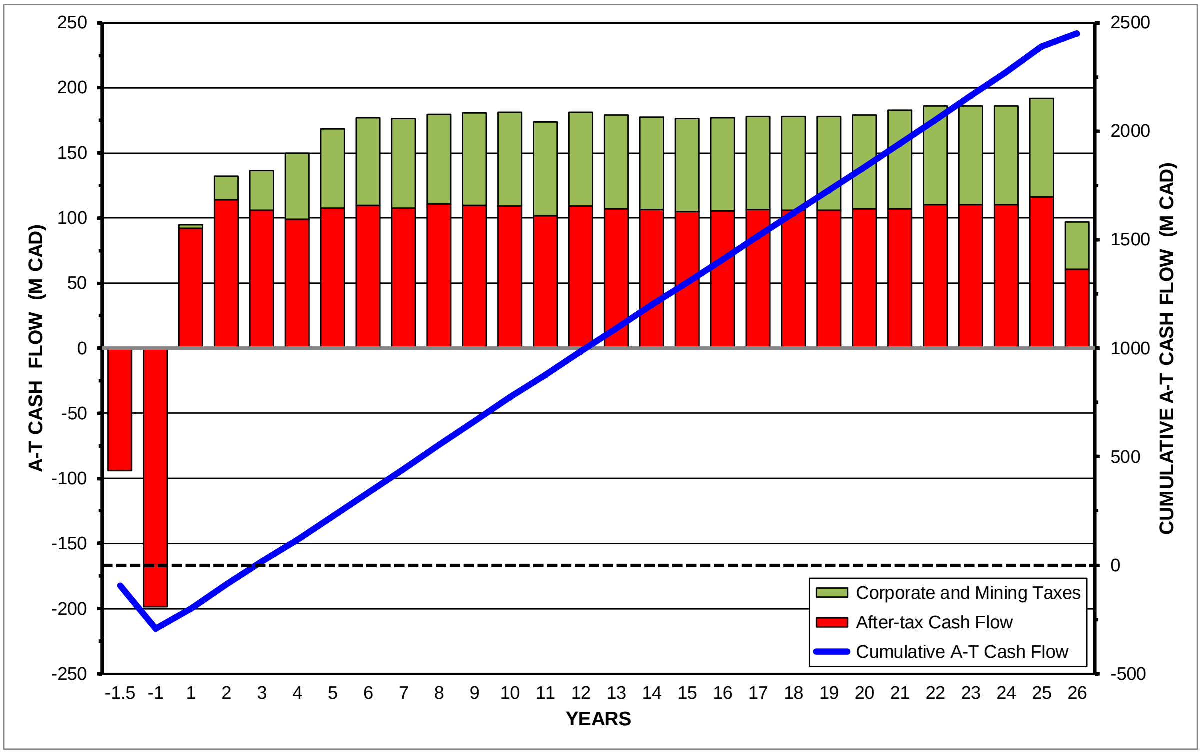
† All averages based on financial model

The first production year consists of a ramp-up period of three (3) months followed by nine (9) months at quasi-full production. The start of commercial production (as defined by the Canada Revenue Agency) corresponds to the beginning of this nine-month period.

22.2 Financial Model and Results

Figure 24.1 illustrates the after-tax cash flow and cumulative cash flow profiles of the Project for base case conditions. The intersection of the after-tax cumulative cash flow curve with the horizontal dashed line represents the payback period (without the ramp-up period correction).

Figure 22.1 – After-Tax Cash Flow and Cumulative Cash Flow Profiles



A summary of the evaluation results is given in Table 22.4 and Table 22.5 gives the cash flow statement, both for base case conditions.

The summary table and cash flow statement indicate that the total pre-production (initial) capital costs were evaluated at $ 276.2 M (includes royalty buyout). The sustaining capital requirement was evaluated at $ 59.8 M. Mine closure costs in the form of trust fund payments at the start of mine production were estimated at an additional $ 14.4 M.

The cash flow statement shows a capital cost breakdown by area and provides an estimated capital spending schedule over the 18-month pre-production period of the Project. Working capital requirements were estimated at three (3) months of total annual operating costs. Since operating costs vary annually over the mine life, additional amounts of working capital are injected or withdrawn as required.

The total revenue derived from the sale of the concentrate products was estimated at $ 5,703.0 M, or on average, $ 95.28/tonne milled. The total operating costs were estimated at $ 1,261.2 M, or on average, $ 21.07/tonne milled.

The financial results indicate a pre-tax NPV of $ 1,286.8 M at a discount rate of 8 %. The pre-tax Internal Rate of Return ("**IRR**") is 40.6 % and the payback period is 2.2 years. The payback period is measured from the start of commercial production and consequently, excludes the ramp-up period in production Year 1.

The after-tax NPV is $ 750.8 M at a discount rate of 8 %. The after-tax IRR is 32.2 % and the payback period is 2.6 years.

Table 22.4 – Project Evaluation Summary – Base Case

Item	Unit	Value
Total Revenue	M CAD	5,703.0
Total Operating Costs	M CAD	1,261.2
Initial Capital Costs (excludes Working Capital)	M CAD	274.2
Royalty Buyout	M CAD	2.0
Sustaining Capital Costs	M CAD	59.8
Mine Rehabilitation Trust Fund Payments	M CAD	14.4
Total Pre-tax Cash Flow	M CAD	4,091.4
Pre-tax NPV @ 6 %	M CAD	1,673.8
Pre-tax NPV @ 8 %	M CAD	1,286.8
Pre-tax NPV @ 10 %	M CAD	1,002.7
Pre-tax IRR	%	40.6
Pre-tax Payback Period†	Years	2.2
Total After-tax Cash Flow	M CAD	2,449.5
After-tax NPV @ 6 %	M CAD	986.7
After-tax NPV @ 8 %	M CAD	750.8
After-tax NPV @ 10 %	M CAD	577.2
After-tax IRR	%	32.2
After-tax Payback Period†	Years	2.6

† Measured from the start of commercial production

Table 22.5 – Cash Flow Statement – Base Case

MATAWINIE PROJECT FS – Nouveau Monde Graphite Inc.

All monetary values in CAD except where specified otherwise

Exchange Rate (USD per CAD): 0.7651

Item	Basis	Input	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Year			-2	-1	1	2	3	4	5	6	7	8	9
Mineralisation (t)			0	133,364	1,865,889	2,483,402	2,455,856	2,423,530	2,473,892	2,462,617	2,436,270	2,321,372	2,371,721
Waste (t)			0	790,210	1,878,407	2,499,784	2,580,111	2,019,127	2,051,009	2,154,575	2,429,429	2,275,352	2,165,791
Overburden (t)			0	342,894	243,476	126,017	9,431	484,518	305,633	143,715	280,957	294,605	432,574
Total Material Mined (t)			0	1,266,468	3,987,772	5,109,203	5,045,398	4,927,175	4,830,534	4,760,907	5,146,656	4,891,329	4,970,086
Stripping Ratio (w : o)				8.496	1.137	1.057	1.054	1.033	0.953	0.933	1.113	1.107	1.096
Mineralisation Processed (t)					1,865,889	2,483,402	2,467,856	2,460,530	2,478,892	2,480,844	2,461,270	2,357,509	2,371,721
Grade (% Cg)					4.14	4.14	4.17	4.17	4.15	4.15	4.18	4.36	4.34
Process Recovery (%)					94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
Concentrate Production (t)	Grade (% Cg)	97.0%		0	74,940	99,742	99,731	99,547	99,670	99,778	99,735	99,514	99,712
Less Transport Losses (t)		0.00%			0	0	0	0	0	0	0	0	0
Concentrate for Sale (t)					74,940	99,742	99,731	99,547	99,670	99,778	99,735	99,514	99,712
Concentrate Inventory Level (t)		0			0	0	0	0	0	0	0	0	0
Concentrate Sold (t)					**74,940**	**99,742**	**99,731**	**99,547**	**99,670**	**99,778**	**99,735**	**99,514**	**99,712**
Cg Price ($)	EXW Mine Site (USD/t)				1,494	1,466	1,439	1,572	1,690	1,777	1,777	1,777	1,777
Cg Concentrate Sales ($)					146,304,703	191,129,366	187,587,280	204,467,713	220,156,996	231,720,414	231,621,125	231,107,371	231,567,279
Transport Cost to Market	Unit Cost (USD/dmt)	0.00			0	0	0	0	0	0	0	0	0
Total Sales – FOB Mine Site ($)					146,304,703	191,129,366	187,587,280	204,467,713	220,156,996	231,720,414	231,621,125	231,107,371	231,567,279
Total Revenue ($)	Base Case				146,304,703	191,129,366	187,587,280	204,467,713	220,156,996	231,720,414	231,621,125	231,107,371	231,567,279
Total Revenue ($)	Indexed for Sensitivity				**146,304,703**	**191,129,366**	**187,587,280**	**204,467,713**	**220,156,996**	**231,720,414**	**231,621,125**	**231,107,371**	**231,567,279**
Mining Costs ($)	$/year (see LoM Schedule)				14,056,315	18,870,744	19,575,802	19,062,776	16,972,600	16,542,093	16,979,964	18,193,684	16,557,913
Processing Costs ($)	$/year (see LoM Schedule)				17,453,182	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909
Tailings Transport Costs ($)	$/year (see LoM Schedule)				4,117,440	4,412,489	4,421,717	4,589,905	4,866,527	7,320,809	6,662,584	6,042,908	5,984,576
Site Services Costs	$/year (see LoM Schedule)				886,080	886,080	886,080	886,080	886,080	886,080	886,080	886,080	886,080
G & A Costs	$/year (see LoM Schedule)				2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010
Municipal Taxes ($)	$/year	0			0	0	0	0	0	0	0	0	0
Interest on Letter of Credit & Purchase Financing ($)			0	0	0	0	0	0	0	0	0	0	0
Third-party Royalty / IBA Payments ($)		0.00%											
Total Operating Costs ($)	Base Case		0	0	38,636,027	49,563,232	50,277,518	49,932,679	48,119,126	50,142,901	49,922,547	50,516,590	48,822,488
Total Operating Costs ($)	Indexed for Sensitivity		**0**	**0**	**38,636,027**	**49,563,232**	**50,277,518**	**49,932,679**	**48,119,126**	**50,142,901**	**49,922,547**	**50,516,590**	**48,822,488**
Operating Profit ($)			**0**	**0**	**107,668,676**	**141,566,134**	**137,309,761**	**154,535,033**	**172,037,870**	**181,577,513**	**181,698,578**	**180,590,781**	**182,744,791**
Mine Pre-production Capital Expenditure ($)													
MINE DEVELOPMENT – Pre-stripping			0	4,244,147	0								
MINING FACILITIES			8,972,099	38,249,476	0								
PROCESSING FACILITIES			59,574,235	89,361,352	0								
TAILINGS & WATER MANAGEMENT			5,105,893	21,767,227	0								
INFRASTRUCTURE			20,661,941	26,297,016	0								
PARTICIPATION IN THIRD-PARTY ASSETS													
ROYALTY BUY-OUT OPTION				2,000,000									
Total	Base Case		94,314,168	181,919,218	0								
Total	Indexed for Sensitivity		94,314,168	181,919,218	0								
Residual Value ($)	Processing Assets	0.0%											
Working Capital ($)	Months of Annual Operating Costs	3.00		9,659,007	2,731,801	178,572	-86,210	-453,388	505,944	-55,088	148,511	-423,526	119,033
Sustaining Capital Expenditures ($)													
Underground Development					0	0	0	0	0	0	0	0	0
Mining Facilities					0	1,407,674	0	227,700	1,227,016	334,650	665,475	1,085,709	424,350
Processing Assets					0	0	0	0	0	0	0	0	0
Tailings & Water Management					6,726,039	4,466,424	851,156	5,124,339	1,783,048	4,161,766	4,573,644	123,766	1,263,094
Total Sustaining Capital Expenditure	Base Case				6,726,039	5,874,098	851,156	5,352,039	3,010,063	4,496,416	5,239,119	1,209,475	1,687,444
Total Sustaining Capital Expenditure	Indexed for Sensitivity				6,726,039	5,874,098	851,156	5,352,039	3,010,063	4,496,416	5,239,119	1,209,475	1,687,444
Total Capital Expenditure ($)			**94,314,168**	**191,578,225**	**9,457,840**	**6,052,670**	**764,946**	**4,898,651**	**3,516,007**	**4,441,327**	**5,387,630**	**785,949**	**1,806,477**
Mine Rehabilitation Trust Fund Payments ($)			**0**	**7,187,917**	**3,593,958**	**3,593,958**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mine Closure Costs ($)			0	0	0	0	0	0	0	0	0	0	0
Federal Corporate Income Tax	Proportions of Total	30.2%	0	0	1,809,263	10,977,652	12,016,779	15,086,020	17,860,673	19,599,726	20,052,510	20,275,049	20,849,370
Provincial Corporate Income Tax		23.1%	0	0	0	0	4,976,759	15,117,255	16,342,831	17,004,010	16,849,979	16,646,751	16,808,106
Quebec Mining Tax		46.7%	0	0	470,192	7,050,081	13,299,394	20,434,106	26,896,136	30,505,622	31,551,880	32,311,496	33,581,533
Total Corporate Income and Mining Taxes ($)	Total	100.0%	**0**	**0**	**2,279,456**	**18,027,733**	**30,292,932**	**50,637,381**	**61,099,640**	**67,109,358**	**68,454,369**	**69,233,296**	**71,239,009**
PRE-TAX CASH FLOW			**-94,314,168**	**-198,766,142**	**94,616,877**	**131,919,506**	**136,544,815**	**149,636,382**	**168,521,863**	**177,136,186**	**176,310,948**	**179,804,832**	**180,938,314**
Cumulative P-T CF			-94,314,168	-293,080,309	-198,463,432	-66,543,926	70,000,890	219,637,272	388,159,135	565,295,320	741,606,269	921,411,101	1,102,349,415
Payback period work area				1.00	1.00	1.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
AFTER-TAX CASH FLOW			**-94,314,168**	**-198,766,142**	**92,337,422**	**113,891,773**	**106,251,884**	**98,999,001**	**107,422,223**	**110,026,828**	**107,856,579**	**110,571,536**	**109,699,305**
Cumulative A-T CF			-94,314,168	-293,080,309	-200,742,888	-86,851,115	19,400,769	118,399,770	225,821,993	335,848,821	443,705,400	554,276,936	663,976,241
Payback period work area				1.00	1.00	1.00	0.82	0.00	0.00	0.00	0.00	0.00	0.00

Item	2031	2032	2033	2034	2035	2036	2037	2038	2039
Year	10	11	12	13	14	15	16	17	18
Mineralisation (t)	2,484,851	2,485,734	2,438,650	2,381,070	2,480,507	2,497,055	2,387,737	2,387,737	2,387,737
Waste (t)	2,615,585	1,826,111	1,400,882	1,531,708	2,249,527	2,487,860	2,072,511	2,072,511	2,072,511
Overburden (t)	0	574,341	1,100,987	1,172,220	761,276	584,053	1,272,970	1,272,970	1,272,970
Total Material Mined (t)	5,100,436	4,886,186	4,940,519	5,084,998	5,491,310	5,568,968	5,733,218	5,733,218	5,733,218
Stripping Ratio (w : o)	1.053	0.966	1.026	1.136	1.214	1.230	1.401	1.401	1.401
Mineralisation Processed (t)	2,484,851	2,485,734	2,438,650	2,381,070	2,480,507	2,497,055	2,387,737	2,387,737	2,387,737
Grade (% Cg)	4.15	4.15	4.24	4.34	4.15	4.14	4.32	4.32	4.32
Process Recovery (%)	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0
Concentrate Production (t)	99,848	99,922	100,108	100,173	99,713	100,063	99,911	99,911	99,911
Less Transport Losses (t)	0	0	0	0	0	0	0	0	0
Concentrate for Sale (t)	99,848	99,922	100,108	100,173	99,713	100,063	99,911	99,911	99,911
Concentrate Inventory Level (t)	0	0	0	0	0	0	0	0	0
Concentrate Sold (t)	**99,848**	**99,922**	**100,108**	**100,173**	**99,713**	**100,063**	**99,911**	**99,911**	**99,911**
Cg Price ($)	1,777	1,777	1,777	1,777	1,777	1,777	1,777	1,777	1,777
Cg Concentrate Sales ($)	231,883,774	232,054,885	232,488,128	232,637,943	231,569,674	232,383,785	232,030,778	232,030,778	232,030,778
Transport Cost to Market	0	0	0	0	0	0	0	0	0
Total Sales – FOB Mine Site ($)	231,883,774	232,054,885	232,488,128	232,637,943	231,569,674	232,383,785	232,030,778	232,030,778	232,030,778
Total Revenue ($) – Base Case	231,883,774	232,054,885	232,488,128	232,637,943	231,569,674	232,383,785	232,030,778	232,030,778	232,030,778
Total Revenue ($) – Indexed for Sensitivity	**231,883,774**	**232,054,885**	**232,488,128**	**232,637,943**	**231,569,674**	**232,383,785**	**232,030,778**	**232,030,778**	**232,030,778**
Mining Costs ($)	16,793,757	16,723,942	18,450,976	19,059,271	20,429,204	20,516,370	21,357,894	21,357,894	21,357,894
Processing Costs ($)	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909
Tailings Transport Costs ($)	6,224,862	6,035,214	6,203,854	6,103,690	5,891,572	5,529,067	6,319,762	6,319,762	6,319,762
Site Services Costs	886,080	886,080	886,080	886,080	886,080	886,080	886,080	886,080	886,080
G & A Costs	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010
Municipal Taxes ($)	0	0	0	0	0	0	0	0	0
Interest on Letter of Credit & Purchase Financing ($)	0	0	0	0	0	0	0	0	0
Third-party Royalty / IBA Payments ($)									
Total Operating Costs ($) – Base Case	49,298,618	49,039,155	50,934,829	51,442,959	52,600,775	52,325,436	53,957,655	53,957,655	53,957,655
Total Operating Costs ($) – Indexed for Sensitivity	**49,298,618**	**49,039,155**	**50,934,829**	**51,442,959**	**52,600,775**	**52,325,436**	**53,957,655**	**53,957,655**	**53,957,655**
Operating Profit ($)	**182,585,156**	**183,015,731**	**181,553,300**	**181,194,984**	**178,968,899**	**180,058,349**	**178,073,123**	**178,073,123**	**178,073,123**
Working Capital ($)	-64,866	473,918	127,033	289,454	-68,835	408,055	0	0	0
Underground Development	0	0	0	0	0	0	0	0	0
Mining Facilities	543,642	4,009,763	227,700	227,700	227,700	227,700	227,700	227,700	227,700
Processing Assets	0	0	0	0	0	0	0	0	0
Tailings & Water Management	1,087,813	4,847,102	132,437	1,565,096	1,104,247	2,726,002	946,116	0	0
Total Sustaining Capital Expenditure – Base Case	1,631,455	8,856,864	360,137	1,792,796	1,331,947	2,953,702	1,173,816	227,700	227,700
Total Sustaining Capital Expenditure – Indexed for Sensitivity	1,631,455	8,856,864	360,137	1,792,796	1,331,947	2,953,702	1,173,816	227,700	227,700
Total Capital Expenditure ($)	**1,566,589**	**9,330,783**	**487,170**	**2,082,250**	**1,263,112**	**3,361,757**	**1,173,816**	**227,700**	**227,700**
Mine Rehabilitation Trust Fund Payments ($)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mine Closure Costs ($)	0	0	0	0	0	0	0	0	0
Federal Corporate Income Tax	21,083,439	21,277,280	21,146,326	21,280,546	21,138,315	21,342,019	21,165,260	21,235,792	21,307,786
Provincial Corporate Income Tax	16,779,337	16,772,479	16,555,967	16,572,126	16,398,264	16,505,991	16,334,258	16,361,252	16,396,193
Quebec Mining Tax	34,008,655	33,855,128	33,951,524	34,092,792	33,737,147	34,013,670	33,634,418	33,824,917	33,958,267
Total Corporate Income and Mining Taxes ($)	**71,871,431**	**71,904,887**	**71,653,817**	**71,945,463**	**71,273,725**	**71,861,680**	**71,133,935**	**71,421,962**	**71,662,246**
PRE-TAX CASH FLOW	**181,018,567**	**173,684,948**	**181,066,130**	**179,112,734**	**177,705,787**	**176,696,591**	**176,899,306**	**177,845,423**	**177,845,423**
Cumulative P-T CF	1,283,367,982	1,457,052,930	1,638,119,060	1,817,231,794	1,994,937,580	2,171,634,171	2,348,533,478	2,526,378,900	2,704,224,323
Payback period work area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AFTER-TAX CASH FLOW	**109,147,136**	**101,780,061**	**109,412,313**	**107,167,270**	**106,432,061**	**104,834,911**	**105,765,371**	**106,423,461**	**106,183,177**
Cumulative A-T CF	773,123,377	874,903,438	984,315,751	1,091,483,021	1,197,915,083	1,302,749,994	1,408,515,365	1,514,938,826	1,621,122,002
Payback period work area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Item	2040	2041	2042	2043	2044	2045	2046	2047	Total
Year	19	20	21	22	23	24	25	26	**Total**
Mineralisation (t)	2,387,737	2,387,737	2,151,235	2,151,235	2,151,235	2,151,235	2,151,235	964,192	**59,854,827**
Waste (t)	2,072,511	2,072,511	1,310,519	1,310,519	1,310,519	1,310,519	1,310,519	91,258	49,961,877
Overburden (t)	1,272,970	1,272,970	0	0	0	0	0	0	13,221,548
Total Material Mined (t)	5,733,218	5,733,218	3,461,754	3,461,754	3,461,754	3,461,754	3,461,754	1,055,450	**123,038,252**
Stripping Ratio (w : o)	1.401	1.401	0.609	0.609	0.609	0.609	0.609	0.095	**1.056**
Mineralisation Processed (t)	2,387,737	2,387,737	2,151,235	2,151,235	2,151,235	2,151,235	2,151,235	964,192	**59,854,827**
Grade (% Cg)	4.32	4.32	4.79	4.79	4.79	4.79	4.79	5.25	**4.35**
Process Recovery (%)	94.0	94.0	94.0	94.0	94.0	94.0	94.0	94.0	**94.00**
Concentrate Production (t)	99,911	99,911	99,908	99,908	99,908	99,908	99,908	49,088	**2,520,377**
Less Transport Losses (t)	0	0	0	0	0	0	0	0	0
Concentrate for Sale (t)	99,911	99,911	99,908	99,908	99,908	99,908	99,908	49,088	2,520,377
Concentrate Inventory Level (t)	0	0	0	0	0	0	0	0	0
Concentrate Sold (t)	**99,911**	**99,911**	**99,908**	**99,908**	**99,908**	**99,908**	**99,908**	**49,088**	**2,520,377**
Cg Price ($)	1,777	1,777	1,777	1,777	1,777	1,777	1,777	1,777	
Cg Concentrate Sales ($)	232,030,778	232,030,778	232,023,523	232,023,523	232,023,523	232,023,523	232,023,523	114,000,398	**5,702,952,338**
Transport Cost to Market	0	0	0	0	0	0	0	0	0
Total Sales – FOB Mine Site ($)	232,030,778	232,030,778	232,023,523	232,023,523	232,023,523	232,023,523	232,023,523	114,000,398	**5,702,952,338**
Total Revenue ($) – Base Case	232,030,778	232,030,778	232,023,523	232,023,523	232,023,523	232,023,523	232,023,523	114,000,398	5,702,952,338
Total Revenue ($) – Indexed for Sensitivity	**232,030,778**	**232,030,778**	**232,023,523**	**232,023,523**	**232,023,523**	**232,023,523**	**232,023,523**	**114,000,398**	5,702,952,338
Mining Costs ($)	21,357,894	21,357,894	13,595,965	13,595,965	13,595,965	13,595,965	13,595,965	4,470,035	448,024,742
Processing Costs ($)	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	23,270,909	11,432,998	587,388,000
Tailings Transport Costs ($)	6,319,762	6,319,762	5,904,405	5,904,405	5,904,405	5,904,405	5,904,405	3,515,809	149,043,858
Site Services Costs	886,080	886,080	886,080	886,080	886,080	886,080	886,080	435,331	22,587,331
G & A Costs	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	2,123,010	1,043,035	54,118,285
Municipal Taxes ($)	0	0	0	0	0	0	0	0	0
Interest on Letter of Credit & Purchase Financing ($)	0	0	0	0	0	0	0	0	0
Third-party Royalty / IBA Payments ($)									0
Total Operating Costs ($) – Base Case	53,957,655	53,957,655	45,780,370	45,780,370	45,780,370	45,780,370	45,780,370	20,897,208	1,261,162,216
Total Operating Costs ($) – Indexed for Sensitivity	**53,957,655**	**53,957,655**	**45,780,370**	**45,780,370**	**45,780,370**	**45,780,370**	**45,780,370**	**20,897,208**	1,261,162,216
Operating Profit ($)	**178,073,123**	**178,073,123**	**186,243,153**	**186,243,153**	**186,243,153**	**186,243,153**	**186,243,153**	**93,103,190**	**4,441,790,122**
MINE DEVELOPMENT – Pre-stripping									4,244,147
MINING FACILITIES									47,221,576
PROCESSING FACILITIES									148,935,587
TAILINGS & WATER MANAGEMENT									26,873,120
INFRASTRUCTURE									46,958,957
PARTICIPATION IN THIRD-PARTY ASSETS									0
ROYALTY BUY-OUT OPTION									2,000,000
Total – Base Case									276,233,386
Total – Indexed for Sensitivity									276,233,386
Residual Value ($)								0	0
Working Capital ($)	0	-2,044,321	0	0	0	0	-6,220,791	-5,224,302	0
Underground Development	0	0	0	0	0	0	0	0	0
Mining Facilities	227,700	962,254	227,700	227,700	227,700	227,700	227,700	227,700	14,076,031
Processing Assets	0	0	0	0	0	0	0	0	0
Tailings & Water Management	0	0	3,271,918	0	0	0	36,609	883,802	45,674,418
Total Sustaining Capital Expenditure – Base Case	227,700	962,254	3,499,618	227,700	227,700	227,700	264,309	1,111,502	59,750,449
Total Sustaining Capital Expenditure – Indexed for Sensitivity	227,700	962,254	3,499,618	227,700	227,700	227,700	264,309	1,111,502	59,750,449
Total Capital Expenditure ($)	**227,700**	**-1,082,067**	**3,499,618**	**227,700**	**227,700**	**227,700**	**-5,956,482**	**-4,112,800**	**335,983,835**
Mine Rehabilitation Trust Fund Payments ($)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-14,375,833**	**0**
Mine Closure Costs ($)	0	0	0	0	0	0	0	14,375,833	**14,375,833**
Federal Corporate Income Tax	21,362,728	21,400,081	22,281,027	22,250,955	22,290,693	22,321,157	22,344,241	11,398,501	495,153,189
Provincial Corporate Income Tax	16,423,166	16,440,469	17,107,380	17,077,978	17,103,693	17,123,492	17,138,528	8,744,801	379,581,066
Quebec Mining Tax	34,051,612	34,055,251	36,132,638	36,260,065	36,349,264	36,411,703	36,452,335	16,319,364	767,209,188
Total Corporate Income and Mining Taxes ($)	**71,837,506**	**71,895,800**	**75,521,045**	**75,588,998**	**75,743,650**	**75,856,352**	**75,935,105**	**36,462,666**	**1,641,943,443**
PRE-TAX CASH FLOW	**177,845,423**	**179,155,190**	**182,743,535**	**186,015,453**	**186,015,453**	**186,015,453**	**192,199,635**	**97,215,990**	**4,091,430,453**
Cumulative P-T CF	2,882,069,746	3,061,224,935	3,243,968,470	3,429,983,923	3,615,999,376	3,802,014,828	3,994,214,463	4,091,430,453	
Payback period work area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
AFTER-TAX CASH FLOW	**106,007,917**	**107,259,389**	**107,222,490**	**110,426,455**	**110,271,803**	**110,159,101**	**116,264,530**	**60,753,324**	**2,449,487,010**
Cumulative A-T CF	1,727,129,919	1,834,389,308	1,941,611,798	2,052,038,253	2,162,310,056	2,272,469,157	2,388,733,687	2,449,487,010	
Payback period work area	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

FINANCIAL INDICATORS				
FINANCIAL INDICATORS	Lag from t=-4 to pre-prod. start (months)	30.0		
Pre Tax	Lag from t=0 to com. prod. start (months)	3.0		
Payback Period (years)			**2.2**	
Total Cash Flow ($)			**4,091,430,453**	
Net Present Value ($)	Discount Rate	6.0%	**1,673,846,558**	
Net Present Value ($)	Discount Rate	8.0%	**1,286,756,896**	
Net Present Value ($)	Discount Rate	10.0%	**1,002,745,544**	
Internal Rate of Return			**40.6%**	
After Tax				Effective
Payback Period (years)			**2.6**	Tax Rates
Total CashFlow ($)			**2,449,487,010**	40.1%
Net Present Value ($)	Discount Rate	6.0%	**986,658,960**	41.1%
Net Present Value ($)	Discount Rate	8.0%	**750,830,260**	41.6%
Net Present Value ($)	Discount Rate	10.0%	**577,170,649**	42.4%
Internal Rate of Return			**32.2%**	

22.3 Sensitivity Analysis

A sensitivity analysis has been carried out, with the base case described above as a starting point, to assess the impact of changes in total pre-production (initial) capital expenditure ("**Capex**"), operating costs ("**Opex**"), product prices ("**PRICE**") and the USD/CAD exchange rate ("**FX RATE**") on the Project's NPV @ 8 % and IRR. Each variable was examined one-at-a-time (price forecasts of the different concentrate products are varied together). An interval of ±30 % with increments of 10 % was used for the first three (3) variables. USD/CAD exchanges rates of 0.65, 0.70, 0.75, 0.80, 0.85, 0.90, and 0.95 (relative variations from -15.05 to 24.17 %) were used. The U.S. content associated with the cost estimates was used to adjust the estimates for each exchange rate assumption.

The before-tax results of the sensitivity analysis, as shown in Figure 22.2 and Figure 22.3, indicate that, within the limits of accuracy of the cost estimates in this FS Study (±15 %, as shown by the vertical dashed lines), the Project's before-tax viability does not seem significantly vulnerable to the under-estimation of capital and operating costs, taken one at-a-time. As seen in Figure 22.2, the NPV is more sensitive to variations in Opex than Capex, as shown by the steeper slope of the Opex curve. As expected, the NPV is most sensitive to variations in price and the USD/CAD exchange rate. The NPV remains positive at the lower limit of the price interval (±30 %) and at the upper limit of the exchange rate interval examined.

Figure 22.2 – Pre-tax NPV$_{8\ \%}$: Sensitivity to Capital Expenditure, Operating Cost, Prices and USD/CAD Exchange Rate

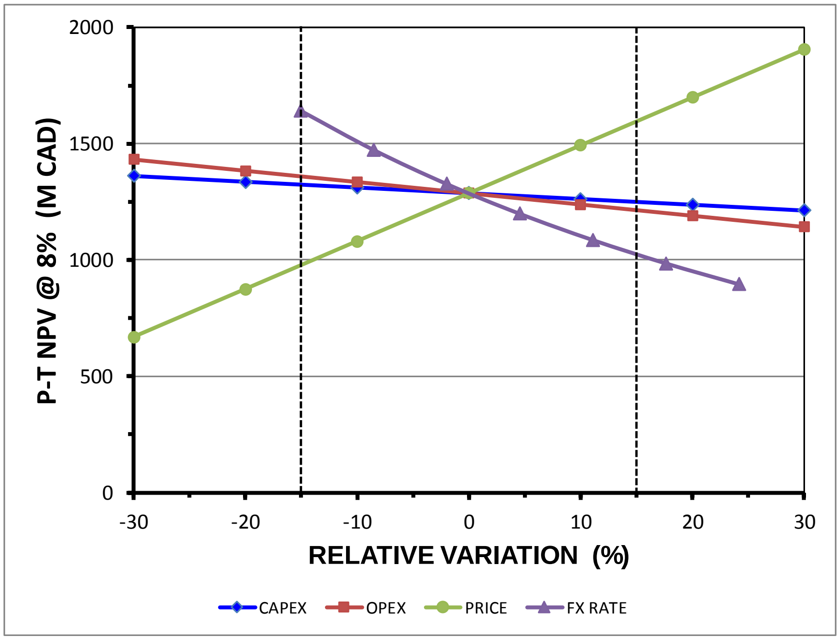
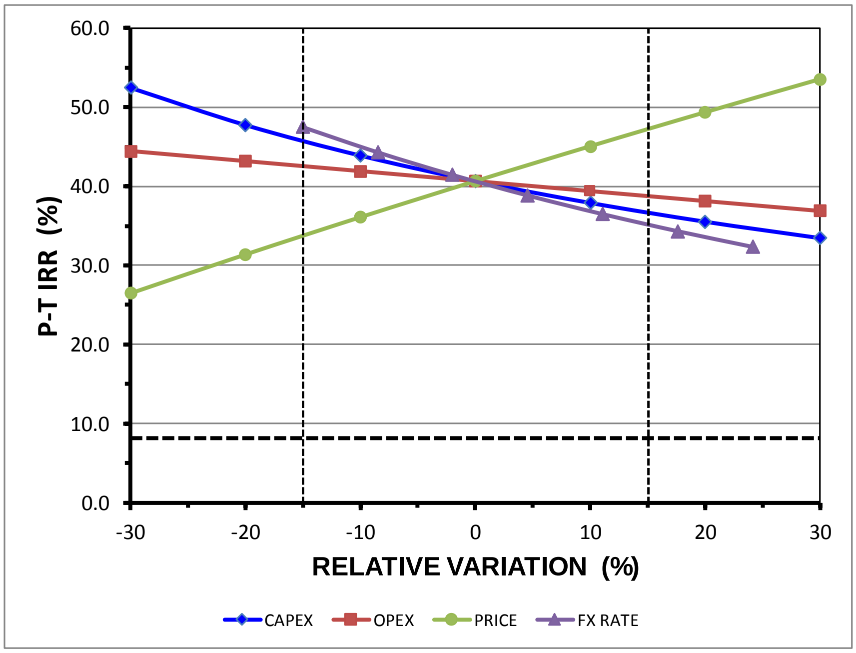


Figure 22.3, showing variations in internal rate of return, provides the same conclusions. The horizontal dashed line represents the base case discount rate of 8 %. Due to the different timing associated with Capex versus Opex, the IRR is more sensitive to variations in Capex than in Opex.

Figure 22.3 – Pre-tax IRR: Sensitivity to Capital Expenditure, Operating Cost, Prices and USD/CAD Exchange Rate



The same conclusions can be made from the after-tax results of the sensitivity analysis as shown in Figure 22.4 and Figure 22.5. Figure 22.4 indicates that the Project's after-tax viability is mostly vulnerable to a price forecast reduction and change in the USD/CAD exchange rate, while being less affected by the under-estimation of capital and operating costs. Nevertheless, the NPV remains positive at the lower limit of the price interval and at the upper limit of the exchange rate interval examined.

Figure 22.4 – After-tax NPV8 %: Sensitivity to Capital Expenditure, Operating Cost, Prices and USD/CAD Exchange Rate

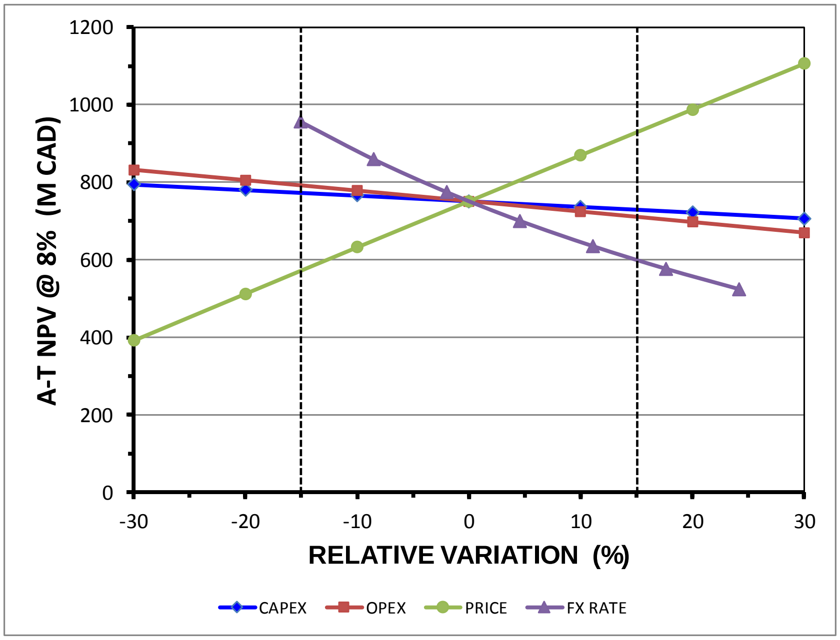
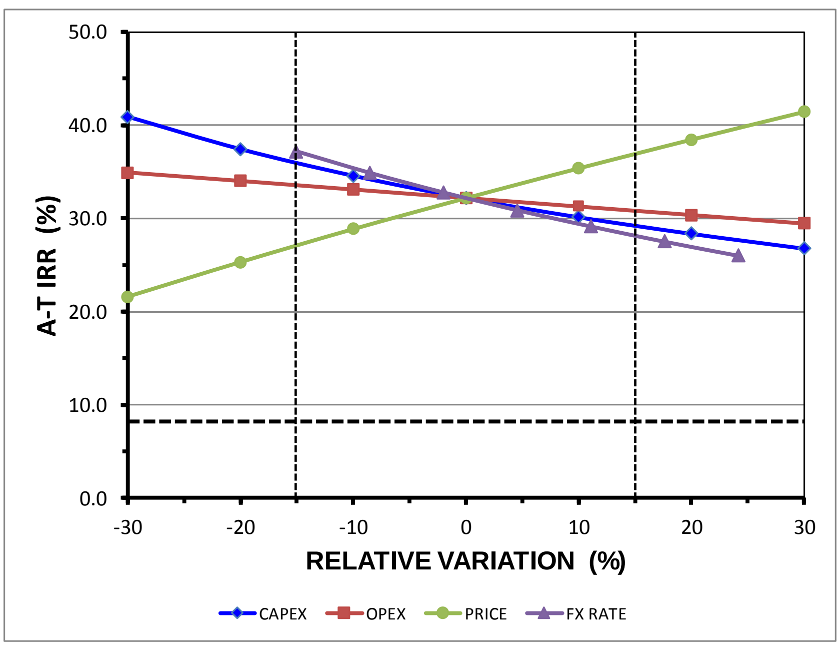


Figure 22.5 showing variations in internal rate of return, provides the same conclusions.

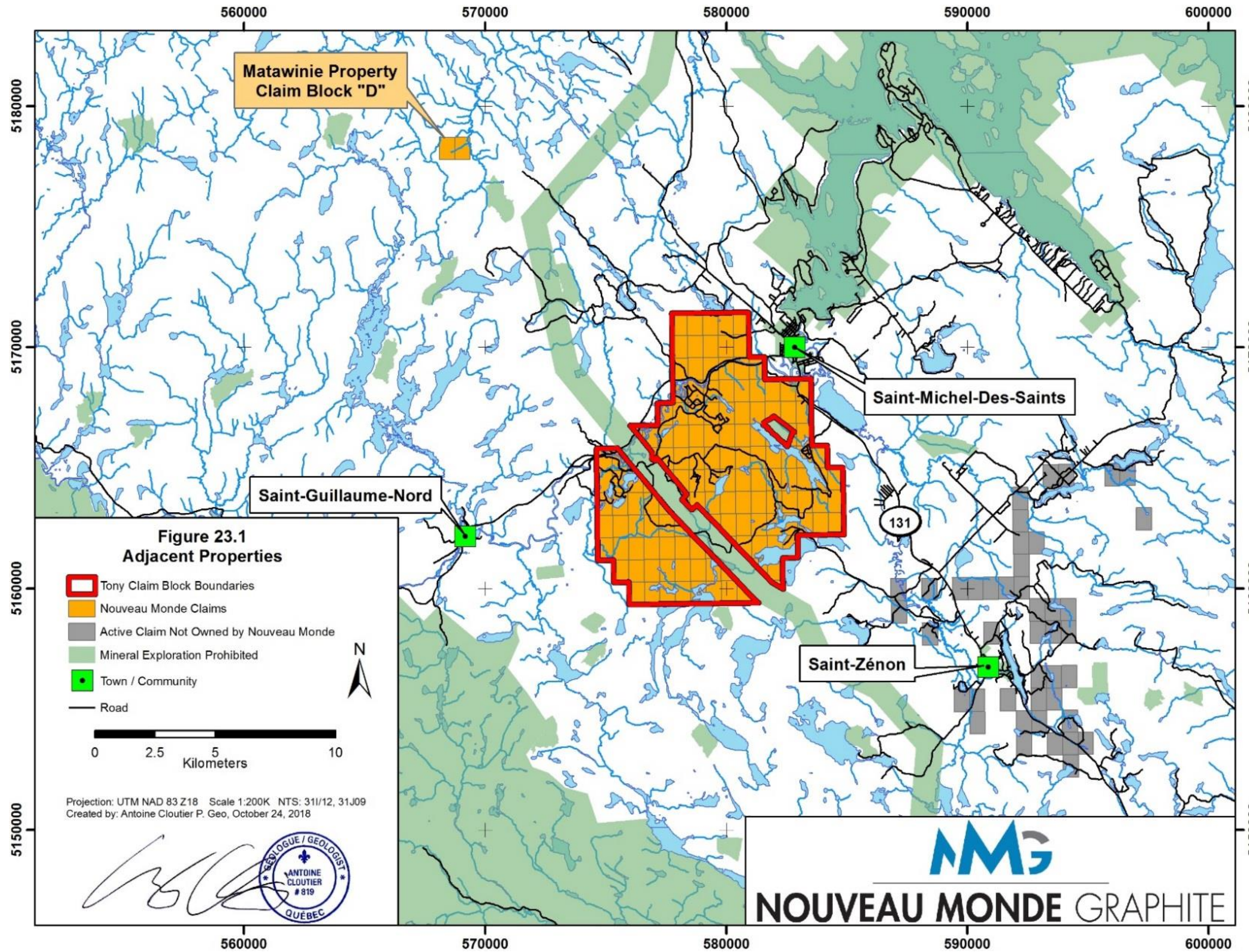
Figure 22.5 – After-tax IRR: Sensitivity to Capital Expenditure, Operating Cost, Prices and USD/CAD Exchange Rate



23.0 ADJACENT PROPERTIES

No other mineral properties are located contiguous to the Tony Claim Block and no other advanced mining projects are noted in the area. Other claim blocks forming NMG's Matawinie Property are considered to be located too far from the Tony Block to be pertinent (See Figure 4.1) and are, therefore, not described in detail in the current Report. The author considers, however, that mineralization on those other property claim blocks is somewhat relevant to the mineralization observed in the Tony Block, as they share the same type of lithologies and a similar formational and tectonic environment. Figure 23.1 below illustrates the Tony Claim Block and surrounding active claims.

Figure 23.1 – Adjacent Properties



24.0 OTHER RELEVANT DATA AND INFORMATION

24.1 Project Implementation Schedule

A Project master schedule for the FS has been developed to cover the major Project activities. The Project master schedule includes activities such as: studies, permitting, engineering, procurement, construction and commissioning at a feasibility level (see Figure 24.1).

24.1.1 Schedule Assumptions

The Project schedule is based on the following assumptions:

- The geotechnical surveys and investigation reports, in their final version, are received by the EPCM contractor (s) prior to the start of basic engineering;
- The hydrogeology surveys and study reports, in their final version, are received by the EPCM contractor (s) prior to the start of basic engineering and are favorable for the Project;
- All necessary permits will be made available prior to the start of construction;
- The division of responsibility between the EPCM contractor (s) will be optimal in terms of the scope of work and the battery limits;
- The coordination between the EPCM contractor (s) will be optimal so as not to disrupt the execution schedule; A six (6)-month advance engineering activity (bridge) starts as soon as sufficient funds are made available to freeze the process flow sheet and to start the procurement process for the long lead items and the obtaining of vendor data. This activity precedes the start of the basic engineering phase;
- Design criteria, process and scope of work are frozen and agreed upon by all stakeholders prior to the start of basic engineering;
- The bid to award duration for major equipment package is ten (10) weeks;
- Qualified resources are available for the EPCM contractor (s);
- Qualified construction workers will be available at the time of construction;
- The temporary power line from Hydro-Québec will be operational prior to the start of construction;
- The 120 kV Hydro-Québec power line will be commissioned and operational prior to the commissioning phase.

24.1.2 Project Schedule / Construction Sequence

The construction flow is the following:

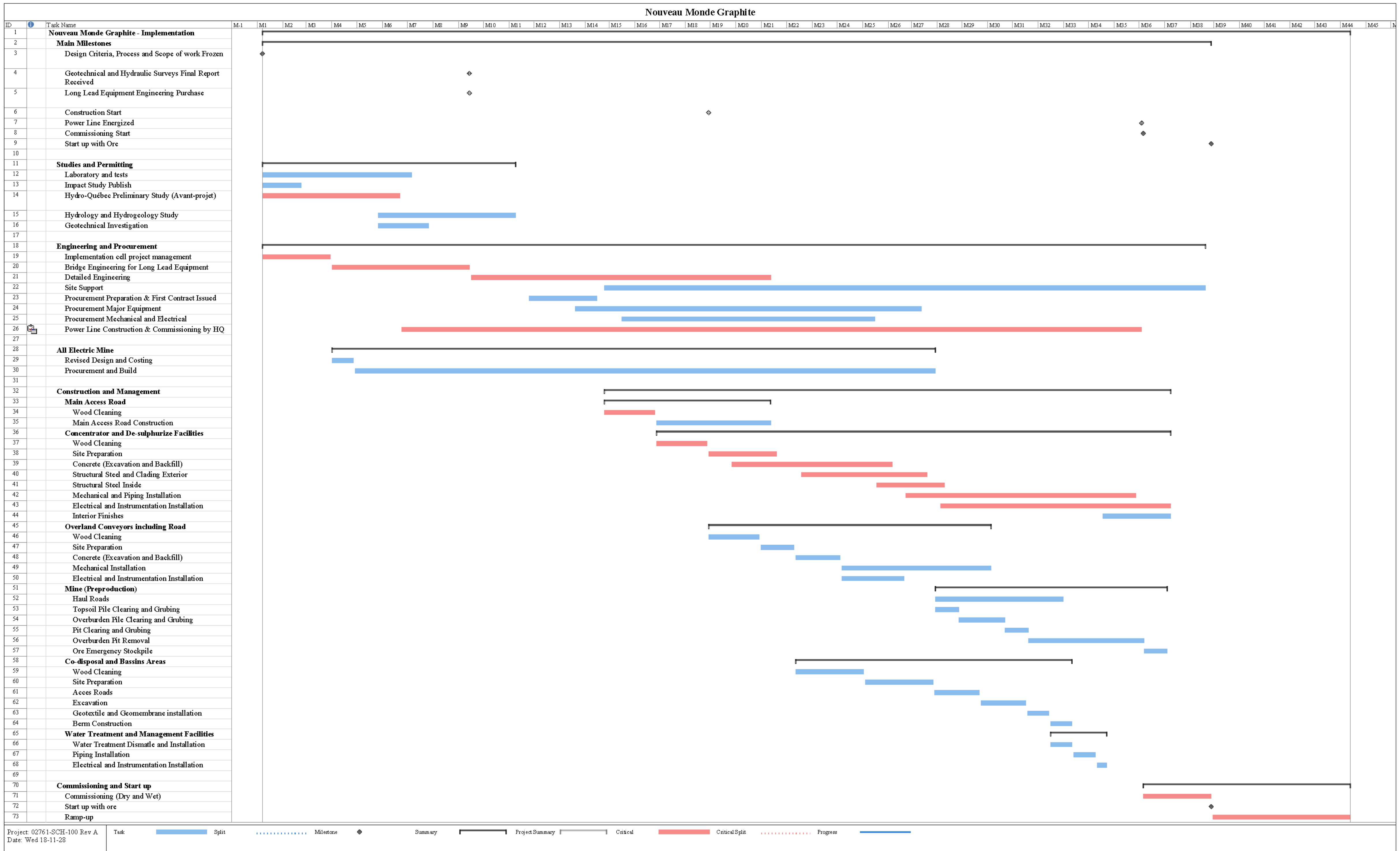
- Award by the EPCM contractor (s) of the various construction packages;
- Mobilization of the EPCM contractor (s) to site;
- Mobilization of the mining contractor for site preparation;
- Site preparation and access road;
- Civil work:
- Concrete works;
- Domes and structure steel erection;
- Architectural installation and finishes;
- Mechanical and piping installation;
- Electrical and instrumentation installation;
- Pre-operational verification and Commissioning activities.

24.1.3 Critical Path

The critical paths are dependent on the procurement of the long lead items, finalization of the 120 kV Hydro-Québec power line and obtaining the Project's financing and permits.

All-electric mining equipment is also on the critical path; however, this activity could be bypassed using diesel equipment.

Figure 24.1 – Project Implementation Schedule



25.0 INTERPRETATION AND CONCLUSIONS

25.1 Conclusions

25.1.1 Exploration Activities

Exploration work on the Project targeted graphite mineralization and consists to date of airborne geophysics (Mag and TDEM), prospecting, ground TDEM surveying, trenching/channel sampling and core drilling. Surface and core samples were also collected for metallurgical tests including representative master composites of the West Zone. Exploration work by NMG was initiated on the Tony Claim Block in summer of 2014 which resulted in the discovery of seven (7) mineralized zones. These zones are named the Far West, West, North, North-East, East, South-East and South-West Zones. No other known mineral occurrences were identified on the Project area prior to the exploration work performed by NMG.

Exploration activities by NMG have culminated in the identification of a Probable Mineral Reserve for the West Zone as well as a Mineral Resource Estimate combining the South-East and South-West mineralization present on NMG's Tony Claim Block. The Probable Mineral Reserve of the West Zone is based on 4,491 assay intervals collected from core drilling and three (3) surface trenches providing 207 channel samples. Proper quality control measures were used throughout the exploration programs leading to the Probable Mineral Reserves detailed in this Report.

25.1.2 Mineral Processing and Testing

The metallurgical test program that was carried out to support the FS confirmed the robustness of the flow sheet that was developed during the PFS.

The additional testing that was completed to address risks and opportunities that have been identified led to the following conclusions:

- A Master composite representing the first few years of planned mining operation and mine plan variability composites confirmed the metallurgical results that were obtained in the flow sheet development and optimization programs. This consistent metallurgical response further reduces the process risk of the Project.
- Process water re-circulation can result in undesirable activation of sulphides in the rougher/scavenger stage and increased sulphide grades in the final graphite concentrate. Further work will be required to develop a better understanding of the impact of process water circulation time and ageing on the activation of sulphides.
- Laboratory simulations of the Outotec SkimAir® technology has not resulted in a superior concentrate product. However, this evaluation is based on two (2) tests

only. Longer term and larger scale testing would be required to determine the attractiveness of the technology.

- Optimized conditions have been developed for the desulphurization stage, but a full characterization of representative low-sulphur and high-sulphur tailings have not been completed.

All test programs completed to-date generated conclusive results and further laboratory scale development testing is deemed unnecessary at this point, especially when considering the new 3.5 t/h demonstration plant commissioned to process the West Zone material.

The demonstration plant has been designed with a capacity of 3.5 t/h will process approximately 40,000 tonnes of ore over a period of two (2) years. The operation of the demonstration plant will facilitate the optimization of all unit operations and a systematic investigation of the grinding conditions for the polishing and stirred media mill applications. It will also allow to test process options such as the SkimAir® technology or spirals in the secondary cleaning circuit. The operation of the demonstration plant will provide critical process data to finalize the flow sheet necessary for the detailed engineering phase.

25.1.3 Recovery Methods

The processing plant is designed to process 6,449 t/d of run of mine to produce 100,000 tonnes per year of graphite concentrate grading at about 97 % C(t) based on a concentrate recovery of 94 %. A suitable process flow sheet has been developed which includes crushing, grinding, flotation, polishing, thickening, filtering and drying. The dried concentrate is then classified into various sized products as required by customers.

The concentrator tailings are de-sulphurized in the de-sulphurization plant. The NAG tailings and the sulphide tailings (PAG) are conveyed to separate stockpiles before being trucked to the co-disposition storage facility.

25.1.4 All-Electric

Based on the work carried out in the FS, it was concluded that for this Project, the following all-electric operation scheme was appropriate:

- Waste rocks (0-750 mm) to be transported from the pit to the CSF by electric haul trucks;
- Both NAG and PAG tailings to be transported from their respective stockpiles to the CSF by electric haul trucks;
- Backfill material to be transported to the pit by electric haul trucks; and

- Run-of-mine ore (0-750 mm) to be transported by electric haul trucks to electrically-cabled in-pit crushers, and then subsequently by electrically-fed overland conveyors (0-150 mm) to the concentrator.

25.1.5 Market

NMG is developing a natural graphite Project which will have competitive advantages due to its privileged location, cost structure and experienced team. A demonstration plant (see Press Release dated September 18th, 2018) located near the mine site has been constructed to allow NMG to have an earlier debut in the market and de-risk the first years of sales. One of the goals of this demonstration plant is to secure medium to long term supply agreements with different customers.

25.1.6 Economic Analysis

This Report shows that the Project is technically feasible as well as economically viable.

Based on a 26-year production period and assuming 100 % equity financing, the IRR is 40.6 % before taxes and 32.2 % after taxes.

The authors of this Report consider that the Project is sufficiently robust to warrant moving it to the mine development phase.

25.1.7 Risk Evaluation

There are a number of risks and uncertainties identifiable to any new project and usually cover the mineralization, process, financial, environment and permitting aspects. This Project is no different and an evaluation of the possible risks was undertaken which is summarized in this Section.

25.1.7.1 Mineralization

- The estimates of Mineral Resources and Mineral Reserves for the Property have been prepared in accordance with NI 43-101 rules and guidelines. There are numerous uncertainties inherent in estimating Mineral Resources and Mineral Reserves and no assurance can be given that the anticipated tonnages and grades will be achieved, that the indicated level of recovery will be realized or that any categories of Mineral Resources or Reserves will be upgraded to higher categories. The estimation of mineralization is a subjective process and the accuracy of estimates is a function of quantity and quality of available data, the accuracy of statistical computations and the assumptions and judgments made in interpreting engineering and geological information.
- The Probable Mineral Reserves on which this FS is based are derived from Indicated Resources and thus, have a lower level of confidence than Proven Mineral Reserves which are derived from Measured Mineral Resources. Hence, there could be

unexpected internal grades or variations which could result in the Project being uneconomic.

- Limited mineralogical data is presently available for the West Zone mineralization. While this is not an immediate risk, a better understanding of the host rock mineralogy may assist in the final optimization of the graphite and sulphide circuits and may provide an opportunity for generating a saleable by-product.
- Hydrogeology studies are ongoing. Potential water sources that affect the mining operation are surface run-off, rainfall, snowmelt, and groundwater. Additional information will be required prior to construction to assess possible risks. The work needed to gather the necessary data will be included in the next phase of the Project.

25.1.7.2 Process

- The process has been developed based on significant test work on representative samples extracted from the mineralization. Major variations in the quality of mineralization could result in limitation of throughput and quality throughout the process. These limitations include:
  - The crushing and grinding circuit has been designed based on limited comminution data. Significant variations in hardness throughout the life of mine resource could cause a throughput limitation in the comminution circuit;
  - Variability flotation tests completed to date have revealed a consistent metallurgical response of composites representing large areas within the resource. However, the risk of increased variation for smaller areas within the deposit still exists. Any significant variation in the metallurgical response of the mill feed during the first few months and years of operation can have a significant impact on the economics of the Project;
  - The addition of xanthate in the sulphide circuit which may lead to residual xanthate in the process water that is cycled back to the front end of the graphite circuit. The xanthate could result in elevated sulphur recovery into the graphite cleaning circuit and possibly the final graphite concentrate.

25.1.7.3 All-Electric

- Maintenance intervals of battery-electric mobile fleet is uncertain due to a general lack of reference data available in the industry.
- The information from Hydro-Québec for the costs and the schedule to build the new 120 kV power line is incomplete.

25.1.7.4 Mine Infrastructure

- Lack of detailed geotechnical assessment could result in unintended consequences and have a significant impact in the construction Capex and hence must be completed before the start of basic engineering and the finalization of the Project budget.

25.1.7.5 Financing

- The results of the Report were based on certain assumptions that were given as of the date of the Report. The economic assessment reveals that the Project's viability will not be significantly vulnerable to variations in capital and operating costs, within the margins of error associated with the Report estimates. However, the Project's viability remains more vulnerable to the USD/CAD exchange rate and the larger uncertainty in future market prices. Delays and cost overrun can impact the Project rendering it uneconomic.
- Currently, there is a significant demand on the mining community for funds for mining opportunities worldwide. NMG is one of those mining companies who would be seeking financing for a project. Even though, the results of this financial analysis is very positive and shows an excellent return on investment, NMG is a smaller mining operator and funds could be difficult to obtain.
- The mining industry is heavily dependent upon the market price of the metals or minerals being mined. There is no assurance that a profitable market will exist for the sale of the same. There can be no assurance that mineral prices will be such that the Project can be mined at a profit. Mineral prices largely fluctuated over the last years and any serious downturn could prevent the continuation of the exploration, construction and development activities of the Corporation.

25.1.7.6 Environmental and Permitting

- The Project requires licenses and permits from various governmental authorities such as the MELCC. There can be no assurance that NMG will be able to obtain or maintain all necessary licenses and permits that may be required to carry out exploration, development and mining operations and failure to do so could delay or prevent the construction and start-up of the mine as planned.
- Any delay in obtaining the anticipated construction permits would have an adverse effect on the timing and costs associated with start-up. Such delays could also allow other third-party projects to commence production before the Matawinie Graphite Property, thereby potentially reducing NMG's target market share, which would have an adverse impact on the level of product sales and economics of the Matawinie Graphite Property.

- Although NMG has had communications with the local communities and has worked with these communities to mitigate their concerns about the potential project's environmental and social impact, the Project could be delayed by changes in the communities' attitudes necessitating additional studies and design alternatives.

26.0 RECOMMENDATIONS

26.1 Next Phase Estimated Costs

Table 26.1 presents the estimated costs for the next phase and the Section below describes the work to be done.

Table 26.1 – Next Phase Estimated Costs

Activity	Estimated Costs ($)
Condemnation Drilling Program, Geotechnical, Hydrology and Hydrogeology Studies	1,050,000
Metallurgical Studies and Tests Works	100,000
Complementary Environmental Studies or Surveys	100,000
Hydro-Québec Preliminary Study (“*Avant-projet*”)	700,000
Hydro-Québec Down Payment	3,000,000
Advance Engineering	2,142,000
Estimated Total Costs	**7,092,000**

26.2 Mining and Geology

26.2.1 Condemnation Drilling and Geotechnical Studies for Infrastructure

It is proposed to proceed with a 1,500 m drilling program in the sector of the West Zone Deposit aimed at providing more detailed geological data in areas where permanent infrastructure is planned. The goal is to ensure that the permanent infrastructure does not conflict with possible economic mineral deposits in the area. Condemnation drilling will also be combined with geotechnical studies since both aim to characterize the planned locations of the co-disposal stockpiles, the main concentrator site and the water collecting basins. Results will also help in determining the suitability of the underlying material for use in construction. The provisions estimated for the work include all field-work expenses, personnel, laboratory analysis, and the preparation of a final report.

Further geotechnical investigation will have to be carried out at the location of the proposed CSF and water management infrastructure (collecting basins, ditches). Investigations will include additional geotechnical boreholes with rock coring supplemented with laboratory tests including particle size distribution, moisture content, and uniaxial compressive strength on selected soils and rock samples.

Geotechnical and hydrogeology studies aimed at characterizing the overburden, pit wall stability and water pressure within the pit area are a necessary step for the project to go forward. The pit angles could be optimized further once geotechnical and hydrogeological assessments of the mine site are completed.

The work program aims to enhance the understanding of the geotechnical and hydrogeological conditions onsite and to characterize materials in support of the design of the open pit. The work program also includes consultant support to perform geo-mechanical mapping, drilling, trenching and a laboratory program as well as computer modelling to simulate groundwater regime and effects from the mining activities. Additional drilling and testing are recommended in the open pit area to get detailed geotechnical information of the overburden. The use of existing and future exploration drill holes could help in lowering the proposed budget for the hydrogeology program.

26.3 Metallurgical Studies and Test Work

A number of process areas require additional characterization in preparation of the detailed engineering stage. Testing to optimize the process and conditions will be completed in the demo plant due to the larger scale and continuous operating mode:

- Optimize the process variables associated with the polishing and stirred media mills. This includes a systematic investigation of the impact of grinding media type and size, retention time, mill speed, and pulp density on the metallurgical response in terms of concentrate grade and flake size distribution. The results of this will help determine whether polishing/cleaning of the coarse fraction is required, and whether upgrading of the graphite using spirals or WHIMS is required to meet the required specifications.
- Establish realistic reagent dosages for the various flotation circuits. Since the demo plant recirculates 100 % of the process water, any residual frother and collector will reduce the reagent dosage requirements.
- Optimize any process equipment design specifications that will require modifications due to the specific nature of graphite. For example, operation of the intermediate and final concentrate thickeners can be challenging due to the persistent froth often observed for graphite concentrates. Specific measures may have to be implemented to address these frothing issues.
- Develop a better understanding of the relationship between PAX dosage in the sulphide rougher and the recovery of sulphides into the final graphite concentrate under continuous operating conditions. This includes the implementation of control mechanisms to reduce the risk of overcollection and the investigation of xanthate destruction technologies and xanthate degradation over time.
- Evaluation of the SkimAir® technology. Outotec can provide a pilot scale cell, which aligns well with the 3.5 t/h nameplate capacity of the demo plant.

- Evaluation of screening and cycloning as dewatering technologies to confirm technical requirements for dewatering.
- Full characterization work on representative low-sulphide and high-sulphide tailings.
- Determine the material characteristics for storage and handling of ore and products. Parameters required for proper bin and pile sizing shall be determined whether with the demonstration plant or with specialized laboratories.
- Packaging cycle times will be determined, and logistics will be optimized for bag loading, inflating, filling, and storage.

26.4 Co-Disposal and Water Management Infrastructure

The following additional information is required to address project design refinements and confirm the assumptions made in co-disposal and water treatment engineering:

- Additional stability analysis will be required to include recommendations and optimization in the next engineering phases for:
    - The co-disposal stockpile including the pit wall data for areas where the pile will be located near the pit;
    - The co-disposal stockpile when placed over the backfilled mine pit;
    - Depending of geotechnical data interpretation after the next investigation, stability analysis for collecting basins design may be required;
    - Additional stability analyses to evaluate the effect of the blasting activities on the pit and the co-disposal pile will have to be carried out.
- Additional validation and engineering will have to be carried out regarding a protective rock layer between the in-pit co-disposal and the northern part of the pit where a lake will form after site reclamation;
- Perform instrumented experimental test cell monitoring on site and gather data (oxygen consumption, water content, suction) to improve co-disposal design;
- Collect surface water and process water quality data from laboratory tests and the demonstration project.

26.5 All-Electric

- It is recommended that automated (unmanned) charging technology be demonstrated in Canadian climatic conditions, in order to de-risk the Project.
- It is recommended for NMG to market benchmark EV operations for open pit mining applications. It could also target underground mining EV applications which would use the same technology.

26.6 Environment

- Undertake air emission, noise, hydrogeology and landscape modelling during the preparation of the environmental impact assessment;
- Perform a land survey in order to properly assess the location and proximity of private and leased lands within a 1 km radius of the proposed open pit;
- Continue the collaborative work with the Community, the Atikamekw First Nation of Manawan and the Stakeholder Committee;
- Continue the engagement with the Atikamekw First Nation of Manawan and the Council of the Atikamekw First Nation in order to reach the pre-development agreement;
- Ensure that all stakeholders and members of the public are engaged for the purpose of the upcoming ESIA;
- Continue holding public consultations in order to properly inform and take into account the local communities' and stakeholders' concerns regarding the Project;
- Pursue the proactive acquisition process;
- Fulfill NMG's engagements and put forth mitigation measures when possible;
- Complete the Environmental and Social Impact Assessment ("**ESIA**") report in winter 2019 following the directive that has been issued by the MELCC for the project (February 2018) and the new set of directives issued after the approval of the new *Loi sur la qualité de l'environnement (March 23, 2018)*.

26.7 Opportunities

The location of NMG's Project is a key competitive advantage to supply natural graphite to the North American market. NMG's demonstration plant, which uses ore material from the West Zone to create natural graphite flakes concentrate, (see Press Releases dated May 24th, 2018 and September 18th, 2018) is a pivotal component in de-risking NMG's open pit natural graphite mining project on its Matawinie Property. The demonstration plant will serve to:

- Supply enough quantities of each material group to support an adequate market approach:
- Qualify NMG graphite products and establish a sales record;
- Test and improve processes for commercial operation optimization;
- Implement high standard and innovative technology for tailings and mine waste management as well as site reclamation;
- Start employee training and local future workforce outreach program.

27.0 REFERENCES

Met-Chem-DRA (2018): NI 43-101 Updated Technical Pre-feasibility Study Report for the Matawinie Graphite Project. Report submitted to Nouveau Monde Graphite Inc. on August 10th, 2018. 367 pp.

Met-Chem-DRA (2017): NI 43-101 Technical Pre-feasibility Study Report for the Matawinie Graphite Project. Report submitted to Nouveau Monde Graphite Inc. on December 8th, 2017. 374 pp.

Norda Stelo (2016): Preliminary Economic Assessment Report for the Matawinie Graphite Project. Report submitted to Nouveau Monde Mining Enterprises Inc. on August 5th, 2016. 317 pp.

27.1 Historical Mineral Exploration and Geoscientific Documents

For ease of use all "GM" reports and other Quebec government publications are available for viewing free of charge on Quebec's *Ministère Des Ressources Naturelles et de la Faune* E-SIGEOM system which is accessible on the world wide web: (http://sigeom.mrnf.gouv.qc.ca/signet/classes/I1102_indexAccueil?l=a).

The "Examine" documents (and surveys) constitute the gateway to the *Géologie Québec* record holdings. They represent the overall available information describing the content of the report, in addition to locating the work perimeter. To facilitate document research, references in this report appearing on the E-SIGEOM system are listed first in GM numerical order and in other codes used by the Quebec Government.

27.1.1 References Available on the SIGEOM System

CGSIGEOM31O 31P 31I 31J

SIGEOM; (2010). *Geological Maps*; Ministère des Ressources Naturelles Québec; 64 maps at 1 :50 000 scale.

DV 2012-06

Thériault R; Beauséjour S (2012). *Carte géologique du Québec édition 2012*; Ministère des Ressources Naturelles Québec 9 p.

DPV 594

Rondot J (1978). *Région du Saint-Maurice*; Ministère des Ressources Naturelles Québec; 93 p.

DPV 744

Avramchev L; Lebel-Drolet S (1981). *Catalogue des gîtes minéraux du Québec: région de l'Abitibi;* Ministère de l'Energie et des Ressources du Québec; 101 p.

DPV 809

Avramchev L; Piché G (1981). *Catalogue des gîtes minéraux du Québec: région de Laurentie-Saguenay;* Ministère de l'Energie et des Ressources du Québec; 62 p.

GM 60206

Marcil J-S; Comeau F. A (2000). Rapport sur les travaux de reconnaissance dans la région de Matawinie Projet Angoulème; 30 p.

GM 68132

Dubé J (2013). *Heliborne Magnetic and TDEM Survey Matawinie Property*; Dubé et Desaulniers Géoscience; Entreprises Minières du Nouveau-Monde; 52 p.

GM 68856

Cloutier A (2015). Technical Report of the 2012-2013 Prospecting and 2013 Drilling Campaigns on the Matawinie Property Québec; Entreprises Minières du Nouveau-Monde; 233 p.

GM 69067

Dubé J (2014). *High Resolution Heliborne Magnetic and TDEM Survey Matawinie-2 Property*; Dubé et Desaulniers Géoscience; 3457265 Canada Inc; 30 p.

GM 69069

Cloutier A (2015). Technical Report of the 2014 Prospecting and Trenching Campaigns on the Matawinie Property Québec; Entreprises Minières du Nouveau-Monde; 90 p.

GM 69560

Dubé J (2015). High Resolution Heliborne Magnetic and TDEM Survey Hotel Property Lanaudière Region Québec; Dynamic Discovery Geoscience; Entreprises Minières du Nouveau-Monde; 26 p.

GM 69561

Dubé J (2016). 2014-2015 *Ground TDEM PhiSpy Surveys Tony Project Matawinie Property Lanaudière Region Québec*; Dynamic Discovery Geoscience; Entreprises Minières du Nouveau-Monde; 26 p.

MM 94-01

Hocq M; Verpaelst P; Clark T; Lamothe D; Brisebois D; Brun J; Martineau G (1994). *Géologie du Québec;* Ministère des Ressources Naturelles Québec; 154 p.

RG 153

Katz M. B (1973). *Région de Rolland Cousineau et Legendre*; Ministère des Ressources Naturelles Québec; 127 p.

RG 2013-01

Moukhsil A; Solgadi F; Clark T ; Blouin S. Indares A; Davis D. W. (2013). *Géologie du nord-ouest de la région du barrage Daniel-Johnson (Manic 5) Côte-Nord*; Ministère de l'Énergie et des Ressources naturelles Québec; 44 p.

RP 541

Katz M. B (1965). Géologie de la région de Legendre (Parc du Mont-Tremblant) Comtés de Montcalm et de Joliette; Ministère des Ressources Naturelles Québec; 15 p.

RP 552 and RP 552A

Schryver K (1966) Géologie de la région de Saint-Michel-Des-Saints (partie ouest) Comtés de Joliette Berthier et Maskinongé; Ministère des Ressources Naturelles Québec; 17 p.

27.1.2 References Not Available on the SIGEOM System

Bliss J. D; Sutphin D. M (1992). *Grade and Tonnage Model of Amorphous Graphite: Model 18K*; In G. J. Orris and J. D. Bliss Editors US Geological Survey Open File Report 92-437, 23-25 pp.

Bussières Y; Yassa A (2016). *2016 Resource Estimate Update Tony Block Matawinie Property Lanaudière Region Québec*; Entreprises Minières du Nouveau Monde; 241 p.

Carr S. D; Easton R. M; Jamieson R. A; Culshaw N. G (2000). *Geologic Transect Across the Grenville Orogen of Ontario and New-York*; In Can. J. Earth Sci. *37*; 193-216 pp.

Corriveau L; Perreault S; Davidson A (2007). *Prospective Metallogenic Settings of the Grenville Province;* In Goodfellow W.D. ed. Mineral Deposits of Canada: A Synthesis of major Deposit-Types District Metallogeny the Evolution of Geological Provinces and Exploration Methods; Geological Association of Canada Mineral Deposits Division Special Publication No. 5; 819-847 pp.

Davidson. A et al (1998). *Geological Map of the Grenville Province Canada and Adjacent Parts of the United States of America*; Geological Survey of Canada; Map 1947A.

Fleury M (2008). *Paléogéographie Quaternaire de la Région de Saint-Michel-Des-Saints*; UQAM Masters Thesis 154 p.

Harris L; Richer-Laflèche M (2010). *Characterization of Crustal-Scale Structures Interpreted From Gravity "Worms" And Their Relashionship to Hydrothermal Alteration and Mineralization Grenville Province SW Québec*; Divex Sub Project SC31 7 p.

Harben P.W; M. Kuzvart (1996). *A Global Geology*; Industrial Minerals Information Ltd; London 462 p.

Logan W. E. (1863). *Geological Survey of Canada*; Dawson Brothers; Montréal 983 p.

Nadeau L; Van-Breemen O (2001). *U-Pb Zircon Age and Regional Setting of the Lapeyrère Gabbronorite Portneuf-Mauricie Region South-Central Grenville Province Québec: Radiogenic Age and Isotope Studies*; Report 14; Geological Survey of Canada Current Research 2001-F6; 13 p.

Peck W. H; DeAngelis M. T; Meredith M. T; Morin E (2005). *Polymetamorphism of Marbles in the Morin terrane Grenville Province Québec*; Canadian Journal of Earth Sciences; V.42 , 1949-1965 pp.

Pierre H. Terreault et al (2016). *Preliminary Economic Assessment Report for the Matawinie Graphite Project*; Norda Stelo Inc.; 317 p.

Rivers T; Martignole J; Gower C.F; Davidson A (1989). *New Tectonic Subdivisions of the Grenville Province Southeast Canadian Shield*; In Tectonics 8; 63-84 pp.

Robitaille A.; Saucier J-P. (1997). *Paysages régionaux du Québec méridional*; Direction de la gestion des stocks forestiers and Direction des relations publiques of Ministère des ressources naturelles Publications du Québec 213 p.

Rollinson Hugh (1993). *Using geochemical data : evaluation presentation interpretation*; Routledge; 384 p.

Simandl G.J. and Kenan W.M. (1997). *Crystalline Flake Graphite*; in Geological Fieldwork 1997 British Columbia Ministry of Employment and Investment Paper 1998-1 24P-1 to 24P-3 pp.

Wynne-Edwards H. R et al (1966). *Mont-Laurier and Kemp Lake map areas Québec*; Commission Géologique du Canada Étude 66 32 p.

Wynne-Edwards H. R. (1972). *The Grenville Province. In Variation in Tectonic Styles in Canada*; R. A. Price and R. J. W. Douglas G. A. C. Special Paper No 11; 263-334 pp.

27.2 Mineral Processing and Metallurgical Testing

Keckes, T., (2017), Thickening Test Report 306033, Outotec test report, 50 pp.

Nesset, J.E., Rosenblum, F., (2017), Self-Heating Test – Tailings and Sulphide Concentrate Samples, NesseTech Consulting Services Inc. report, 6 pp.

Peters, O., Imeson, D., (2015), The Scoping Level Evaluation of Two Samples from the Matawinie Graphite Prospect, SGS test report, 30 pp.

Peters, O., Imeson, D., (2015), The Scoping Level Evaluation of Four Composites from the Matawinie Mineralization, SGS test report, 27 pp.

Peters, O., Imeson, D., (2016), The Scoping Level Evaluation of Nine Samples from the Tony Block Mineralization, SGS test report, 52 pp.

Peters, O., Imeson, D., (2017), The Bulk Processing of Two 6 Tonne Samples from the Tony Block Mineralization, SGS test report, 68 pp.

Peters, O., Imeson, D., (2017), The Flowsheet Development on Samples from the Matawinie Mineralization, SGS test report, 141 pp.

Peters, O., (2017/2018), Excel files with comminution test results, flotation mass balances and sizing data from process optimization program.

27.3 Mineral Reserve Estimates

Journeaux, N. L. and Kamel Sherif, Open Pit Slope Design, Pre-feasibility Study, Matawinie Project – Tony Block (Graphite), Saint-Michel-des-Saints, Québec, Report No. L-17-1980, August 25th, 2017, 87 pp.

27.4 Environmental Studies, Permitting and Social or Community Impact

Atlas des amphibiens et des reptiles (AARQ). 2015. Atlas des amphibiens et des reptiles du Québec : banque de données active depuis 1988 alimentée par des bénévoles et professionnels de la faune. Société d'histoire naturelle de la vallée du Saint-Laurent. Results obtained on November 18, 2015.

Bazoge, A., D. Lachance and C. Villeneuve. 2014. *Identification et délimitation des milieux humides du Québec méridional. Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques, Direction de l'écologie et de la conservation et Direction des politiques de l'e*au.

Beaulieu, M. 2016. *Guide d'intervention - Protection des sols et réhabilitation des terrains contaminés. Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques.*

Centre d'expertise en analyse environnementale du Québec (CEEAQ). 2012. Méthode d'analyse. MA. 100 – Lix.com. 1.1 Protocole de lixiviation pour les espèces inorganiques. Révision 2012-12-07. Gouvernement du Québec. Québec, QC.

Consulair. 2017. *Modélisation des émissions atmosphériques en vue de l'implantation d'une mine de graphite à Matawinie, Version Préliminaire* #2.

Couillard, L., N. Dignard, P. Petitclerc, D. Bastien, A. Sabourin and J. Labrecque. 2012. *Guide de reconnaissance des habitats forestiers des plantes menacées ou vulnérables : Outaouais, Laurentides et Lanaudière. Ministère des Ressources naturelles et de la Faune et ministère du Développement durable, de l'Environnement et des Parcs*.

Desrosiers, N., R. Morin and J. Jutras. 2002. *Atlas des micromammifères du Québec. Société de la faune et des parcs du Québec, Direction du développement de la faune, et Fondation de la faune du Québec.*

Environnement Canada and *Ministère du Développement durable, de l'Environnement et des Parcs du Québec (MDDEP). 2007. Critères pour l'évaluation de la qualité* des *sédiments au Québec et cadres d'application : prévention, dragage et restauration*.

Fabianek, F. 2016. *Inventaire acoustique des chiroptères dans la MRC de Matawinie, région de Lanaudière. Compte rendu méthodologique et résultats obtenus. Rapport préparé pour SNC-Lavalin inc*.

Gouvernement du Québec. 2016. Statistiques de chasse et de piégeage. http://mffp.gouv.qc.ca/faune/statistiques/chasse-piegeage.jsp. Consulté le 6 novembre 2017.

Hénault, M. 2015. *Plan de gestion de l'orignal dans la zone 15. In S. Lefort et S. Massé (éd.). Plan de gestion de l'orignal au Québec 2012-2019. Ministère des Forêts, de la Faune et des Parcs. Direction générale de l'expertise sur la faune et ses habitats et Direction générale du développement de la faune. Québec*, QC. p. 272-299.

Huot, M. and F. Lebel. 2012. *Plan de gestion du cerf de Virginie au Québec 2010-2017. Ministère des Ressources naturelles et de la Faune, Secteur Faune Québec, Direction générale de l'expertise sur la faune et ses habitats. Québec*, QC.

Lamontagne, G.H., H. Jolicoeur and S. Lefort. 2006. *Plan de gestion de l'ours noir, 2006-2013. Ministère des Ressources naturelles et de la Faune, Direction du développement de la faune. Québec*, QC.

Mining Environment Neutral Drainage Program (MEND). 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. Report 1.20.1. Natural Resources Canada. December 2009.

Ministère des Forêts, de la Faune et des Parcs (MFFP). 2015. Demande d'informations fauniques. Results obtained on December 4th, 2015.

Ministère du Développement durable, de l'Environnement et des Parcs (MDDEP). 2012. Directive 019 sur l'industrie minière (March 2012).

Prescott, J. and P. Richard. 2013*. Mammifères du Québec et de l'est du Canada. Éditions Michel Quintin*. Waterloo, QC.

SNC-Lavalin. 2016a. *Étude hydrogéologique préliminaire - Inventaires de terrain - Zone Ouest du bloc* Tony. Report prepared for Entreprises minières Nouveau Monde. Montréal, QC.

SNC-Lavalin. 2016b. *Caractérisation de l'ambiance sonore initiale*. Report prepared for Entreprises minières Nouveau Monde. Montréal, QC.

SNC-Lavalin. 2016c. *Projet Matawinie – Inventaire des micromammifères et des anoures*. Report prepared for Entreprises minières Nouveau Monde. Lévis, QC.

SNC-Lavalin. 2017a. *Climat et hydrologie*. Report prepared for Entreprises minières du Nouveau Monde. Lévis, QC.

SNC-Lavalin. 2017b. *Qualité de l'air initiale*. Report prepared for Entreprises minières Nouveau Monde. Montréal, QC.

SNC-Lavalin. 2017c. *Caractérisation environnementale des sols – Zone Ouest du Bloc Tony - Saint-Michel-des-Saints (Québec)*. Report prepared for Entreprises minières du Nouveau Monde. Montréal, QC.

SNC-Lavalin. 2017d. *Caractérisation des eaux de surface et des sédiments - Projet Matawinie*. Report prepared for Nouveau Monde Graphite. Lévis, QC.

SNC-Lavalin. 2017e. Preliminary Geochemical Characterization of Mine Wastes (Draft). Matawinie Graphite Project. Prepared for Nouveau Monde Graphite. Lévis, QC.

SNC-Lavalin. 2017f. *Étude hydrogéologique préliminaire - Zone Ouest du bloc Tony*. Report prepared for Entreprises minières du Nouveau Monde. Montréal, QC.

SNC-Lavalin. 2017g. *Projet Matawinie – Végétation, milieux humides et espèces floristiques en situation précaire, exotiques et envahissantes*. Report prepared for Entreprises minières du Nouveau Monde. Lévis, QC.

SNC-Lavalin. 2017h. *Caractérisation des cours d'eau et inventaires de la faune ichtyenne et benthique - Projet Matawinie*. Report prepared for Entreprises minières du Nouveau Monde. Lévis, QC.

SNC-Lavalin. 2017i. *Projet Matawinie – Inventaire de l'herpétofaune*. Report prepared for Nouveau Monde Graphite. Lévis, QC.

SNC-Lavalin. 2017j. *Projet Matawinie – Inventaire de l'avifaune nicheuse*. Report prepared for Entreprises minières Nouveau Monde. Lévis, QC.

SNC-Lavalin. 2018a. *Climat et hydrologie*. Report prepared for Entreprises minières du Nouveau Monde. Lévis, QC.

SNC-Lavalin. 2018b. *Caractérisation environnementale des sols 2016 et Caractérisation environnementale complémentaire des sols 2017* – Saint-Michel-des-Saints (Québec). Report prepared for Entreprises minières du Nouveau Monde. Lévis, QC.

Soft dB. 2017. *Étude d'impact sonore théorique. Exploitation de la mine de graphite Matawinie*. Report prepared for Nouveau Monde Graphite. Québec, QC

SOS-POP. 2015. *Banque de données sur les populations d'oiseaux en situation précaire au Québec* [November 13, 2015]. *Regroupement Québec Oiseaux*, Montréal, QC.

27.5 Market Study

Benchmark Mineral Intelligence, Graphite market report and forecast for Noveau (sic) Monde Graphite DRAFT; July 2018; 44 p.

28.0 ABBREVIATIONS

The following abbreviations may be used in this Report.

Table 28.1 – List of Abbreviations

Abbreviation	Description
$\mu g/m^3$	Microgram per Cubic Metre
µm	Microns, Micrometre
'	Feet
"	Inch
$	Dollar Sign
$\$/m^2$	Dollar per Square Metre
$\$/m^3$	Dollar per Cubic Metre
$/t	Dollar per Metric Tonne
%	Percent Sign
% w/w	Percent Solid by Weight
¢/kWh	Cent per Kilowatt hour
°	Degree
°C	Degree Celsius
2D	Two Dimensions
3D	Three Dimensions
AARQ	*Atlas des amphibiens et des reptiles du Québec*
ABA	Acid-Base Accounting
Ag	Silver
Ai	Abrasion Index
ALS	ALS Minerals Laboratories
AMSL	Above Mean Sea Level
AP	Acid Potential
ARD	Acid Rock Drainage
As	Arsenic
ASL	Above Sea Level
ATV	All-Terrain Vehicle
Au	Gold
AWG	American Wire Gauge
az	Azimuth

Abbreviation	Description
Ba	Barium
bank	Bank Cubic Metre (Volume of material in situ)
BAPE	*Bureau d'Audience Publique sur l'Environnement*
Be	Beryllium
BFA	Bench Face Angle
BIF	Banded Iron Formation
BOF	Basic Oxygen Furnace
BQ	Drill Core Size (3.65 cm diameter)
BSG	Bulk Specify Gravity
BTU	British Thermal Unit
BVSM	Saint-Maurice Watershed
BWi	Bond Ball Mill Work Index
C(g)	Carbon Graphite
C(t)	Total Carbon
$C_{10}C_{50}$	Petroleum Hydrocarbons
Ca	Calcium
CA	Certificate of Authorization
CAD	Canadian Dollar
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditures
CCBE	Cover with Capillary Barrier Effect
CCME	Canadian Council of Ministers of the Environment
Cd	Cadmium
CDC	*Claim désigné sur carte*
CDE	Canadian Development Expenses
CDP	Closure and Decommissioning Plan
CDPNQ	*Centre de données sur le patrimoine naturel du Québec*
Ce	Cesium
CEAA	Canadian Environmental Assessment Agency
CEE	Canadian Exploration Expenses
CEEAQ	*Centre d'expertise en analyse environnementale du Québec*
CEPA	Canadian Environmental Protection Act
cfm	Cubic Feet per Minute

Abbreviation	Description
CFR	Cost and Freight
CFU	Colony-Forming Unit
CIF	Cost Insurance and Freight
CIL	Carbon in Leach
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CIP	Carbon in Pulp
CIS	Commonwealth Independent States
Cl	Clay
CL	Concentrate Leach
cm	Centimetre
Co	Cobalt
CofA	Certificate of Authorization
COG	Cut Off Grade
COPH	*Coalition des opposants à un projet minier en Haute-Matawanie*
COV	Coefficient of Variation
Cr III	Chromium Oxide
Cr VI	Hexavalent Chromium
CREL	Lanaudière Environmental Regional Council
CRM	Certified Reference Materials
CSF	Co-Disposal Storage Facilities
Cu	Copper
$CuSO_4$	Copper Sulphate
CWi	Crusher Work Index
d	Day
d/w	Days per Week
d/y	Days per Year
D2	Second Generation of Deformation
D3	Third Generation of Deformation
D4	Fourth Generation of Deformation
dB	Decibel
dBA	Decibel with an A Filter
DDH	Diamond Drill Hole
deg	Angular Degree

Abbreviation	Description
DFO	Department of Fisheries and Oceans
DGPS	Differential Global Positioning System
DMS	Dense Media Separator
DRI	Direct Reduced Iron
DT	Davis Tube
DWI	Drop Weight Index
DWT	Drop Weight Test
DXF	Drawing Interchange Format
E	East
EA	Environmental Assessment
EAB	Environmental Assessment Board
EAF	Electric Arc Furnace
EBS	Environmental Baseline Study
EHS	Environment Health and Safety
EIA	Environmental and Social Impact Assessment
EIS	Environmental Impact Statement
EMP	Environmental Management Plant
EOH	End of Hole
EP	Environmental Permit
EPA	Environmental Protection Agency
EPCM	Engineering, Procurement and Construction Management
EPS	Expandable Polystyrene
EQA	Environmental Quality Act
ER	Electrical Room
ESBS	Environmental and Social Baseline Study
ESIA	Environmental and Social Impact Assessment
FAG	Fully Autogenous Grinding
FDS	Fused Disconnect Switch
Fe	Iron
FOB	Free on Board
ft	Feet
FVNR	Full Voltage Non-Reversible

Abbreviation	Description
g	Grams
G&A	General and Administration
g/l	Grams per Litre
g/t	Grams per Tonne
gal	Gallons
GDP	Gross Domestic Product
GEMS	Global Earth-System Monitoring Using Space
GPS	Global Positioning System
GQ	Government of Quebec
Gr	Granular
GCW	Gross Combined Weight
GOH	Gross Operating Hours
H	Horizontal
h	Hour
h/d	Hours per Day
h/y	Hour per Year
H_2	Hydrogen
ha	Hectare
HBI	Hot Briquetted Iron
HCO_3	Bicarbonate
HCT	Humidity Cell Test
HDPE	High Density Polyethylene
HF	Hydrofluoric Acid
HFO	Heavy Fuel Oil
Hg	Mercury
HG	High Grade
HL	Heavy Liquid
HmFe	Hematitic Iron
hp	Horse Power
HPEV	Hybrid Plug-in Electric Vehicle
HQ	Drill Core Size (6.4 cm Diameter)
HVAC	Heating Ventilation and Air Conditioning
I/O	Input / Output

Abbreviation	Description
ICP-AES	Inductively Coupled Plasma – Atomic Emission Spectroscopy
ICP-MS	Inductively Coupled Plasma – Mass Spectroscopy
ICP-OES	Inductively Coupled Plasma – Optical Emission Spectroscopy
ID	Identification
IDW	Inverse Distance Method
IDW2	Inverse Distance Squared Method
In	Inches
IRA	Inter-Ramp Angle
IRR	Internal Rate of Return
IT	Information Technology
J/g	Joule per grams
KE	Kriging Efficiency
kg	Kilogram
kg/l	Kilogram per Litre
$kg/m^2/h$	Kilogram per Square Metre per Hour
Kg/t	Kilogram per Metric Tonne
kl	Kilolitre
km	Kilometre
km^2	Square Kilometre
km/h	Kilometre per Hour
kPa	Kilopascal
KSR	Kriging Slope Regression
kt	Kilotonne
kV	Kilovolt
kVA	Kilovolt Ampere
kW	Kilowatt
kWh	Kilowatt-hour
kWh/t	Kilowatt-hour per Metric Tonne
Hz	Hertz
L	Line

Abbreviation	Description
l	Litre
l/h	Litre per hour
lbs	Pounds
LCT	Locked Cycle Tests
LFO	Light Fuel Oil
LG	Low Grade
LG-3D	Lerchs-Grossman – 3D Algorithm
Li	Lithium
LIMS	Low Intensity Magnetic Separator
LOI	Loss on Ignition
LOM	Life of Mine
LV	Low Voltage
m	Metre
m/h	Metre per Hour
m/s	Metre per Second
m^2	Square Metre
m^3	Cubic Metre
m^3/d	Cubic Metre per Day
m^3/h	Cubic Metre per Hour
m^3/y	Cubic Metre per Year
mA	MilliAmpère
Mag	Magnetic
MagFe	Magnetic Iron
Mm^3	Million Cubic Metres
MCC	Motor Control Center
MDDELCC	*Ministère du Développement durable, de l'environnement et de la Lutte contre les changements climatiques*
MDDEP	*Ministère du Développement Durable, Environnement, Faune et Parcs*
MENA	Middle East and North Africa
MEND	Mining Environment Neutral Drainage Program
MERN	*Ministère de l'Énergie et des Ressources naturelles*
MFFP	*Ministère des Forêts, de la Faune et des Parcs*
Mg	Magnesium

Abbreviation	Description
mg/L	Milligram per Litre
MI	Mineralized Intervals
MIBC	Methyl Isobutyl Carbinol
MIBK	Methyl Isobutyl Ketone
min	Minute
min/h	Minute per Hour
Min/shift	Minute per Shift
ml	Millilitre
ML	Metal Leaching
mm	Millimetre
mm/d	Millimetre per Day
Mm^3	Million Cubic Metres
MMER	Metal Mining Effluent Regulation
MMU	Mobile Manufacturing Units
Mn	Manganese
MNDM	Ministry of Northern Development and Mines
MNRW	Ministry of Natural Resources and Wildlife
MOE	Ministry of Environment
MOU	Memorandum of Understanding
MRC	*Municipalité régionale de comté*
MRN	*Ministère des Ressources Naturelles*
MSDEP	Ministry of Sustainable Development, Environment and Parks
Mt	Million Metric Tonnes
Mt/y	Millions of Metric Tonnes per year
MV	Medium Voltage
MVA	Mega Volt-Ampere
MW	Megawatts
MWh/d	Megawatt Hour per Day
My	Million Years
N	North
N/A	Not Available
NAG	Non-Acid Generating
Nb	Number

Abbreviation	Description
NE	Northeast
NFPA	National Fire Protection Association
NGR	Neutral Grounding Resistor
NI	National Instrument
Nm^3/h	Normal Cubic Metre per Hour
NMG	Nouveau Monde Graphite Inc.
NP	Neutralization Potential
NPV	Net Present Value
NQ	Drill Core Size (4.8 cm diameter)
NRCAN	Natural Resources Canada
NSR	Net Smelter Return
NTP	Normal Temperature and Pressure
NTS	National Topographic System
NW	North West
O/F	Overflow
OB	Overburden
OK	Ordinary Kriging
OEM	Original Equipment Manufacturer
OPEX	Operating Expenditures
ORF	Ontario Research Foundation
oz	Ounce (troy)
oz/t	Ounce per Short Ton
P&ID	Piping and Instrumentation Diagram
Pa	Pascal
PAG	Potentially Acid Rock Drainage Generating
PAH	Polycyclic Aromatic Hydrocarbons
PAX	Potassium Amyl Xanthate
Pb	Lead
PEA	Preliminary Economic Assessment
PEV	Plug-in Electric Vehicle
PF	Power Factor
PFS	Pre-Feasibility Study
PGGS	Permit for Geological and Geophysical Survey

Abbreviation	Description
ph	Phase (electrical)
pH	Potential Hydrogen
PIR	Primary Impurity Removal
PLC	Programmable Logic Controllers
PP	Preproduction
ppb	Part per Billion
ppm	Part per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance / Quality Control
QKNA	Quantitative Kriging Neighbourhood Analysis
QP	Qualified Person
RCM	Regional County Municipality
RCMS	Remote Control and Monitoring System
RER	Rare Earth Magnetic Separator
RES	*Résurgences des eaux souterraines dans les eaux de surface*
RMR	Rock Mass Rating
ROM	Run of Mine
rpm	Revolutions per Minute
RQD	Rock Quality Designation
RWI	Bond Rod Mill Work Index
S	South
S	Sulphur
S/R	Stripping Ratio
SAG	Semi-Autogenous Grinding
Sb	Antimony
SCC	Standards Council of Canada
scfm	Standard Cubic Feet per Minute
SCIM	Squirrel Cage Induction Motors
SCSE	SAG Circuit Specific Energy
SE	South East

Abbreviation	Description
sec	Second
Set/y/unit	Set per Year per Unit
SFP	State Forest Permit
SG	Specific Gravity
SGS Geostat	SGS Canada Inc. – Geostat office in Blainville, Quebec, Canada
SGS Lakefield	SGS Lakefield Research Limited of Canada
SHC	Self-Heating Capacities
SIR	Secondary Impurity Removal
SLO	Social Licence to Operate
SMC	SAG Mill Comminution
SNRC	*Système National de Référence Cartographique*
SO_4	Sulphate
SolFe	Sulphate Ferrous
SPI	SAG Power Index
SPLP	Synthetic Precipitation Leaching Procedure
SPT	Standard Penetration Tests
SR	Stripping Ratio
SW	South West
SW	Switchgear
t	Metric Tonne
t/d	Metric Tonne per Day
t/h	Metric Tonne per Hour
t/h/m	Metric Tonne per Hour per Metre
$t/h/m^2$	Metric Tonne per Hour per Square Metre
t/m	Metric Tonne per Month
t/m^2	Metric Tonne per Square Metre
t/m^3	Metric Tonne per Cubic Metre
t/y	Metric Tonne per Year
Ta	Tantalum
TCLP	Toxicity Characteristic Leaching Procedure
TDEM	Time Domain Electromagnetic
Ti	Titanium
TIN	Triangulated Irregular Network

Abbreviation	Description
Tl	Thallium
TMF	Tailings Management Facilities
ton	Short Ton
tonne	Metric Tonne
TOR	Terms of Reference
TotFe	Total Iron
TSS	Total Suspended Solids
U	Uranium
U/F	Under Flow
UGAF	Furbearer Management Units
ULC	Underwriters Laboratories of Canada
USA	United States of America
USD	United States Dollar
USGPM	Us Gallons per Minute
UTM	Universal Transverse Mercator
V	Vanadium
V	Vertical
V	Volt
VAC	Ventilation and Air Conditioning
VFD	Variable Frequency Drive
VLF	Very Low Frequency
W	Watt
W	West
WHIMS	Wet High Intensity Magnetic Separation
WHO	World Health Organization
WRA	Whole Rock Analysis Method
WSD	World Steel Dynamics
wt	Wet Metric Tonne
X	X Coordinate (E-W)
XRD	X-Ray Diffraction
XRF	X-Ray Fluorescence

Abbreviation	Description
y	Year
Y	Y coordinate (N-S)
Z	Z coordinate (depth or elevation)
ZEC	*Zone d'exploitation contrôlée*
Zn	Zinc
Zr	Zirconium

Appendix A – Claims Status as of October 24th, 2018

Claim #*	Area (ha)	NTS Sheet	Staking Date	Expiry Date	Cumulated Credits	Required Credits	Renewal Fee
2396504	59.08	31I12	27/12/2013	26/12/2019	$ 357,150.10	$ 780.00	$ 64.09
2396505	59.08	31I12	27/12/2013	26/12/2019	$ 31,501.14	$ 780.00	$ 64.09
2396506	59.08	31I12	27/12/2013	26/12/2019	$ 17.92	$ 780.00	$ 64.09
2396507	59.08	31I12	27/12/2013	26/12/2019	$ 17.92	$ 780.00	$ 64.09
2396508	59.08	31I12	27/12/2013	26/12/2019	$ 17.92	$ 780.00	$ 64.09
2396509	59.07	31I12	27/12/2013	26/12/2019	$ 1,933.17	$ 780.00	$ 64.09
2396510	59.07	31I12	27/12/2013	26/12/2019	$ 77,791.11	$ 780.00	$ 64.09
2396511	59.07	31I12	27/12/2013	26/12/2019	$ 162,516.19	$ 780.00	$ 64.09
2396512	59.07	31I12	27/12/2013	26/12/2019	$ 2,049.11	$ 780.00	$ 64.09
2396513	59.07	31I12	27/12/2013	26/12/2019	$ 113,559.20	$ 780.00	$ 64.09
2396514	59.07	31I12	27/12/2013	26/12/2019	$ 59,450.40	$ 780.00	$ 64.09
2396515	59.06	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396516	59.06	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396517	59.06	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396518	59.06	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396519	59.06	31I12	27/12/2013	26/12/2019	$ 489.11	$ 780.00	$ 64.09
2396520	59.06	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396521	59.05	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396522	59.05	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396523	59.05	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396524	59.05	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396525	59.05	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09
2396526	59.05	31I12	27/12/2013	26/12/2019	$ -	$ 780.00	$ 64.09

Claim #*	Area (ha)	NTS Sheet	Staking Date	Expiry Date	Cumulated Credits	Required Credits	Renewal Fee
2399854	5.08	31I12	18/02/2014	17/02/2020	$ 2,504.11	$ 325.00	$ 32.77
2399855	45.98	31I12	18/02/2014	17/02/2020	$ 5,098.13	$ 780.00	$ 64.09
2399856	51.37	31I12	18/02/2014	17/02/2020	$ 2,049.11	$ 780.00	$ 64.09
2399857	58.41	31I12	18/02/2014	17/02/2020	$ -	$ 780.00	$ 64.09
2399858	58.56	31I12	18/02/2014	17/02/2020	$ -	$ 780.00	$ 64.09
2407286	59.1	31I12	16/07/2014	15/07/2020	$ 2,067.03	$ 780.00	$ 64.09
2407287	59.1	31I12	16/07/2014	15/07/2020	$ 256,541.06	$ 780.00	$ 64.09
2407288	59.1	31I12	16/07/2014	15/07/2020	$ 318,495.23	$ 780.00	$ 64.09
2407289	59.1	31I12	16/07/2014	15/07/2020	$ 33,550.25	$ 780.00	$ 64.09
2407290	59.1	31I12	16/07/2014	15/07/2020	$ -	$ 780.00	$ 64.09
2407291	59.09	31I12	16/07/2014	15/07/2020	$ -	$ 780.00	$ 64.09
2407292	59.09	31I12	16/07/2014	15/07/2020	$ -	$ 780.00	$ 64.09
2407293	59.09	31I12	16/07/2014	15/07/2020	$ -	$ 780.00	$ 64.09
2407294	59.09	31I12	16/07/2014	15/07/2020	$ 2,067.03	$ 780.00	$ 64.09
2407295	59.09	31I12	16/07/2014	15/07/2020	$ 186,642.89	$ 780.00	$ 64.09
2407296	59.09	31I12	16/07/2014	15/07/2020	$ 80,149.03	$ 780.00	$ 64.09
2407297	59.08	31I12	16/07/2014	15/07/2020	$ 97,785.70	$ 780.00	$ 64.09
2407298	59.08	31I12	16/07/2014	15/07/2020	$ 2,067.03	$ 780.00	$ 64.09
2407299	59.08	31I12	16/07/2014	15/07/2020	$ 116,744.68	$ 780.00	$ 64.09
2407300	59.07	31I12	16/07/2014	15/07/2020	$ 12,071.61	$ 780.00	$ 64.09
2409338	45.71	31I12	12/08/2014	11/08/2020	$ 2,067.03	$ 780.00	$ 64.09
2409339	55.12	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409340	43.5	31I12	12/08/2014	11/08/2020	$ 32,008.21	$ 780.00	$ 64.09
2409341	58.98	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09

Claim #*	Area (ha)	NTS Sheet	Staking Date	Expiry Date	Cumulated Credits	Required Credits	Renewal Fee
2409342	59.04	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409343	59.11	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409344	59.11	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409345	59.11	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409346	59.1	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409347	59.1	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409348	59.09	31I12	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409349	59.11	31J09	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409350	59.11	31J09	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409351	59.1	31J09	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409352	59.1	31J09	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409353	59.09	31J09	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409354	59.09	31J09	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2409355	59.08	31J09	12/08/2014	11/08/2020	$ -	$ 780.00	$ 64.09
2411654	47.87	31I12	09/09/2014	08/09/2020	$ -	$ 780.00	$ 64.09
2411655	8.9	31I12	09/09/2014	08/09/2020	$ 147.92	$ 325.00	$ 32.77
2411656	7.14	31I12	09/09/2014	08/09/2020	$ 2,977.03	$ 325.00	$ 32.77
2411657	58.97	31I12	09/09/2014	08/09/2020	$ -	$ 780.00	$ 64.09
2411658	34.01	31I12	09/09/2014	08/09/2020	$ -	$ 780.00	$ 64.09
2411659	1.73	31I12	09/09/2014	08/09/2020	$ 147.92	$ 325.00	$ 32.77
2411660	18.83	31I12	09/09/2014	08/09/2020	$ 147.92	$ 325.00	$ 32.77
2411661	56.93	31I12	09/09/2014	08/09/2020	$ -	$ 780.00	$ 64.09
2411662	19.75	31I12	09/09/2014	08/09/2020	$ 147.92	$ 325.00	$ 32.77
2411663	10.86	31I12	09/09/2014	08/09/2020	$ 2,197.21	$ 325.00	$ 32.77

Claim #*	Area (ha)	NTS Sheet	Staking Date	Expiry Date	Cumulated Credits	Required Credits	Renewal Fee
2411664	12.67	31I12	09/09/2014	08/09/2020	$ 147.92	$ 325.00	$ 32.77
2411665	53.72	31J09	09/09/2014	08/09/2020	$ -	$ 780.00	$ 64.09
2426857	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2426858	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2426859	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2426860	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2426861	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2426862	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2426863	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2426864	59.12	31I12	17/04/2015	16/04/2019	$ 17.92	$ 780.00	$ 64.09
2429408	59.12	31I12	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429409	59.11	31I12	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429410	59.11	31I12	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429411	59.11	31I12	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429412	59.08	31I12	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429413	59.07	31I12	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429414	59.07	31I12	19/06/2015	18/06/2019	$ -	$ 780.00	$ 64.09
2429415	59.06	31I12	19/06/2015	18/06/2019	$ -	$ 780.00	$ 64.09
2429416	59.12	31J09	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429417	59.11	31J09	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429418	59.11	31J09	19/06/2015	18/06/2019	$ 17.92	$ 780.00	$ 64.09
2429419	59.1	31I12	19/06/2015	18/06/2019	$ -	$ 780.00	$ 64.09
2429420	59.09	31I12	19/06/2015	18/06/2019	$ -	$ 780.00	$ 64.09
2429421	59.08	31I12	19/06/2015	18/06/2019	$ -	$ 780.00	$ 64.09

Claim #*	Area (ha)	NTS Sheet	Staking Date	Expiry Date	Cumulated Credits	Required Credits	Renewal Fee
2431602	59.12	31I12	28/07/2015	27/07/2019	$ -	$ 780.00	$ 64.09
2431603	37.17	31I12	28/07/2015	27/07/2019	$ -	$ 780.00	$ 64.09
2431604	56.28	31I12	28/07/2015	27/07/2019	$ 17.92	$ 780.00	$ 64.09
2431605	21.62	31I12	28/07/2015	27/07/2019	$ 472.68	$ 325.00	$ 32.77
2431606	31.19	31I12	28/07/2015	27/07/2019	$ -	$ 780.00	$ 64.09
2431607	58.68	31I12	28/07/2015	27/07/2019	$ -	$ 780.00	$ 64.09
2431865	25.17	31I12	11/08/2015	10/08/2019	$ -	$ 780.00	$ 64.09
2431866	2.95	31I12	11/08/2015	10/08/2019	$ -	$ 325.00	$ 32.77
2433699	59.11	31J09	02/10/2015	01/10/2019	$ -	$ 780.00	$ 64.09
2433700	59.1	31J09	02/10/2015	01/10/2019	$ -	$ 780.00	$ 64.09
2433701	59.09	31J09	02/10/2015	01/10/2019	$ -	$ 780.00	$ 64.09
2433702	59.08	31J09	02/10/2015	01/10/2019	$ -	$ 780.00	$ 64.09
2433703	59.07	31J09	02/10/2015	01/10/2019	$ -	$ 780.00	$ 64.09
2435494	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435495	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435496	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435497	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435498	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435499	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435500	59.03	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435501	59.03	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435502	59.03	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435503	59.03	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435504	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09

Claim #*	Area (ha)	NTS Sheet	Staking Date	Expiry Date	Cumulated Credits	Required Credits	Renewal Fee
2435505	59.04	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435508	59.03	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435509	59.03	31I12	05/01/2016	04/01/2020	$ -	$ 780.00	$ 64.09
2435633	2.84	31I12	08/01/2016	07/01/2020	$ -	$ 325.00	$ 32.77
2435634	10.96	31I12	08/01/2016	07/01/2020	$ -	$ 325.00	$ 32.77
2435635	1.02	31I12	08/01/2016	07/01/2020	$ -	$ 325.00	$ 32.77
2435636	13.74	31I12	08/01/2016	07/01/2020	$ -	$ 325.00	$ 32.77
2435637	55.49	31I12	08/01/2016	07/01/2020	$ -	$ 780.00	$ 64.09
2435638	34.06	31I12	08/01/2016	07/01/2020	$ -	$ 780.00	$ 64.09
2435639	48.83	31J09	08/01/2016	07/01/2020	$ -	$ 780.00	$ 64.09
2435640	7.14	31J09	08/01/2016	07/01/2020	$ -	$ 325.00	$ 32.77
2435641	15.86	31J09	08/01/2016	07/01/2020	$ -	$ 325.00	$ 32.77
2496343	59.05	31I12	14/06/2017	13/06/2019	$ -	$ 780.00	$ 64.09
2496344	59.04	31I12	14/06/2017	13/06/2019	$ -	$ 780.00	$ 64.09
2496345	59.04	31I12	14/06/2017	13/06/2019	$ -	$ 780.00	$ 64.09
2496346	59.04	31I12	14/06/2017	13/06/2019	$ -	$ 780.00	$ 64.09
2496347	46.34	31I12	14/06/2017	13/06/2019	$ -	$ 780.00	$ 64.09
2496348	58.53	31I12	14/06/2017	13/06/2019	$ -	$ 780.00	$ 64.09
2519598	59.03	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09
2519599	59.03	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09
2519600	59.03	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09
2519601	59.02	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09
2519602	59.02	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09
2519603	59.02	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09

Claim #*	Area (ha)	NTS Sheet	Staking Date	Expiry Date	Cumulated Credits	Required Credits	Renewal Fee
2519604	59.02	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09
2519605	59.02	31I12	06/06/2018	05/06/2020	$ -	$ 780.00	$ 64.09

* All claims are 100 % owned by Nouveau Monde Graphite inc. (GESTIM client # 96458)

* Claim information effective date: October 24th, 2018