TMAC Resources Inc.

Revisions to TMAC Resources Inc. Amendment Application No. 1 of Project Certificate No. 003 and Water Licence 2AM-DOH1323

Package 2: Project Description

TMAC Resources Inc.
95 Wellington Street West, Suite 101, P.O. Box 44
Toronto, ON M5J 2N7
Tel: (416) 628-0216
info@tmacresources.com

June 2015

Revisions to TMAC Resources Inc. - Amendment Application No. 1 of Project Certificate No. 003 and Water Licence 2AM-DOH1323

Regulatory Submission Outline

PACKAGE 1

Project Summary and Submission Outline

P1-1 Plain Language Summary (translated)
P1-2 Maps
P1-3 Schedule for Implementation
P1-4 Regulatory Submission Outline

PACKAGE 2

Project Description

P2-1 Project Description with Executive Summary (translated)

PACKAGE 3

NIRB and NWB Application Documents

P3-1 NIRB Amendment Application Documents
P3-2 NWB Amendment Application Documents
P3-3 NPC Conformity Determination

PACKAGE 4

Environmental Effects Assessment

P4-1 Environmental Effects Assessment

PACKAGE 5

Management and Other Plans

P5-1 Air Quality Management Plan
P5-2 Interim Closure and Reclamation Plan
P5-3 Water Management Plan
P5-4 Waste Rock and Ore Management Plan

PACKAGE 6

Engineering and Design Documents

P6-1 Doris Central Vent Raise Pad and Access Road
P6-2 Doris Connector Vent Raise Pad and Access Road
P6-3 Groundwater Inflow and Quality Model
P6-4 Landfill
P6-5 Reclamation and Security
P6-6 Roberts Bay Discharge System: Water Management Options
P6-7 Roberts Bay Discharge System: Surface Infrastructure
P6-8 Roberts Bay Discharge System: Pump and Pipe Requirements
P6-9 Roberts Bay Expanded Laydown Pads
P6-10 Site-Wide Water and Load Balance
P6-11 Storage Pad U
P6-12 Tailings Geochemistry
P6-13 Tailings Management System
P6-14 Waste Rock and Ore Geochemistry, Static Testing
P6-15 Waste Rock and Ore Geochemistry, Kinetic Testing

PACKAGE 7

Proponent Information

P7-1 Financial Statements
P7-2 List of Officers
P7-3 Certificate of Incorporation

TMAC RESOURCES

Package 2

Project Description

Package 2
Project Description

P2-1 Project Description with Executive Summary (translated)

Package 2: Project Description

Document ID: P2-1

REVISIONS TO TMAC RESOURCES INC. AMENDMENT APPLICATION NO.1 OF PROJECT CERTIFICATE 003 AND WATER LICENCE NO.2AM-DOH1323

June 2015

Prepared by:

TMAC Resources Inc.
Toronto, Ontario

REVISIONS TO TMAC RESOURCES INC. AMENDMENT APPLICATION NO.1 OF PROJECT CERTIFICATE 003 AND WATER LICENCE NO. 2AM-DOH1323

Table of Contents

List of Figures

List of Tables

Executive Summary

This amendment application relates to the Doris Mine (the Mine) authorized by the Nunavut Impact Review Board (NIRB) under Project Certificate No. 003 (the Project Certificate) issued in September 2006 and the Nunavut Water Board (NWB) under Type A Water Licence 2AM-DOH1323 (the Type A Water Licence) issued in August 2013.

Based on encouraging results from its continuing exploration in the vicinity of the Doris Mine, TMAC Resources Inc. (TMAC) now anticipates it will use the existing Doris Portal to access and mine the entire Doris deposit. This includes all mineralized zones that can be accessed from the existing Doris Portal including those zones known as Connector and Central, bringing the total amount of ore to be mined to an estimated 2.5 million tonnes. The decision to use the existing Doris decline to access all of the known Doris zones has led mine engineering and operations teams to identify changes to the existing mine footprint and facilities that will be necessary to optimize the operation and ensure a continuous ore feed. The changes, presented in this document and supported by other application package components, add approximately 4 years of mine life to the approximately 2 years originally reported in the Final Environment Impact Statement (FEIS) approved by the NIRB, bringing the total life of mine to about 6 years.

The Mine changes described within this application are required to continue mineral exploration and development of the Doris Mine (also referred to as Phase 1) and are not a "pre-build" to support future development of the Hope Bay Belt Project (also referred to as Madrid/Boston, or Phase 2). Subsequent Belt-wide development will be the subject of separate regulatory applications to the NIRB and the NWB. The Doris Mine (Phase 1) discussed in this application is a stand-alone operation and does not depend on development of Madrid/Boston (Phase 2) for the operation of either the Doris Mine or changes now being proposed.

Proposed changes to the Doris Mine are summarized briefly below.

- Mining all ore zones that are accessible via the existing Doris Portal in addition to the Doris North deposit will extend the life of the Doris Mine to approximately 6 years. TMAC has conducted geochemical analysis to characterize the additional material expected to be mined and the results of these analyses confirms that the waste rock can be managed via existing site controls. Procedures for waste rock management on surface have been updated for operational efficiency.
- TMAC anticipates an initial mining and milling rate of 1,000 tonnes per day (tpd; daily average ore mining rate). This rate will ultimately increase up to 2,000 tpd.
- The Doris Camp will be enlarged to a capacity of 280 personnel, no additional domestic water supply is anticipated.
- Expanded mining activities will result in additional materials shipped to site as well as ore that will require storage, therefore laydown areas and temporary ore storage areas will be expanded.
- Despite expanded mining activities, TMAC will maximize water recycle for milling, and as such, no additional surface water withdrawal beyond that current permitted withdrawal rate is required from Doris Lake.

- The mine plan now includes Doris North, Doris Central and Doris Connector. Doris North is located in permafrost while the other zones are located beneath Doris Lake in an unfrozen zone, a talik. TMAC anticipates that groundwater encountered in the talik under Doris Lake will be saline. Any groundwater encountered during mining will be reused within the mine to the extent possible, with the remainder directed to the marine outfall in Roberts Bay through an overland pipeline.
- Using conservative assumptions of hydrogeological characteristics, conventional mine water control technology and dynamic modelling techniques, the maximum groundwater inflow encountered at full mine development under Doris Lake is expected to be 3,000 m^3/day. The modelling indicates a risk that some of the water entering the mine will originate in Doris Lake and could infiltrate at a rate that could cause reductions in Doris Lake water levels. Based on modelling and review of baseline data, the changes to Doris Lake are considered to be mostly within the natural variation of flows in the system. Should changes occur outside of natural variation, TMAC will offset for any negative effects to fisheries.
- Tailings from the mill process will be discharged to the Tailings Impoundment Area (TIA) but, because of the additional tonnes to be mined, tailings will now be deposited subaerially (placed on the land), instead of subaqueously (under water). Approximately 94% of the tailings, known as flotation tailings, will be disposed of subaerially in the TIA, placing the tailings in a beach in the south end of the TIA, behind a dike designed to retain solids. The remaining 6%, the cyanide leach tailings, will be deposited underground as backfill following destruction of residual cyanide, and in conjunction with waste rock. This approach maximises use of capacity within the tailings area, isolates leach tailings and promotes water reuse.
- As in previous plans, TMAC will use the water in the TIA as process water in the mill. Excess water will be discharged directly to Roberts Bay via pipeline and a diffuser to be located on the ocean floor, rather than to Doris Creek as had been previously planned and permitted. All regulatory parameters, including those listed in the Type A Water Licence and in the Metal Mining Effluent Regulations, will be met prior to discharge. The process water may be mixed with the saline groundwater and treated, if needed, prior to discharge. Footprint impacts will be minimal, as the majority of the on-land portion of the discharge pipeline will follow the existing all-weather road to Roberts Bay.
- An additional 550 m of road and pipe length will extend to the northwest of the existing jetty and laydown area, terminating at a point on shore where the pipe will enter the marine environment, armoured by riprap. The pipeline will run approximately 2 km from shore to the 40 m bathymetric contour.
- TMAC is introducing additional treatment measures in the mill to destroy cyanide in the tailings slurry (which was not a measure proposed by Miramar). Cyanide will be reduced to 0.5 mg/L which will fall below management thresholds set out in the International Cyanide Management Code for the Gold Mining Industry and will meet all applicable Canadian regulatory standards.
- The revisions that TMAC is requesting to TIA water management (which include treatment, if needed) will ensure that discharge meets required criteria and as such, the on-site laboratory previously proposed by Miramar Hope Bay and described in the Project Certificate is no longer necessary.
- Materials from existing Windy Road quarries A, B, D and 3 will be used for general construction. Quarry 3 material will be used primarily for south dam, interim dike and access road construction.

- A non-hazardous waste landfill will be located in Quarry 3, to contain both operational and closure non-hazardous waste. This location was chosen because the area is already permitted, the quarry will be exploited early in the mine life, and it is located upstream of the TIA. All wastes permanently on site will now be co-located within in the same drainage area.

In addition, TMAC wishes to clarify that it is expected that certain measures originally anticipated to be temporary will continue. Specifically, TMAC plans to continue to, from time to time and as needed, over-winter fuel barges and vessels in ice in order to ensure continuous delivery of fuel to site.

As part of this application, TMAC has described the direct associated changes to its reclamation and closure plan. The management plans associated the changes to the Project Certificate and Type A Water Licence addressed in this application have been revised and can be found in *Package 5* of this submission.

To proceed with the proposed Mine changes, TMAC is requesting all necessary amendments to the Project Certificate in addition to amendments to the Type A Water Licence. It is TMAC's desire to pursue a NIRB/NWB coordinated review process to the extent possible.

ᑐᓴᒐᒃᓴᑦ ᓇᐃᓈᖅᓯᒪᔪᑦ

Placeholder-3 pages

Tuhagahait Nainaqhimayut

Placeholder-3 pages

Résumé Analytique

Cette demande de modification concerne la mine Doris (« la Mine »), dont l'exploitation a été autorisée par la Commission du Nunavut chargée de l'examen des répercussions (CNER), en vertu du certificat de projet n° 003 (le certificat de projet) accordé en septembre 2006 et par l'Office des eaux du Nunavut (OEN), en vertu du permis d'utilisation des eaux de Type A 2AM-DOH1323 (le permis d'utilisation des eaux de Type A) accordé en août 2013.

À la lumière des résultats encourageants des travaux d'exploration qui se poursuivent dans les environs de la mine Doris, TMAC Resources Inc. (TMAC) envisage maintenant d'utiliser l'entrée actuelle de la mine Doris pour accéder à l'ensemble du gisement Doris et y réaliser ses travaux d'extraction. Cela vise notamment toutes les zones minéralisées accessibles à partir de l'entrée actuelle de la mine Doris, y compris les zones désignées Connor et Central, ce qui porte les ressources minérales estimatives totales à 2,5 millions de tonnes. La décision d'utiliser la descenderie actuelle de la mine Doris pour accéder à toutes les zones connues de la mine Doris a amené les équipes de conception technique et de l'exploitation à apporter des changements à la configuration et aux installations actuelles de la mine, ces modifications étant nécessaires pour optimiser l'exploitation et garantir un apport continu en minerai. Ces modifications, dont fait état ce document et qui sont également abordées dans d'autres documents de la trousse de demande, prolongeront la durée de vie utile de la mine d'environ 4 ans, par rapport aux 2 ans mentionnés dans l'énoncé final des incidences environnementales qu'a approuvé la CNER, ce qui porte la durée de vie totale de la mine à approximativement 6 ans.

Les modifications de la mine décrites dans cette demande s'imposent pour poursuivre les travaux d'exploration minière et de mise en valeur à la mine Doris (désigné aussi comme la Phase 1) et il ne s'agit pas d'infrastructures préalables au projet visant à soutenir la réalisation future du projet de ceinture aurifère de Hope Bay (connu également comme projet Madrid/Boston, ou Phase 2). Les travaux de mise en valeur ultérieurs dans l'ensemble de la ceinture feront l'objet d'autres demandes présentées à la CNER et à l'OEN conformément à la règlementation. Les activités de la mine Doris (Phase 1) abordées dans cette demande concernent une exploitation unique et ne dépendent aucunement de la réalisation du projet Madrid/Boston (Phase 2) aux fins de l'exploitation de la mine Doris ou des changements qui sont maintenant proposés.

Les changements proposés à la mine Doris sont décrits brièvement ci-dessous.

- L'exploitation minière de toutes les zones minéralisées accessibles à partir de l'entrée actuelle de la mine Doris, outre l'exploitation du gisement Doris Nord, permettra de prolonger la durée de vie utile de la mine Doris et de la porter à environ 6 ans. TMAC a réalisé des analyses géochimiques de caractérisation des autres matières susceptibles d'être extraites et les résultats de ces analyses confirment qu'il est possible de gérer les stériles par les mesures de contrôle existantes en vigueur sur le site. La marche à suivre pour la gestion des stériles en surface a été révisée pour garantir l'efficacité des activités d'exploitation.
- TMAC prévoit une cadence de production et de broyage initiale de 1 000 tonnes par jour (tpj – soit le taux d'extraction minière quotidien moyen). Ce taux de production finira par atteindre 2 000 tpj.

- Les activités élargies d'exploitation minière se traduiront par l'envoi d'autres matériaux sur le site et nécessiteront l'entreposage du minerai. Les zones de dépôt et de stockage temporaire du minerai seront donc agrandies.
- Malgré les activités d'exploitation minière élargies, TMAC optimisera le recyclage de l'eau destinée au broyage, de sorte qu'il n'y aura pas de captage d'eau de surface au-delà des quantités de prélèvement actuellement autorisées dans le lac Doris.
- Le plan d'exploitation minière comprend maintenant Doris Nord, Doris Central et Doris Connector. Doris Nord se trouve dans une zone de pergélisol, tandis que les autres zones sont situées sous le lac Doris, dans une zone non gelée, un talik. TMAC s'attend à ce que l'eau souterraine dans le talik sous le lac Doris soit de nature saline. La totalité de l'eau souterraine interceptée pendant l'exploitation minière sera réutilisée dans toute la mesure du possible dans la mine, le reste de l'eau d'origine souterraine devant être évacuée vers l'effluent en milieu marin de la baie Roberts, au moyen d'un pipeline terrestre.
- Selon des hypothèses de travail prudentes concernant les caractéristiques hydrogéologiques, une technologie de contrôle conventionnel de l'eau dans la mine et des techniques de modélisation dynamique, l'apport maximal de l'eau souterraine pendant la pleine mise en valeur de la mine sous le lac Doris devrait être de 3 000 m^3/jour. La modélisation indique qu'une partie de l'eau d'infiltration dans la mine pourrait provenir du lac Doris et pourrait y pénétrer à un rythme qui entraînerait possiblement une réduction du niveau de l'eau du lac Doris. Selon la modélisation et l'examen des données de base, les changements susceptibles de survenir dans le lac Doris concerneraient principalement la variation naturelle des apports hydriques dans le système. Si d'autres changements que cette variation naturelle survenaient, TMAC atténuerait toutes les incidences négatives sur les pêches.
- Les résidus issus du traitement seront déversés dans la zone de retenue des résidus miniers. Toutefois, en raison du volume supplémentaire de minerai à extraire, les résidus seront maintenant déposés sur terre, plutôt dans un milieu sub-aqueux (sous l'eau). Environ 94 % des résidus désignés comme résidus de flottation seront déposés sur terre dans la zone de retenue des résidus, les résidus devant être déposés sur une plage au sud de la zone de retenue, derrière une digue conçue pour contenir les matières solides. Le 6 % de matières résiduelles, soit les résidus de lixiviat de cyanuration, sera déposé sous terre de pair avec les stériles comme matériau de remblayage après la destruction du cyanure résiduel. Cette façon de procéder optimise la capacité de la zone de résidus, isole les résidus de lixiviat, et favorise la réutilisation de l'eau.
- Comme il était prévu dans les plans précédents, TMAC utilisera l'eau de la zone de retenue des résidus comme eau de traitement dans l'usine. L'eau en trop sera déversée directement dans la baie Roberts, au moyen d'un pipeline et d'un diffuseur qui reposera au fond de l'océan, plutôt que dans le ruisseau Doris, comme il était envisagé antérieurement, une solution qui avait été autorisée en vertu d'un permis. Tous les paramètres règlementaires seront respectés avant le déversement, ce qui comprend ceux qui figurent dans le permis d'utilisation des eaux de Type A et dans le règlement sur les effluents des mines de métaux. L'eau de traitement peut être mélangée à l'eau salée souterraine et traitée au besoin avant son déversement. Les incidences sur l'empreinte seront minimes, car pour l'essentiel, la partie terrestre du pipeline de déversement suivra le tracé existant du chemin d'accès ouvert toute l'année vers la baie Roberts.
- Un prolongement de 550 m de chemin et de pipeline sera aménagé au nord-ouest de la jetée et de la zone de dépôt actuelle, prenant fin en un point de la rive où la conduite entrera dans le

milieu marin, puis sera entourée et protégée par un enrochement. Le pipeline s'enfoncera dans l'eau sur une distance d'environ 2 km à partir de la rive jusqu'à la courbe isobathe de 40 m.

- TMAC adopte un autre train de mesures de traitement dans l'usine pour détruire le cyanure dans les boues de résidus (ce qui n'était pas une mesure proposée par Miramar). La teneur en cyanure sera réduite à 0,5 mg/L, soit une teneur inférieure aux limites de gestion établies en vertu du Code international de gestion du cyanure pour l'industrie aurifère et qui satisfait à toutes les normes règlementaires canadiennes en vigueur.
- Les révisions demandées par TMAC en matière de gestion des eaux de la zone de retenue des résidus (qui comprendra le traitement au besoin) garantiront que l'effluent respecte les critères en vigueur. Il s'ensuit que le laboratoire sur place précédemment proposé par Miramar à Hope Bay et décrit dans le certificat de projet n'est plus exigé.
- Les matériaux provenant des carrières A, B, D et n° 3 de Windy Road serviront aux travaux de construction générale. Les matériaux de la carrière n° 3 serviront principalement à la construction du barrage de retenue sud, d'une digue provisoire, et d'un chemin d'accès.
- Un site d'enfouissement de déchets non dangereux sera aménagé dans la carrière n° 3 et il servira au confinement des déchets d'exploitation et de fermeture non dangereux. Cet emplacement a été choisi, car cette zone est déjà visée par des permis en vigueur, la carrière sera exploitée au début de la vie de la mine et la carrière se trouve en amont de la zone de retenue des résidus. Tous les déchets en permanence sur le site seront dorénavant entreposés également dans la même zone de drainage.

De plus, TMAC souhaiterait préciser qu'elle prévoit que certaines des mesures qui devaient avoir un caractère temporaire deviendront permanentes. Plus particulièrement, TMAC prévoit de continuer à laisser hiverner dans la glace, de temps à autre et au besoin, les barges et les bâtiments de ravitaillement en carburant dans le but de garantir l'approvisionnement permanent de carburant du camp minier.

Dans le cadre de cette demande, TMAC a décrit les changements directement associés à son plan de remise en état et de fermeture. Dans les plans de gestion, les changements étaient associés au certificat de projet et au permis d'utilisation des eaux de Type A. Ces changements ont été révisés et ils figurent dans la trousse documentaire n° 5 de cette présentation.

Pour aller de l'avant avec les changements proposés à la mine, TMAC demande l'autorisation de toutes les modifications nécessaires au certificat de projet, ainsi que les changements au permis d'utilisation des eaux de Type A. TMAC souhaite poursuivre dans toute la mesure du possible un processus d'examen coordonné par la CNER et l'OEN.

1. General Information

1.1 INTRODUCTION

This document describes changes to the Doris North Project (the Project) identified by TMAC Resources Inc. (TMAC) and its technical advisors to extend the mine life, optimize the Mine footprint and that are necessary in order to make the Doris Mine (the Mine) operationally feasible. In order to proceed, several of these changes will require amendments to Project Certificate No. 003 (the Project Certificate) issued by the Nunavut Impact Review Board (NIRB) in September 2006, and Type A Water Licence 2AM-DOH1323 (the Type A Water Licence), issued by the Nunavut Water Board (NWB) in August 2013. Figure 1 of *Package 1* illustrates location of the Doris North Mine at a local and regional scale.

TMAC is a privately held mineral exploration and development focused company. TMAC completed the acquisition of the Hope Bay Project from Hope Bay Mining Limited, a subsidiary of Newmont Mining Corporation (Newmont), on March 12, 2013. Detailed corporate information regarding TMAC is included in *Package 7* of this submission.

In late 2007, Hope Bay Mining Limited (HBML), an indirect wholly-owned subsidiary of Newmont, purchased Miramar Hope Bay Limited (Miramar), a Canadian gold company that controlled the Hope Bay Belt, including the Doris Mine and exploration and mineral rights over one of the largest undeveloped greenstone belts in North America.

TMAC considers the Hope Bay Project and the Doris Mine to be an opportunity to develop a positive working relationship with the Inuit, Nunavut, and Canada by managing risk and sharing the economic and social benefits with stakeholders through a responsible approach to exploration, mining, and gold production.

The following Sections describe the need for the Mine and the associated changes. Other documents to be reviewed in conjunction with this Package are presented in Table 1.

Table 1. Documents to be reviewed in conjunction with this Package.

Package #	Title	Document Reference #	Summary of Contents
1	Project Summary and Submission Outline	P1	Plain language summary with translations, maps, schedule for implementation, outline of the regulatory submission
2	Project Description	P2	Description of the project changes
3	NIRB and NWB Applications	P3	NIRB Screening Form, NWB Application and SIG[1], Correspondence with the NPC[2]
4	Environmental Effects Assessment	P4	Assessment of the environmental effects related to the project changes
5	Management and Other Plans	P5	Revised Plans related to Project changes
6	Engineering and Design Documents	P6	Technical and design briefs, models and data summaries
7	Proponent Information	P7	Statement of TMAC's financial security, list of TMAC's officers and TMAC's certificate of incorporation

TMAC first submitted an application to amend Project Certificate 003 and Water License 2AM-DOH1323 on November 29, 2013 (it is noted this Amendment Application was substantially similar to the amendment application originally filed by Hope Bay Mining and later withdrawn). In April 2014 the amendment process was suspended pending the provision of further information on the project by TMAC. In the interim TMAC has undertaken a successful exploration program and a detailed technical review of the entire project to confirm that all currently foreseeable project revisions are included within the Amendment Application. TMAC believes this approach will support an efficient regulatory process and will limit the need for further stand-alone amendment applications in future. While the June 2015 revised application reflects a change to the tailings management strategy described in November 2013 (from subaqueous to subaerial management) it should be noted that most of the project activities and facilities described in the June 2015 revised amendment are substantially similar to those originally proposed in 2013 and have already been considered within the NIRB and NWB amendment processes. Based on communications between TMAC, the NWB and the NIRB, it is understood that the two Boards are prepared to facilitate a cooperative review of the proposed amendments.

[1] Supplemental Information Guide
[2] Nunavut Planning Commission

1.2 RATIONALE FOR PROPOSED CHANGES TO THE PROJECT

TMAC's rationale for the proposed changes to the Project is as follows. After evaluating Miramar's approved plans for development of the Doris North Project surface infrastructure TMAC has determined the project is not operationally feasible as envisioned by Miramar. To take the Project to production, TMAC needs to be reasonably certain that the mine life is greater than two years for reasons related to economic sustainability. Further, TMAC has re-examined the geology of the other Doris zones (Connector and Central) and determined that they can all be accessed from the existing Doris Portal. Including these additional ore zones results in an increase in ore and tailings processed to 2.5 million tonnes, rather than the approximately 1.4 million tonnes proposed in the 2013 Amendment Application. It is this larger number of tonnes and the infrastructure needs for their processing that necessitates the amendments contemplated in this submission. However, in TMAC's view, the changes that are necessary for the Mine to proceed are generally within the scope of the original project as described in the Doris North Final Environmental Impact Statement (FEIS; Miramar 2005) and the Project Certificate.

The specific changes that have been proposed in the current Amendment Application, as well as TMAC's rationale for these changes, can generally be summarized as presented below. The locations and of specific changes are illustrated in a series of five (5) figures located in *Package 1.*

Revisions to Doris Facilities to Optimize Engineering and Project Footprint

As detailed project planning and engineering has proceeded, TMAC has identified a number of changes to the originally permitted project that are, in its view, necessary for operational purposes but may require amendments to the key Project regulatory approvals. These include items such as the change in milling and mining rates, additional laydown areas and an increase in waste generation. Additionally, TMAC wishes to clarify that certain activities originally anticipated in the FEIS to be temporary, such as freezing in fuel supply vessels from time to time, may continue for the life of project. As requested by several regulatory authorities, rather than submitting piecemeal applications TMAC has consolidated these changes into the single Amendment Application so that all of these changes may be considered together.

Access to Doris Central and Connector Zones via Doris Mine Portal Rather than just the Doris North Deposit

TMAC's rationale for this change is that these near mine resources can be developed via the Doris Mine underground portal (in the original FEIS, Miramar contemplated that additional portals would be required to access these deposits). In TMAC's view, accessing the additional resources via the existing Doris Portal offers the opportunity to extend the benefits of the mine for several years longer without significantly modifying the project footprint.

Specific changes described in the Amendment Application related to the access of the additional Doris zones include expanded ore storage, establishment of additional vent raises, and revisions to the tailings deposition and water management strategy.

Deposit of Tailings Subaerially Rather than Subaqueously

With the increase in mine life and the commensurate increase in tailings produced, TMAC proposes to deposit tailings using subaerial tailings deposition. This will be achieved by placing flotation tailings subaerially in the southern area of the Tailings Impoundment Area (TIA) between the South Dam and a new Interim Dike located about 1,500 m to the north. Leach tailings, that is, tailings subjected to the cyanide leaching process, will have residual cyanide destroyed and be placed underground as mine backfill.

Deposit of Groundwater and Compliant Tailings Water to Marine Environment Rather than to the Freshwater Environment in Doris Creek

TMAC has further considered the proposed tailings water management strategy and determined that marine discharge would be a more reliable and scientifically supported strategy than direct discharge of tailings water to Doris Creek. This is the same as proposed in the 2013 submission of these proposed amendments. Additionally, a better understanding of the underground water chemistry has led to the conclusion that if underground water was encountered at any point during mining, it will be saline and a method for managing this saline water would be needed. The marine environment is a better receptor for saline water than the freshwater environment.

Overall, TMAC believes that the changes proposed in the Amendment Application improve the Project by making it safer, more environmentally sound, of greater benefit to Inuit and to the Kitikmeot, and of improved viability for TMAC.

1.3 PURPOSE OF AND NEED FOR MINE CHANGES

The development of the Hope Bay Belt (the Belt) as a series of sustainable projects over a number of years is of potential great value to the people of the Kitikmeot Region and Nunavut, and it is of strategic importance for Canadian sovereignty in the Arctic. The objectives of the Project include providing opportunities for the Kitikmeot Region and Nunavut while protecting the environment and minimizing negative socio-economic impacts.

TMAC views the Doris Mine as the first phase of Belt-wide development, which proposes to start limited gold production from one stand-alone underground mine located at the north end of the Belt near Doris Lake. Originally, Miramar anticipated a 2 year mine life for the Doris Mine. Ongoing exploration by HBML, and more recently since TMAC acquired the Mine, suggests there are sufficient resources and tailings storage capacity to allow 4 years of additional mine life with some revisions to existing facilities, operating plans and new infrastructure. The proposed changes described here to the Project will permit the Mine to begin sustainably operating as a stand-alone operation, independent from potential future (Madrid/Boston) Hope Bay Belt Project activities. The changes that are proposed to existing and planned Doris Mine facilities are required for mining at Doris and are not a “pre-build” for any aspect of Madrid/Boston.

To provide appropriate context for the proposed Project changes within the potential long-term belt-wide development, TMAC is providing some information in this application regarding the potential Madrid/Boston phase of the Hope Bay Belt Project, known as Phase 2. The Madrid/Boston phase of the Hope Bay Belt Project will be the subject of separate future NIRB and NWB applications. Development of Madrid/Boston is currently anticipated to proceed in three phases: 1) exhaustion of the mineable areas of the Doris deposit including possible expansion of underground development beyond what is accessible from the Doris North decline, 2) moving into the Madrid/Patch district with commercial underground mining following a bulk sample project, and 3) moving into the Boston district with underground mining. Development of Madrid/Boston will include the expansion of infrastructure at Doris beyond what is required for the operation of the existing stand-alone Doris Mine. In addition, future regional development will be supported by ongoing exploration, as well as surface and advanced exploration (e.g., bulk sampling) in areas such as Madrid/Patch and Boston. These activities will be the subject of separate licencing applications. However, in the near term, the Doris Mine will operate as a stand-alone project.

1.4 ALTERNATIVES TO THE CHANGES

Alternatives to the proposed design changes are presented in each individual design brief, available in *Package 6*. Alternatives for each proposed design were examined for operational suitability, efficiency, cost and environmental effects. The preferred design alternative was carried forward to the conceptual design stage and is presented herein.

1.5 ACTS, REGULATIONS AND GUIDELINES

Various Nunavut and federal Acts, Regulations and Guidelines apply to the Project and the changes presented herein. Table 2 provides a list of the regulatory instruments relevant to the specific scope addressed in that specific Plan.

Key revised management plans are presented in *Package 5*. A complete update of all management and monitoring plans to reflect current site ownership, site conditions and plan execution is planned for the near term. Changes are expected to be primarily administrative and so these plans have not been included in this Amendment Application; review and approval, where needed, will occur outside the scope of this Application.

1.6 APPROVALS, PERMITS AND LICENCES

Approvals, permits and licences currently in place for the Project are presented in Table 2. A compliance assessment for the Water Licence is appended to the NWB application form in *Package 2*.

All work on the Project will proceed in accordance with all applicable authorizations.

Table 2. Approvals, permits and licences currently in place for the Doris North project

Approvals, Permits or Licences	**Issuing Agency**
Project Certificate 003	NIRB
Water Licence 2AM-DOH1323	NWB
Fisheries Authorizations • NU-02-01117.2 • NU-02-01117.3 • NU-10-0028	DFO[3]
Inuit Mining and Land Access Agreements March 30, 2015 • KIA - Commercial Lease #KTCL 313D001 (Includes Quarry Permissions) • KIA - Inuit Impacts and Benefit Agreement • KIA - Water Compensation Agreement	Between the KIA[4], NTI[5] and TMAC
Nunavut Lease 77A/3-1-4 & 3574	AANDC[6]
Navigable Waters Protection Act Approval 8200-02-6565	Transport Canada

[3] Department of Fisheries and Oceans
[4] Kitikmeot Inuit Association
[5] Nunavut Tunngavik Inc.
[6] Aboriginal Affairs and Northern Development Canada

1.7 BELT-WIDE DEVELOPMENT

The Madrid/Boston (Phase 2) development is not a component of this Amendment Application, but will rather be part of a future environmental assessment. Essentially, the Madrid/Boston project proposes the development of new mining districts in the southern part of the Hope Bay Belt: the Madrid/Patch district, and the Boston district. The scope of the proposed Madrid/Boston project can be viewed in detail in the Phase 2 Hope Bay Belt Project Proposal (HBML 2011), which has been submitted to the NIRB. In particular, the project fact sheet included at Section 1.4 of that Project Proposal, and the detailed descriptions of the project in Sections 2 and 3 therein, provide scoping details. TMAC continues its planning and evaluation of the Madrid/Boston project, as well as ongoing exploration, Belt-wide.

1.7.1 Hope Bay Belt Phase 2 (Madrid/Boston)

The Doris North Project and the Madrid/Boston (Phase 2) Hope Bay Belt Project are separate but related neighboring projects.

As background, HBML, and then TMAC, have undertaken significant regional geological investigations in the Doris District and south along in the Belt. During the last several years, the geology of the Doris zones has been better defined and more potential resources were discovered. TMAC conducted a detailed review of Miramar engineering and construction plans to determine whether it is feasible to construct the Project as permitted and to evaluate the financial viability of a variety of potential development options.

Based on these investigations, TMAC now plans to develop the resources located within the Belt in a series of phases which will have the benefit of maintaining continuously producing mines over time. Maintaining continuous production mitigates the potential negative economic and social impacts of mine closures on TMAC, its workers, Inuit, the Kitikmeot Region, and Nunavut.

The first phase of development is the operation of the Doris North Project (as modified by this Amendment Application) as a standalone mine. While the Doris Mine is operating, TMAC plans to commence permitting and development of the second phase of development, the Madrid/Boston project.

To minimize overall project footprint and potential for impact, and to maximize the existing investment TMAC has designed the Madrid/Boston project to use facilities that already exist at Doris to the extent possible. However, it is important to note that the revisions to Doris facilities listed in this Amendment Application are in support of the Doris Mine itself. Additional changes will later be required to support the Madrid/Boston project, but any such changes will be outlined and permitted separately as part of the Part 5 review of the Madrid/Boston (Phase 2) Hope Bay Belt Project.

Doris Project components that may be expanded further if the Madrid/Boston project is permitted to proceed include:

- Port facilities in Roberts Bay, which will continue to be used to unload and laydown equipment and supplies.
- Doris North airstrip, which lies between Roberts Bay and Doris Camp.
- Doris Mill and modification of the process to accommodate Madrid, Patch and Boston ores.
- Doris Camp accommodation, laydown, storage facilities, and waste management facilities.
- Tailings Impoundment Area beyond the incremental expansion of capacity needed for the Doris North Project to continue forward as a standalone mine.
- Quarry 3 non-hazardous waste landfill (once constructed).

1.7.2 Ongoing Belt-Wide Exploration

TMAC conducts its exploration program under two separate water licences (2BB-BOS1217 for Boston, and 2BE-HOP1222 for the rest of the Hope Bay Belt) and has submitted an application for a third licence, 2BB-MAE----, for bulk sampling at Madrid. Land use activities throughout the Belt are conducted under permission of the KIA through the Inuit Land Access Agreements signed on March 30, 2015. Land tenure on the Hope Bay Belt is a mix of Inuit Owned lands and Crown lands.

On March 30, 2015, TMAC entered into a series of landmark agreements with the KIA with respect to the Inuit Owned surface title for the lands on which the Hope Bay Project is located. These agreements replace certain existing agreements and comprise a 20 year comprehensive Framework Agreement known as the *Inuit Mine and Land Access Agreement* (the Agreement). The Agreement sets forth the terms under which land use licenses, advanced exploration leases and Inuit owned lands commercial leases will be extended by the KIA to TMAC. Additionally, the Agreement replaces TMAC's pre-existing land use licenses with a single land use license and replaces the pre-existing quarry permits with advanced exploration leases. The exploration occurring on the Hope Bay Belt will continue in much the same way it has been for the past several years. The exploration program consists of mapping and drilling programs aimed at discovering potential mineralized zones in the Belt and better defining the known deposits (Doris North, Madrid/Patch, and Boston). These activities are supplemented with ground and aerial geophysical programs. The majority of drilling is focused on known deposits with the goal of better defining the resources. Where possible, underground exploration diamond drilling may be performed to explore deposits at depth. TMAC plans to proceed with underground advanced exploration and bulk sample testing at Madrid, once permitted, and Boston deposits at some point in the future.

2. Mine Development Plan Update

The Doris Mine contains several zones of economic mineralization that have been previously described as being associated with the Doris Deposit (Doris Connector and Doris Central). The ore zones have been further defined by exploration to be a contiguous ore body (Doris) of consistent geologic structure and mineralization origins but varying thickness and grade. Continued drilling in these zones is leading to development of a mine plan where the previous subdivisions merge into a contiguous ore body. In addition, preliminary exploration shows that the Doris North zone extends to depth. Geology of these additional zones is presented later in this Section. Mining these zones will increase the gold resources mined from the Doris Portal, and in turn extend the near term life of the mine. The recently published NI 43-101 Preliminary Feasibility Study (PFS; RPA 2015) has determined the enlarged Doris deposit can be mined in addition to the zones that were described in earlier Doris Mine plans. Detailed mine plans have been prepared to extract the Doris Mine ores.

The underground development method for the additional zones will be the same as previously proposed by Miramar: conventional drill and blast. Figure 1 illustrates the general layout of the revised 2.5 million tonne mine area and the locations of potential stope areas.

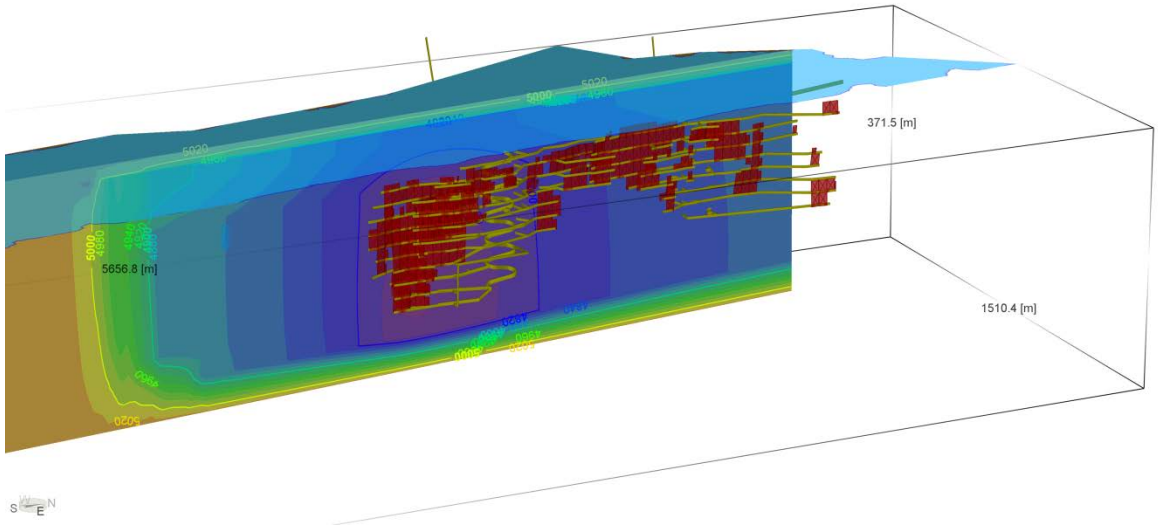

Figure 1. General Layout of Mining Area and Potential Locations of Stopes

The PFS has identified two primary mining methods suitable for the Doris Mine: longhole with delayed backfill; mechanized overhand cut and fill or drift and fill. The longhole stoping will consist of longitudinal longhole stopes (along the strike direction) with widths sized to match the vein. The longhole stopes will be mined in an extract and fill sequence with both run of mine and cemented waste rock backfill used to backfill the open stopes for stability. Mechanized cut and fill or drift and fill will be used to extract the thicker ore zones or, if there are localized concerns with ground conditions, in longhole stoping areas. The drift and fill mining will utilize cemented waste rock pillars to fully extract the ore in a sequential process. Potential water flow will be carefully monitored during the development of the stope overcuts and undercuts, and grouting will be carried out as required.

Geotechnical work completed by TMAC and SRK has indicated that longhole stoping methods can be utilized with reasonable stope dimensions while maintaining stable openings to minimize ore dilution by waste. As in many mines, several mining methods will be necessary to address the various geometries and ground conditions at Doris. These will be optimized as experience is gained in each zone.

Table 3 shows the preliminary mining schedule for Doris North and the Central and Connector zones equivalent to approximately 2.5 Mt of milled ore. TMAC plans to initially commence mining and milling at Doris at a rate averaging 1,000 tonnes per day (tpd) increasing to 2,000 tpd yearly. Mining rates are highly variable and dependent on the number of stopes and the width of the deposit. Estimated rates will vary day to day and are based on annual averages.

Table 3. Preliminary Mining Schedule

	Ore (tonnes)			Waste Rock and Backfill (tonnes)		
	Doris North	Balance of Doris	Total Ore	Doris North	Balance of Doris	Waste Stockpile (Peak)
Totals	900,000	1,600,000	2,500,000	400,000	1,000,000	800,000

While additional waste rock will be produced according to the mine development schedule, sufficient capacity on existing pads exist on site (specifically Pad T).

Backfill requirements for the Mine have been calculated at 1,500,000 tonnes in the PFS based on volumes of planned stopes and the sequence of mining. Development waste will be dumped directly into stopes as backfill whenever possible to reduce the cost of haulage to surface. Mineralized waste (material with the potential to generate acid through oxidation and to leach metals) that is temporarily stockpiled on surface will be used for backfill before the non-mineralized (non-acid generating, limited potential for metal leaching) material. Current projections indicate that all of the waste rock produced will be returned to the Mine as backfill during the life of the Mine. The waste rock storage on surface will peak in the early years of the Mine life and be depleted near the end of the Mine life. This material will be handled and reclaimed as specified in the *Waste Rock and Ore Management Plan* (TMAC 2015a; *Package 5*) to be approved by the NWB and as updated with the NWB approval from time to time. It is anticipated that the geochemical characteristics and proportions of the waste rock from the additional development will be similar to that of Doris.

As noted earlier in this Application, greater volumes of groundwater flows are now anticipated and more is known regarding the composition of the groundwater. To prevent excessive groundwater inflows, an investigation and grouting program will be put in place during mining. This will consist of evaluating drilled exploration holes for water in advance of development. Should water be encountered in substantial volumes a program of pressure grouting the area will be initiated. If substantial inflows are anticipated a grout curtain will be put in place prior to blasting. Any leaking drill holes that are encountered will be plugged, likely using Margo type plugs. Inflow estimates have been modeled including management methods and the expected peak daily inflow of water to the Doris Mine is estimated to be 3000 m^3/d when the mine is fully developed. Where possible, groundwater will be utilized during underground drilling to reduce fresh water and salt consumption and to minimize groundwater discharge volumes. Excess groundwater will be collected and discharged directly to the marine environment, as presented in subsequent sections of this document.

During development fresh air will be supplied from the existing Doris North Vent Raise and forced into the headings with auxiliary fans and ventilation tubing. As the development advances, the Doris Connector Vent Raise will be constructed for exhaust only. A new vent raise pad with a surface area of approximately 225 m^2 will be required on surface to facilitate the fan and an emergency shelter. An access road to the pad leading from the Doris-Windy All Weather Road (AWR) will also be required.

A second vent raise, the Doris Central Vent Raise, may be constructed south of Doris Camp to supply Doris Central zones. This vent raise would be of a similar design to that at Doris Connector and would be connected to the main Float Plane Dock Access Road by a spur road of the same design as the Doris Central vent raise.

2.1 GEOLOGY

The Hope Bay Belt is located in the Slave Structural Province, a geological sub-province of the Canadian Shield. The region is underlain by the late Archean Hope Bay Greenstone Belt, which is 7 to 20 km wide and over 80 km long in a north-south direction. The Archean Hope Bay Greenstone Belt lies entirely within the faulted Bathurst Block forming the northeast portion of the Slave Structural Province. The Belt is mainly comprised of mafic metavolcanic (mainly meta-basalts) and meta-sedimentary rocks that are bound by Archean granite intrusives and gneisses. Archean volcanic greenstone hosts many of Canada's precious and base metal mines (i.e., Yellowknife, Timmins, and Rouyn-Noranda).

The Doris Mine area is located on the north end of the Hope Bay greenstone belt and consists of a steeply dipping, over 3 km long quartz vein system that is hosted in folded and metamorphosed pillow basalts. The Mine can now be further divided into three zones from north to south: Doris North, Doris Connector, and Doris Central (Figure 2). All three related zones are hosted within the same lithologies and share the same alteration and mineralization assemblages.

Lithology consists of mafic volcanic and plutonic lithologies with minor intercalated sediments. Mafic lithologies can be subdivided into Mg-tholeiites (C-type) and Fe-tholeiites (B-type) based on lithogeochemistry analyses. Felsic units such as the feldspar porphyry make up a minor component of stratigraphy and consist of a fine to medium grained pink moderately foliated dike intercepted in Doris Connector and Doris Central but not observed at Doris North.

A series of Proterozoic diabase dikes intrude the area and clearly crosscut all stratigraphy. The dikes vary in size, are coarse grained and display a felty texture. The largest dike is approximately 100 m thick and dips up to 30 east. The diabase dikes are pristine and do not appear to be offset by late faulting.

Early deformation of the Doris system caused a tight isoclinal fold of the mafic basalt stratigraphy. The fold axis of this isoclinal anticline strikes approximately north-south and is doubly plunging. The core of the anticline consists of more massive Mg-tholeiitic basalt with Fe-tholeiitic basalt out board of this unit. Belt-wide deformation associated with the gold event caused a localized near vertical extension along this contact in the anticline hinge and limbs where the Doris vein was formed. The regional fabric changes from a north-south orientation within the Central and Connector areas of Doris to a north-northeast orientation within Doris North area. Later movements within this stress field caused the vein to dislocate along foliation parallel shear planes. At a later point in time, the Doris vein has been broken and sinistral offset along northwest-striking brittle faults. In recent geologic time, a diabase dike has bisected the Doris system (Figure 3).

Two types of alteration systems are present within the region, a weak "distal" system and a strong "proximal" system. The weak "distal" alteration system is defined by Mg-Ca carbonate alteration

overprinting basaltic rocks and calcite-leucoxene alteration overprinting gabbroic rocks. A strong "proximal" hydrothermal alteration system is directly related to mineralized quartz veins. Alteration consists of iron dolomite-sericite-paragonite and quartz flooded zones. Sulphidization accompanying gold includes up to 5% pyrite, minor chalcopyrite, and arsenopyrite. Alteration intensity decreases away from veining with vein size directly reflecting the size of the alteration envelope. Alteration may extend up to 45 m above the crest of the fold and can range from 0 to 20 m along the limbs.

Mineralization in the Doris system is typical of "Archean Lode" deposits. Visible and disseminated gold is found primarily within quartz veins that range from a few centimetres to about 10 m in scale. Gold is commonly associated with narrow tourmaline-chlorite septa oriented parallel to and along the vein margins. Veins contain high-grade intersections but are not consistently mineralized along strike. Visible gold (VG) mineralization consists of coarse, leafy, free-milling grains located along vein margins, tourmaline septa, wallrock fragments and is associated with pyrite. Disseminated sulphides consisting of trace to 2% pyrite, trace chalcopyrite, rare sphalerite and pyrrhotite, occur along the vein and septa margins as well as in clusters within the vein. Occasionally gold is present within brecciated zones adjacent to the quartz veins. Whole rock analysis has shown mineralization to be situated at the contact between titanium rich Fe-tholeiites and Mg-tholeiites (Kleespies and Mercer 2001).

Doris Connector and Doris Central mineralization has a strike-length of approximately 1.8 km which extends to the south beneath Doris Lake. Connector veins extend from the lake bottom, but the anticline hinge is eroded away (Figure 4). At Doris Central, the hinge begins to reappear as the anticline plunges gently to the south (~10°), but the fold tightens and the limbs begin to coalesce (Figure 5). Lithology and mineralogy in Doris North Deep is relatively similar to that found in Connector and Central.

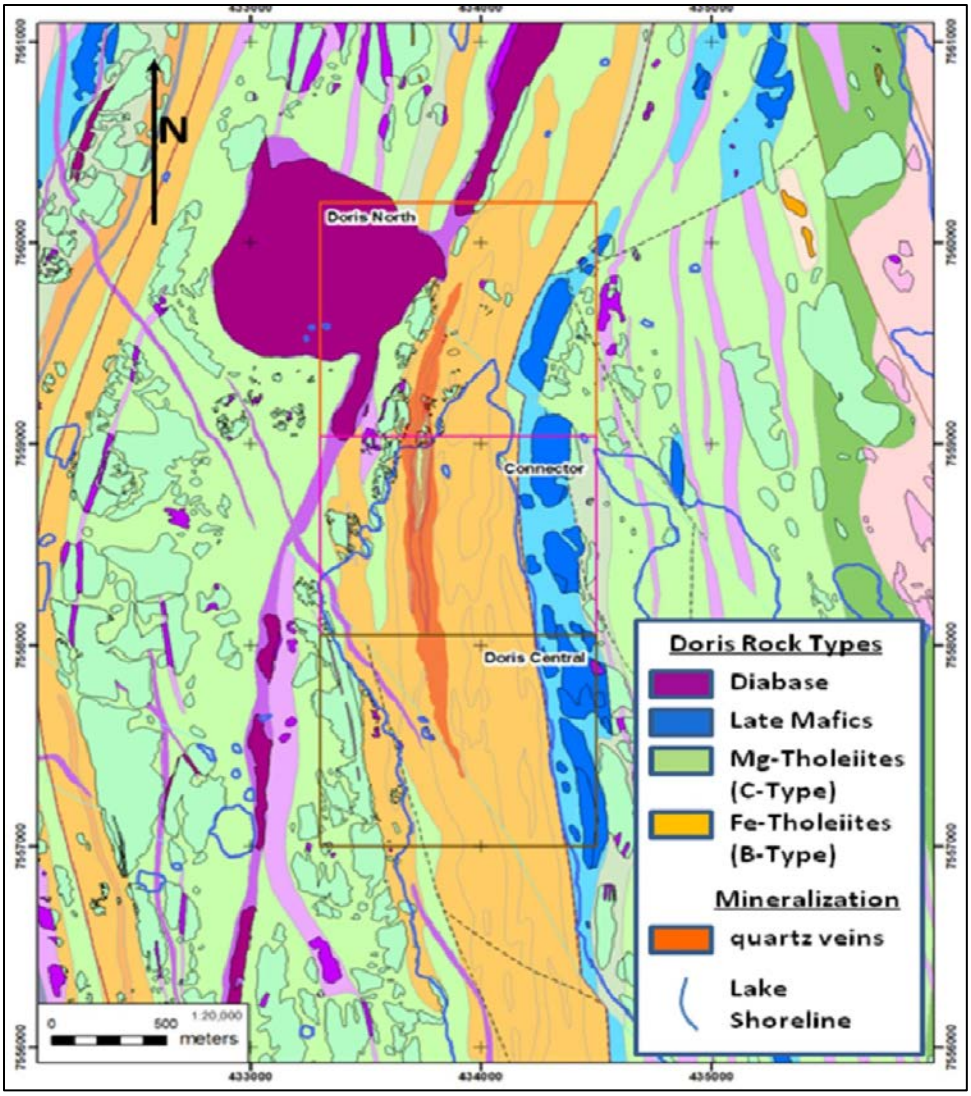

Figure 2. Surface Geology around the Doris Deposit with the Deposit Area Outlines, with 2009 Vein Shapes Projected to Surface

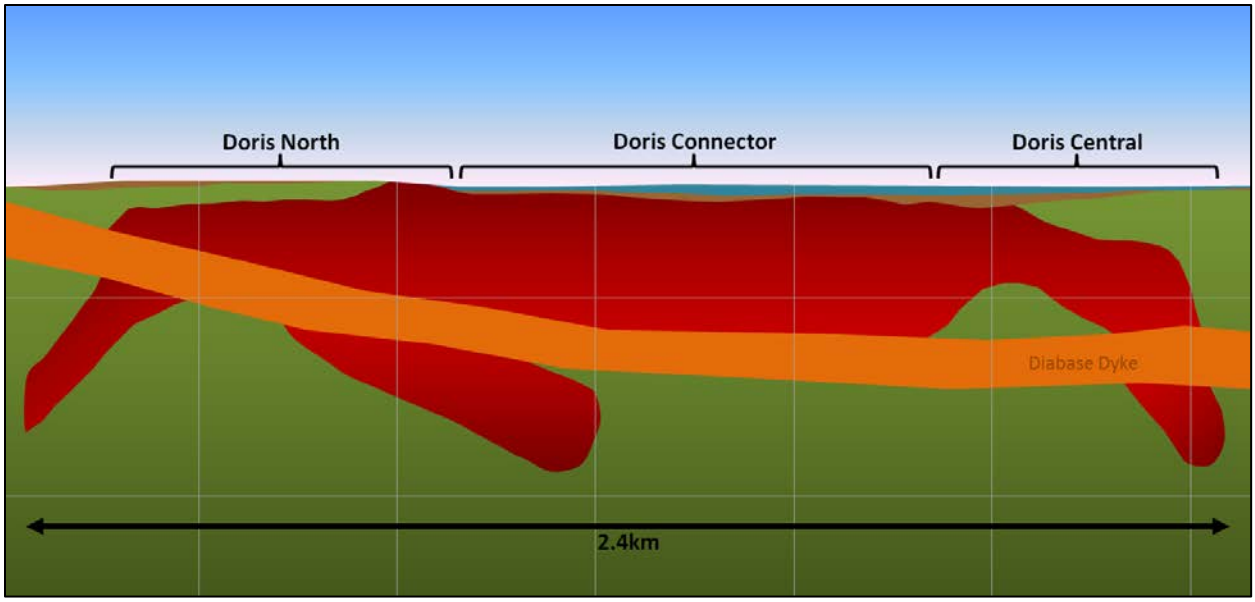

Figure 3. Long Section of the Doris Geology with Deposit Area Outlines, and the 2009 Vein Shapes Looking East

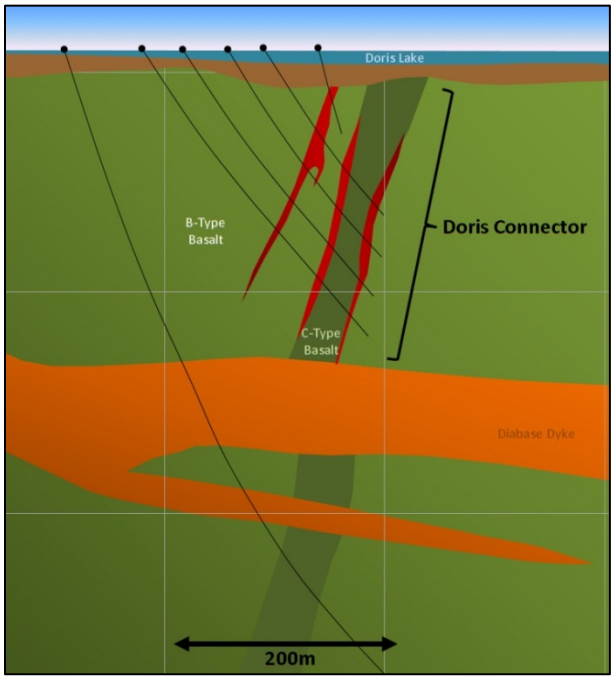

Figure 4. Doris Connector Zone Cross-section

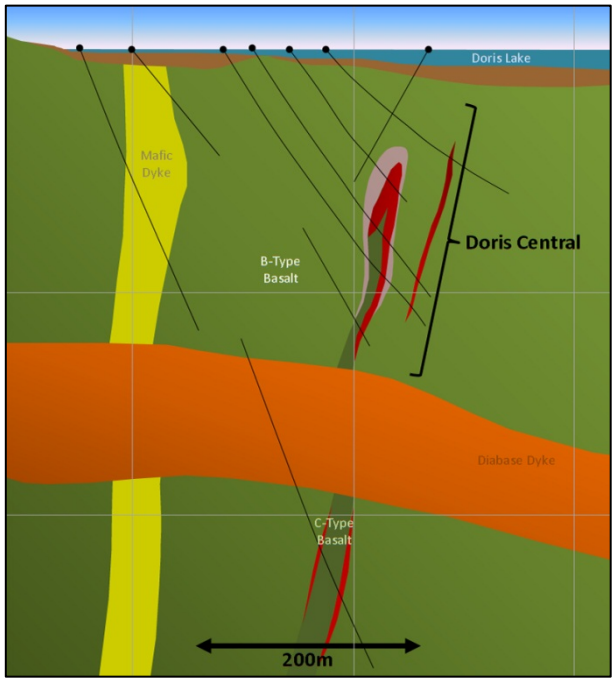

Figure 5. Doris Central Zone Cross-section

2.2 GEOCHEMISTRY

HBML, and more recently TMAC, have undertaken a comprehensive geochemical characterization program of quarry materials and mine waste at the Doris Deposit and a number of other gold deposits in the Hope Bay Belt. The details of the Doris testing programs, including waste rock and ore characterization and testing, are provided in *Package 6* and include an assessment of the metal leaching and acid rock drainage (ML/ARD) potential of waste rock and ore that would be produced as part of the proposed mining activities. Summaries of the findings of these works are reproduced here.

Package 6, document P-14 provides an assessment of the ML/ARD potential of waste rock and ore that would be produced as part of the proposed additional underground mining activities at Doris Central and Connector. The findings are based on a compilation of static (e.g., ABA, acid-base accounting) and mineralogy data (XRD, X-Ray Diffraction) obtained from various sources, including previous studies, samples recently characterized by consultants, and data generated internally by HBML and, more recently, TMAC. The different testing campaigns used different analytical and data interpretation methods. A comparison of data was made to reconcile the different analytical methods and to select surrogate parameters for the assessment of ARD. Data analysis was performed according to deposit, zone and rock type. Rock types were assigned to each sample using standardized lithology codes. Key results from the static testing program are summarized as follows:

- From an ML/ARD perspective, the most significant finding from the mineralogy data is that carbonate minerals are abundant in most rock types. Ferroan dolomite ($[Ca,Mg,Fe]CO_3$) was the dominant carbonate mineral, although calcite ($CaCO_3$) and to a lesser degree, siderite ($FeCO_3$) were also present. Pyrite was the only sulphide mineral detected using XRD methods.
- The static testing results show that, in general, samples from Doris are characterized by high levels of neutralization potential (NP) and total inorganic carbon (TIC). As a result, most samples were characterized as not-potentially acid-generating (non-PAG; i.e., ratios of NP to acid potential [AP] or TIC/AP greater than 3). That said, the potential for localized ARD cannot be eliminated because a small proportion of samples was classified as potentially acid-generating (PAG; [NP or TIC]/AP < 1).
- A comparison of the 90th percentile levels of solid-phase elemental data with five times the average crustal abundance for basalt (Price 1997) indicated that a number of elements that could be mobile under neutral and alkaline pH conditions were present at elevated concentrations in the solid phase. These parameters include arsenic, boron, cadmium, molybdenum, antimony and selenium. Some samples contained relatively high concentrations of sulphur in the form of sulphide minerals, suggesting that metal leaching under neutral to alkaline pH conditions may be a concern with respect to water quality.

Kinetic test work has been carried out to assess metal leaching rates. A summary of the findings is provided in *Package 6* (document *P6-15*). The kinetic test program for Doris included 21 humidity cell tests and five barrel tests. Four humidity cell tests were operated by Rescan (2001), and the remaining 17 samples were from more recent geochemical characterization programs by SRK Consulting (Canada) Inc. (SRK) in collaboration with HBML. Sample selection was based on lithology, economic classification (ore or waste), and ABA characteristics. Samples representing material with typical and higher than average sulphide concentrations were selected for testing. Trace elements (e.g., arsenic) were also considered during sample selection, but were a secondary consideration to ABA. Detailed mineralogical testing was also completed on the more recent samples selected for humidity cell testing. Key findings from the kinetic testing program are summarized as follows:

- The leachates from all samples were neutral to alkaline. Stable sulphate release rates were low and ranged between the limit of analytical detection (0.4 mg/kg/week) to 6 mg/kg/week. Samples with higher sulphide contents tended to exhibit higher stable sulphate release rates.
- Overall, metal concentrations were low for all of the humidity cell tests. Late gabbro samples with elevated sulphur levels had higher levels of antimony, arsenic and cobalt as compared to the other Doris waste rock samples. Mafic volcanics with elevated sulphur, and mafic volcanics combined with quartz vein also had elevated levels of cobalt relative to the other samples. All samples were predicted to be non-PAG on the basis of acid potential (AP) and NP depletion times and/or low stable sulphate release rates (less than 6 mg/kg/week).
- For the barrel tests, leachate concentrations were comparable to the humidity cells, however loadings were one to two orders of magnitude lower (e.g., sulphate was 0.007 to 0.2 mg/kg/week). The lower release rates for the barrel tests reflect the lower operating temperatures and the larger grain size of the test material.
- The more detailed mineralogical characterization has shown that pyrite is the most dominant sulphide mineral. However trace amounts of cobaltite (CoAsS), chalcopyrite ($CuFeS_2$), galena (PbS), gersdorffite ((Fe,Co,Ni)AsS), pyrrhotite (FeS), sphalerite (ZnS), and tetrahedrite (Cu_3SbS) were found in some samples.

The data from the kinetic test program have been used to validate inputs used for water quality predictions from the waste rock and ore. As noted in the preceding section, it is now being proposed that the waste rock will be managed according to the protocols outlined in the *Waste Rock and Ore Management Plan* (TMAC 2015a; *Package 5* document *P5-4*) and as revised from time to time with approval of the NWB. The more mineralized rock, including any PAG rock, will be visually segregated and stored in a separate mineralized portion of the waste rock pile. The mine plan for the Doris Mine indicates that all waste rock generated during the life of the mine (along with approximately 6% of the tailings) will be used as backfill during the life of the mine, with mineralized waste rock used preferentially. By using mineralized waste rock preferentially, should any waste rock remain on surface at the end of mine life, it will be non-PAG rock with limited potential for metal leaching and/or ARD issues, and will be reclaimed in place. At closure, the backfilled rock in the Mine will be flooded and/or inundated by permafrost, and is not expected to result in any long-term closure issues.

3. Proposed Changes

3.1 INTRODUCTION

Based on encouraging results from its continuing exploration in the vicinity of the Doris Mine, TMAC now anticipates it will use the existing Doris Portal to access and mine the entire Doris deposit. The decision to use the existing Doris decline to access all of the known Doris zones has led mine engineering and operations to identify changes to the existing mine footprint and facilities that will be necessary to optimize the operation and ensure a continuous ore feed. The changes presented in this section and supported by other application package components add approximately 4 years of mine life to the approximately 2 years originally reported in the FEIS approved by the NIRB.

The Project changes described within this Amendment Application are required in order to continue mineral exploration and development of the Doris Mine and are not a "pre-build" to support future Belt-wide development.

3.2 MINING

As stated earlier, approximately 2.5 million tonnes of ore are now known to be contained in the Doris deposit. TMAC plans to access all accessible mineralized zones via the existing Doris Portal, not just the ore in the Doris North zone. Originally, Miramar anticipated these resources would be accessed via additional underground portals or by open pits. This change to the Doris Mine Plan will adds a 4 year extension of the Mine life while minimizing the potential effects by using, to a large extent, existing infrastructure necessary to access the ore.

3.3 MILLING

TMAC anticipates an initial mining and milling rate of 1,000 tpd (yearly average ore mining rate) with a planned increase 2,000 tpd. The mineral processing plant will utilize two primary processing circuits (Pythons by Gekko Systems Pty Ltd), each having a nominal 1,000 tpd capacity, fed by a single primary jaw crusher. The Python plant consists of secondary crushing, grinding, gravity gold recovery, and flotation to produce a gold-containing concentrate. Flotation concentrate will go to a 240 tpd concentrate treatment plant (CTP) for further processing. The CTP consists of regrinding to optimize particle size, cyanidation to dissolve gold from the particles, resin gold recovery, and doré gold bar production. Non-gold bearing reject solids, or tailings, from the CTP process (about 6% of the total) will be subjected to cyanide destruction to reduce the cyanide concentration to about 0.5 mg/L, and filtering to form a filter cake that will be placed underground. The flotation tailings will be thickened to maximize process water recycle then pumped to the TIA as a slurry. Water supply to the process will be primarily reclaim water from the TIA Reclaim Pond and raw water from Doris Lake as a supplement to maintain process water quality. The plant, except for the primary jaw crusher, will be contained within a structure with containment bunds to separate process flows and prevent discharge from the process except to the TIA.

3.4 WATER USE

Despite an increase in the milling rate, additional water beyond the current permitted withdrawal volume will not be required to be withdrawn from Doris Lake. As such, no additional water allowance is being requested in this Amendment Application.

3.5 TAILINGS

In the original application for the Type A Water Licence, it was stated that the cyanide destructed slurry would be filtered and deposited as backfill in underground stopes. Flotation tailings were to be pumped to the TIA for subaqueous deposition. In this Amendment Application, it is proposed that CTP tailings (from the cyanide leach process) will also be filtered and disposed of back underground, and flotation tailings will be disposed of in the TIA. However, because of the additional volume of tailings to be disposed (2.5 million tonnes) the flotation tailings will be placed subaerially rather than subaqueously.

Cyanide destruction will be performed using the SO_2-Air Process, a process that has been successfully tested. Test work confirmed previous findings that the concentration of Weak Acid Dissociable (WAD) cyanide could be reduced to less than 0.5 mg/L. At a concentration of less than 0.5 mg/L the subsequent tailings filtration and handling for backfill will not be classified as Cyanide Facilities by the International Cyanide Management Institute (ICMI). The eventual discharge of excess tailings reclaim water as effluent will meet all Canadian cyanide discharge, as well as other regulatory requirements, in particular, those set out in the *Metal Mining Effluent Regulations* (*MMER*).

Subaerial deposition requires three retention structures: a water retaining frozen core dam (North Dam, already constructed); a frozen foundation tailings containment dam (South Dam, currently permitted as frozen core, design revised in this submission to a frozen foundation); an Interim Dike situated at approximately the midpoint of the facility (*Package 1*, Figure 5). The intent of this configuration is to deposit and contain the tailings between the South Dam and Interim Dike, and to manage reclaim water between the Interim Dike and the North Dam.

At closure the subaerial tailings will be free-draining and covered with a dry cover. The North Dam will be breached. Under the proposed subaerial scheme, the South Dam does not have to retain water ans as such its design will change: it is now planned to be a frozen foundation dam consisting of a compacted rock fill dam with a geosynthetic clay liner (GCL) keyed into the permafrost overburden foundation.

Technical and design documents associated with changes to the TIA and tailings management can be found in *Package 6* (document *P6-13*). Subaerial tailings deposition was not included in the original application to the NIRB, so effects pathways were not assessed at that time. Accordingly, an effects assessment including subaerial tailings deposition is included in *Package 4*. A revised *Air Quality Management Plan* (TMAC 2015b), outlining fugitive dust and dustfall monitoring measures, can be found in *Package 5* (document *P5-1*).

3.5.1 Tailings Deposition Strategy

Tailings deposition will commence from the crest of the South Dam so that a continuous beach is formed along the upstream face of the structure. Tailings deposition will initially occur from three spigot locations along the South Dam, and later utilizing three additional spigots situated along the east flank of the TIA. This configuration will ensure that the foundation of the South dam remains frozen. Best management practices will be adopted to schedule seasonal changes in discharge locations to minimize ice buildup and possibly permanent entrapment of ice within the tailings mass. The overall operational strategy is to ensure that the final tailings landform allows for free draining of the tailings surface at closure towards the reclaim pond downstream of the Interim Dike.

Tailings deposition is further discussed in *Package 6* (document *P6-13*).

3.5.2 Tailings Geochemistry

The geochemical characterization program for tailings was designed to characterize the ML/ARD potential of three separate tailings products: bulk flotation tailings, detoxified tailings (i.e. detoxified tailings from cyanide leaching of ore concentrates) and mixed tailings that represent a combination of bulk flotation tailings and detoxified tailings, generated from several rounds of metallurgical testing on ores from the Doris North, Connector and Central ore zones. The characterization program for metallurgical tailings included mineralogical analysis, static tests and kinetic tests, as well as tailings slurry process water chemistry and aging tests. While all three types of tailings have been assessed for geochemical characteristics, mixed tailings do not form a part of the proposed tailings management scheme and as such mixed tailings references are for completeness only.

All tailings types had abundant neutralization potential and thus buffering capacity typically in the form of ferroan dolomite with minor calcite and/or siderite. The results of static and humidity cell tests indicate that the detoxified tailings are PAG and the flotation tailings are non-PAG. Several metals in the tailings solids occur at concentrations in excess of crustal abundances. These included consistently elevated silver, arsenic, gold, cadmium, lead and selenium, and inconsistently elevated copper, molybdenum and tungsten in the detoxified tailings, as well as elevated gold, arsenic and selenium in the mixed tailings, and elevated gold in the flotation tailings. Many of these metals are associated with sulphides and as indicated will be concentrated within the detoxified CTP tailings. Long-term humidity cell tests indicate that after the initial flushing of the samples, there was an increased tendency for arsenic leaching under neutral pH conditions from the Doris North tailings (flotation, mixed and detoxified tailings) as well as the Doris Connector mixed tailings. The results of these tests were used to evaluate water quality emanating from the tailings area water quality assessments for this submission.

Further discussion on tailings geochemistry is provided in *Package 6* (document *P6-12*).

3.6 WATER MANAGEMENT AND MONITORING

Changes to water management at Doris arise from a change in mine footprint, a change in milling rate, a change in mining location, a change in effluent discharge location and a more robust understanding of expected groundwater inflows encountered during mining under Doris Lake.

A revised *Water Management Plan* can be found in *Package 5* (TMAC 2015c; document *P5-3*).

3.6.1 Site Water Management

Construction of additional surface infrastructure, including Doris Central and Connector vent raises, Roberts Bay Expanded Laydown Area, temporary ore storage and laydown area on Pad U, the Quarry 3 Landfill and the Roberts Bay Discharge Access Road may result in an increase in surface run-off. Infrastructure will all be constructed out of quarry material or non-mineralised waste rock, the geochemistry of which is well understood and suitable for construction with minimal impacts to surrounding vegetation and water courses arising from surface runoff. The vent raises and expanded lay down areas will be areas without processing activities and therefore with negligible ability to affect surrounding water quality and water quantity and are not enclosed within the contact water control system. Pad U design includes a dedicated pollution control pond.

The Quarry 3 Landfill is a non-hazardous waste facility, situated in a quarry within the watershed of the TIA. Any leachate generated is expected to be minimal, non-contaminated and will accumulate in a sump incorporated into the landfill design. In the event that contaminated leachate is produced, it will

accumulate in the sump and be sampled before being pumped or flowing naturally to the TIA prior to discharge to the environment, along with the tailings effluent.

The Roberts Bay Access Road will be constructed in the same manner as other site roads and will be constructed beyond 30 m from the high water mark along the majority of its length. In the vicinity of the watercourse crossing and the Marine Outfall Berm, construction will occur in the dry and best practices for erosion and sediment control will be implemented.

The Doris Central and Connector vent raises, Roberts Bay Expanded Laydown Areas, temporary ore storage and laydown area on Pad U, the Quarry 3 Landfill and the Roberts Bay Discharge System are discussed in greater detail in subsequent sections.

Further detail on changes to water management are discussed in subsequent sections, with various supporting documents provided elsewhere in this submission:

- *Groundwater Inflow and Quality Model* (SRK 2015a; *Package 6* document *P6-3*);
- *Roberts Bay Discharge System 1: Water Management Options* (SRK 2015b; *Package 6* document *P6-6*);
- *Roberts Bay Discharge System 2: Surface Infrastructure* (SRK 2015c; *Package 6* document *P6-7*);
- *Roberts Bay Discharge System 3: Pump and Pipeline Requirements* (SRK 2015d; *Package 6* document *P6-8*);
- *Tailings Management System* (SRK 2015e; *Package 6* document *P6-13*);
- *Site-Wide Water and Load Balance* (SRK 2015f; *Package 6* document *P6-10*); and
- *Water Management Plan* (TMAC 2015c; *Package 5* document P5-3).

3.6.2 Tailings and Mine Water Management

Currently, the Water Licence indicates that TIA water is initially to be discharged into Doris Creek, which in turn flows to Roberts Bay. TMAC is proposing to amend this tailings water management strategy. Consistent with the current licence, the mine water reports to the TIA, however, the revised strategy will have a single discharge from the mine to the marine environment in Roberts Bay. Current projections of TIA water quality indicate that no additional treatment, other than settling in the TIA Reclaim Pond is necessary to meet *MMER* limits. However, this will be monitored during actual operation and if necessary, TIA water will be treated prior to discharge to ensure compliance with *MMER* limits within the discharge pipeline to Roberts Bay. TMAC proposes to monitor water quality near the marine discharge location to confirm that Canadian Council of Ministers of the Environment (CCME) guidelines for the protection of marine aquatic life (the Guidelines) are met within Roberts Bay.

Excess TIA water will be discharged to Roberts Bay during the summer period only in order to maintain adequate water levels in the winter for reclaim to the mill process, and to remove excess water inventory as needed for level and quality reasons. The site wide water model indicates nominal flow rate of 46 L/s (4000 m^3/d) is necessary to maintain TIA water levels at the desired elevation. Discharge works will be sized accordingly. TIA water is expected to flush completely from Roberts Bay into Melville Sound during the summer open water season.

More groundwater will be encountered during mining than originally anticipated by Miramar; deep groundwater below permafrost in Doris North Deep and talik water under Doris Lake. Due to its potential

salinity, this water would be detrimental to freshwater ecosystems if discharged from the TIA into Doris Creek (as currently permitted). To avoid this risk to Doris Creek it is more environmentally appropriate to discharge the mine water into the receiving environment at Roberts Bay.

Where possible, saline groundwater will be reused in underground drilling and, where not consumed, will accumulate in appropriately sized mine sumps and discharged year-round directly to the marine environment through a pipeline. Based on groundwater modelling of the peak inflow during mine life, the design rate for mine water discharge is 35 L/s (3000 m^3/d) on a year round basis. As such, saline groundwater will not report to the TIA; during the summer months, excess TIA decant water and mine water will be discharged simultaneously through the discharge system to Roberts Bay at a combined rate of 80 L/s (7000 m^3/s). The discharge system is designed to accommodate this variability in flow.

As previously permitted, inputs to the TIA will include mill effluent, surface runoff water, precipitation and contact water accumulating in the sediment control pond, pollution control pond (PCP) 1, landfill sump and Pad U PCP 2. Reclaim water withdrawal from the TIA will accommodate all inflows in a manner that ensures available volume takes into account the effects of ice cover. Excess water will be pumped from the TIA to the Marine Outfall Mixing Box located in the mill building, and then be pumped via a pipeline along existing corridors to the Roberts Bay Discharge System. Mine water will accumulate in sumps underground before being pumped into the Marine Outfall Mixing Box plant where it will comingle with the TIA effluent during the summer months.

The mine and mill water transfer system has the following components:

1. appropriately sized sumps underground, designed to accumulate a specific volume of groundwater, from which accumulated groundwater is pumped to the discharge pipe;
2. a pipeline through which treated tailings slurry is pumped from the process plant to the TIA;
3. a pipeline through which excess water is pumped from the TIA to the Marine Outfall Mixing Box located beside the process plant; and
4. a pipeline through which excess TIA water, sometimes comingled with saline groundwater, is discharged to a subsea diffuser located in Roberts Bay.

These components were based on a site water management plan that incorporates precipitation, groundwater, water recycle, raw make up, proper effluent disposal, and energy conservation to minimize the impact to the local environment.

The tailings management strategy is supported by a water balance model that predicts TIA discharge water quality. Metallurgical testing has been completed on representative samples from each of the Doris deposits, and the solids and process waters have been subjected to detailed geochemical characterization testing, including acid base accounting, kinetic testing, characterization of process waters, and aging tests on tailings slurries. The geochemical characteristics of the new ore zones are similar to that of Doris North.

Tailings will be stored in the TIA, between the Interim Dike and the South Dam. Supernatant will drain from the tailings and pass through the Interim Dike to the Reclaim Pond. The beached tailings will be covered either with a dust suppressing layer of polymer and/or ice, or a rock cover, depending upon the season and point in mine life when deposited. This combination of drainage and cover will control fugitive dust emissions and the release of sulphate and metals from the tailings solids. The potential effects of the tailings process water on pond and discharge water quality were assessed using a water

and load balance model. The results of the model were used to establish water management requirements. All efforts will be made to recycle as much of the process water from inside the milling, grinding and gold recovery areas of the plant as possible. A portion of the process water will leave with the tailings as a slurry to be deposited in the TIA.

The water and overall mass balance will be managed inside the process facility using recycle water and thickeners to reduce the amount of water being pumped from the mill to the TIA. All efforts will be made to select the optimum balance between recycle, process effluent treatment and fresh water make up to balance metals and other contaminants within the plant. Make up water from Doris Lake will continue to be used to offset the water consumed in the process.

The proposed discharge criteria for the water from the TIA will be *MMER* limits in the discharge system and CCME Guidelines within Roberts Bay. Water quality modelling results show that the TIA discharge water quality would be in compliance with these criteria under a wide range of conditions without the need for additional water treatment.

The mill processing plant waste streams will be combined into a tailings thickener where the overflow water will be reused in the process and the underflow will be transferred to a tailings box and pumped to the TIA through a pipeline. The pipeline will be equipped with heat tracing, insulation and low point drains.

The piping will be routed the most convenient way across the plant-site and then follow the secondary road to the TIA. The pipeline route has been designed to minimize low points. Two low point drainage points have been designed to accommodate the pipeline contents in the event of an emergency. The low point drains will be used to recover the pipeline contents. All piping will be above ground and easily accessible for visual inspection and if needed, repair.

3.6.3 Roberts Bay Discharge System

The Roberts Bay Discharge System consists of an insulated pipeline, the Roberts Bay Discharge Pipeline, which will run from the Marine Outfall Mixing Box, along to the Primary Road and the airstrip to the Roberts Bay Laydown Areas. At Roberts Bay the pipeline will run in front of the 20 Ml fuel tank farm, along the south side of the Roberts Bay Jetty Access Road and laydown pads, to the Roberts Bay shoreline along the south side of the Roberts Bay Discharge Access Road. The discharge pipeline will enter the Roberts Bay marine environment through a Marine Outfall Berm, which extends from the shoreline to approximately the 4 m bathymetric contour. From the Marine Outfall Berm, the Marine Outfall Pipeline will extend to the 40 m bathymetric contour and terminate at the Roberts Bay Diffuser.

Pipe routing from the mine area to Roberts Bay was chosen to minimize interaction between the new pipe and existing infrastructure (jetty, laydown area), and to mitigate impacts from anchoring. Routing around the laydown area requires no disturbance to the existing pad or the recently repaired jetty. By entering the marine environment a distance away from the jetty, there is some disturbance to the upland and riparian areas, however, there is a decreased length of pipe placed on the ocean floor and a decreased risk of damage due to marine logistics activities. A critical component of the outfall involves the crossing of the foreshore zone adjacent to Roberts Bay to a point below the expected depth of freezing (approximately the 4 m bathymetric contour). The pipeline will thus consist of both armoured and exposed sections. Construction of the Marine Outfall Berm to the 4 m bathymetric contour protects the pipeline from ice scouring and displacement.

It is recognised that construction of the Marine Outfall Berm in the marine environment may constitute Serious Harm and that a Fisheries Authorization will be required from the DFO. TMAC's assessment of the effects of this work on fish and fish habitat can be found in *Package 4*, as can TMAC's proposed approach to offsetting.

Accidents that could potentially cause damage to the subsea pipeline or diffuser will be limited to ice and/or anchor impacts. The subsea pipeline and diffuser have been sited to avoid such impacts by armouring to a depth of 4 m and aligning such that the pipeline avoids the active anchoring area adjacent to the jetty. Concrete ballast blocks will be used to stabilize the pipeline and diffuser against wave forces projected to occur less frequently than once in 100 years.

The system will operate at relatively low pressures. Leakage from normal operating modes is therefore highly unlikely. In the event that the discharge system does sustain damage, flow through the pipe can be turned off and subsea repairs can be conducted. In the worst case, these might entail replacement of a pipe section with a premeasured spool piece fitted into the damaged section and connected to the undamaged section by clamps. Spare pipe sections can be stored on site to expedite such repairs. Nonetheless, in the event of a leakage, the discharge flowing through the pipeline will already meet *MMER* limits, allowing for CCME Guidelines to be met within Roberts Bay.

Further detail on the Roberts Bay marine Discharge System is discussed in *Package 6* (documents *P6-7* and *P6-8*).

3.6.4 Aquatic Monitoring Framework

TMAC is proposing to amend the existing Aquatic Effects Monitoring Program (AEMP) to address changes associated with TIA effluent discharge location change from Doris Creek to Roberts Bay. The new monitoring framework will consider the geographical area of the proposed diffuser and area of influence of the discharge to Roberts Bay and will be revised over the course of the year (2015) with due consideration of the *Guidelines for Designing and Implementing Aquatic Effects Monitoring Programs for Development Projects in the NWT* (INAC 2009), the Environmental Effects Monitoring requirements of the *MMER*, and current and future Surveillance Network Program (SNP) monitoring requirements.

There are currently two monitoring stations in Roberts Bay, and a marine reference site in Ida Bay. Additional new monitoring stations will be determined in consultation with stakeholders including the Inuit Environmental Advisory Committee (struck under TMAC's Inuit Land Access Agreements), the DFO and Environment Canada. Study design, including sample locations, frequency and parameters, will be based upon both Inuit Qaujimatuqangjit (IQ) and Western science.

It is anticipated that the Roberts Bay monitoring program study design will include monitoring to determine whether the water quality in Roberts Bay is remaining below CCME Guidelines, whether dissolved oxygen concentrations remain above CCME Guidelines, whether phytoplankton biomass levels are being influenced by nutrient input, whether sediment quality or benthic communities are being influenced by the TIA water, and whether the discharge of TIA water is causing any changes in marine bivalve metal concentrations. If results from the program show that adverse environmental changes are occurring, TMAC will review possible adaptive management measures to address the situation.

Further discussion on aquatic effects monitoring in Roberts Bay is provided in *Package 4*.

3.7 WASTE ROCK AND ORE STORAGE

HBML, and more recently TMAC, have undertaken a comprehensive geochemical characterization program of mine waste at the Doris Deposit and a number of other gold deposits in the Hope Bay Belt. A summary of ML/ARD potential of waste rock and ore that would be produced as part of the proposed mining activities associated with all of the Doris deposits are summarized in Section 2.2 of this document.

In addition to current stock piles and areas, designated waste rock storage areas have sufficient capacity to temporarily store waste rock on surface over the Doris Mine life. Permitting this facility, Pad T, is currently underway, so is considered outside the scope of the Amendment Application and is not discussed further. It is expected that TMAC will have access to Pad T for waste rock storage within 2015.

Ore is currently stockpiled on Pads I and G. Given the increase in mining rate, the need may arise for additional temporary ore storage. Pad U is a new proposed pad, designed to function as a general laydown area, and also to accommodate temporary ore storage. Because it is outside of the existing contact water management area, a pollution control pond is included in the design for Pad U. Should Pad U be utilized for temporary ore storage, the PCP downslope berm will be modified to include a liner keyed into the permafrost, to provide appropriate water management.

The *Waste Rock and Ore Management Plan* is presented in *Package 5* (TMAC 2015a; document *P5-4*).

3.8 DORIS VENT RAISES

Two new vent raises are proposed for construction to support mining into the Doris Connector and Doris Central zones. These vent raises will be limited in footprint, providing exhaust only, with power provided from the mine underground. The vent raises and their access roads are described below and both are illustrated in detail in *Package 6* (documents *P6-1* and *P6-2*).

3.8.1 Doris Connector Vent Raise

Under the proposed Project revisions a vent raise pad will be constructed south of the Doris Camp to supply the Doris Connector ore zone. The Doris Connector Vent Raise will be connected to the Float Plane Dock Access Road by a spur road. The spur road will be approximately 200 m long and will cross a potentially fish bearing creek with 2 0.5 m diameter corrugated steel pipe (CSP) culverts. Based on a review of maps, air photos and field assessments of similar creeks, the water course is expected to be non-sport fish bearing so crossing in this manner is not expected to result in serious harm. A Fisheries Self-Assessment will be conducted in the upcoming (2015) open water season to confirm this expectation.

The Doris Connector Vent Raise Pad will cover an approximate total area of 225 m^2 and will house vent raise infrastructure and an emergency shelter. No blasting is required to construct the vent raise; local levelling of a small pad will occur and will subsequently be covered with at least a 0.15 m-thick layer of crushed surfacing material. Limited drilling and blasting will be required to anchor the vent raise fan to the vent raise.

3.8.2 Doris Central Vent Raise

Under the proposed Project revisions a second vent raise pad will be constructed at a location east of the Doris-Windy all-weather road, south of Doris Camp and north of Windy Camp. The Doris Central Access Road will be constructed to provide access to the Doris Central Vent Raise from the Doris-Windy all-weather road.

The Doris Central Vent Raise Pad will be similar to the Doris Connector Vent Raise and will cover an approximate total area of 225 m^2. The area of the vent raise will house the vent raise infrastructure and an emergency shelter. No blasting is required; local levelling of a small pad will occur and will subsequently be covered with at least a 0.15 m-thick layer of crushed surfacing material. Limited drilling and blasting will be required to anchor the vent raise fan to the vent raise.

The Doris Central Access Road is an extension of the existing Doris-Windy AWR and provides access to the Doris Central Vent Raise. The 717 m long access road will have one turn-out location. While no stream crossings are required for the Doris Central Access Road, there is a defined surface water drainage area at the western extent of the road. At this location of the road alignment, a double culvert will be installed to allow surface water to drain under the all-weather road and into Doris Lake.

3.9 LAYDOWN AREAS

As part of the proposed Project changes, three new laydown areas will be constructed at Roberts Bay, and one new laydown area, Pad U, will be constructed proximal to the mine.

3.9.1 Roberts Bay Laydown Areas

The three laydown areas (designated as Roberts Bay Expanded Laydown Areas West, Southwest, and Southeast) will provide up to an additional 4 ha of general laydown area. The West Laydown Area will be located adjacent to the south perimeter of the existing Beach Laydown Area and will greatly enhance the efficiency of vessel offloading. The Southwest and Southeast Laydown areas will be located adjacent to the Primary Road, south and east of the existing Roberts Bay Tank Farm.

Descriptions of the design criteria for the Roberts Bay Laydown Expansion, in addition to the associated detail design drawings, are provided in *Package 6* (document *P6-9*).

3.9.2 Pad U

Pad U is a new proposed pad, designed to function as a general laydown area, and also to accommodate temporary ore storage. Pad U is close to the mine, just south of the Secondary road to the TIA and east of the Doris Lake road. Pad U will have an area of 31,000 m^2 and will be equipped with a dedicated PCP to capture runoff water from the site.

The design criteria for Pad U, in addition to the associated detail design drawings, are provided in *Package 6* (document *P6-11*).

3.10 QUARRIES

TMAC plans to use rock from the existing Quarries A, B, D and 3 (currently permitted by KIA Land Use Licences and Type B Water Licence 2BE-HOP1222) for construction and maintenance of Doris Mine facilities. Quarry 3, on the eastern side of the TIA watershed, will be developed for the construction of the Secondary Road as well as all the surface infrastructure components of the TIA (i.e. the Secondary Road, the Interim Dike, and the South Dam).

3.11 CAMP SIZE

Due to the increase in mining and milling rate the camp capacity will need to increase from the currently permitted 180 persons to 280 persons. No additional domestic water beyond the current permitted volume is required for this number of camp residents and water will continue to be supplied to the camp from Windy Lake.

TMAC is planning on installing a new waste water treatment plant on site in 2015. This plant will be of the same design as those currently on site, however it will have a greater capacity, which is more operationally stable. The existing plants will be taken out of service, retrofitted and made available for operations as back-up units.

3.12 LANDFILL

A non-hazardous waste landfill will be situated in Quarry 3, to receive non-hazardous waste generated during Doris operations and at mine closure. Quarry 3 has been selected as the optimal location for the landfill for two reasons: once Quarry 3 is exploited for construction of the South Dam Road, the South dam and the Interim Dike, it will provide suitable grade, capacity and natural controls for sustainable landfill operations; upon closure, all Doris Mine waste facilities reclaimed in place will be situated in the same watershed.

The landfill will be constructed in the northeast corner of the developed Quarry 3 on competent bedrock within a region of continuous permafrost. The landfill will be hydrogeologically isolated due to the presence of permafrost, and the bedrock is of good quality such that cracks and fractures created by blasting are expected to be surficial and should not propagate any leachate.

The landfill will be contained by rock walls on two sides and containment berms on the other two sides. There is a ramp into the landfill to facilitate access for waste deposition, compaction and cover placement. As the landfill will receive only inert waste, the risk of generating contaminated leachate will be low. Accordingly, it is not necessary to completely eliminate moisture migration into and out of the landfill so the landfill design does not consider an engineered liner. Should there be any runoff, from the landfill, it will be contained within the TIA.

The detailed design for the landfill can be found in *Package 6* (document *P6-4*).

3.13 EXPLOSIVES

A number of programs for explosives storage have been examined and permitted over the life of the project to date. The current plan involves bagged pre-mixed ammonium nitrate-fuel oil (ANFO) to be delivered to site in specially modified sea containers and, in accordance with Mines Inspector approval, to be stored temporarily within secondary containment on specially prepared rock fill pad in the TIA near the east end of the North Dam. When an ANFO storage container is opened for use, it will be completely emptied and the explosive material transported to the approved magazines in Quarry A from which it will be dispensed.

TMAC will continue to seek out safe and economical ways to improve explosives handling. Currently under consideration is an alternative plan wherein ammonium nitrate prill would be received in dry form on site, and mixed in a facility located underground close to the mining associated blasting works. Small lots would be produced for short term use and stored in underground magazines.

Currently, no ANFO mixing is planned to occur on surface.

3.14 BARGES

Marine transport activities will remain limited to seasonal resupply and waste backhaul.

3.14.1 Winter Fuel Barges

During 2010-2011, HBML temporarily stored fuel in an Arctic class double hull ship frozen into the ice in Roberts Bay, as there was not enough available tankage on site at the time. This activity was carried out in compliance with Transport Canada regulatory requirements and industry best practices. TMAC plans to maintain the option of bringing in additional fuel in vessels and/or barges in the future to allow flexibility. If this option is utilized, TMAC will continue to ensure that any vessel or barge that is retained is fit for this purpose and that this activity occurs in full compliance with all applicable regulatory requirements.

4. Socio-Economics

4.1 EMPLOYMENT AND ECONOMY

For employment and economy, the proposed amendment to extend the mine life does change the predicted environmental impacts of the undertaking in that the total benefits are predicted to increase. There remains the potential for there to be an adverse effect on other community employers, such as local government, if the labour demands of the Project result in a shortage of skilled workers and an inability to fill certain positions; however, the effect is predicted to remain minor and be increasingly alleviated over the longer term.

4.2 CONTRACTING AND BUSINESS OPPORTUNITIES

The extension of the mine life and mining rate are predicted to increase the socio-economic benefits of the project because of the increase in employment, income, and business activity. Under new agreements signed by TMAC and the KIA rules and procedures for addressing contracting and business opportunities are in place.

4.3 PUBLIC CONSULTATION

Previously, HBML and TMAC undertook a range of consultation and communication activities with local communities, regulators, and resource managers over the past several years, including proposed changes to the Mine described in this document. These activities are described below in chronological order.

4.3.1 2010

In August 2010 when HBML conducted a community tour, proposed amendments planned at that time were presented and discussed with meeting attendees. These included the camp expansion and mine life extension. Environmental baseline studies conducted in the Doris North area were also presented and discussed. Communities visited during the August 2010 meetings included Cambridge Bay, Gjoa Haven, Kugaaruk, Kugluktuk, and Taloyoak, with the overall attendance totalling approximately 121 attendees and the largest attendance being in Gjoa Haven. Community Elders were in attendance at Gjoa Haven, Taloyoak, and Kugaaruk. No specific questions were asked regarding the proposed changes to the Doris Mine. For the three communities where Elders were present, the following topics were discussed:

Gjoa Haven

- Discussion topics included opportunities for work, employment requirements, scheduling, and activities in the Windy Lake area.

Taloyoak

- Discussion topics included climate change, possible site visits for local residents, mine abandonment, training and opportunities for youth, helicopter use and wildlife, and potential effects on human health.

Kugaaruk

- Questions were primarily on training and employment opportunities and applications.

Additionally, a community newsletter was published and distributed in October 2010. The newsletter presented information pertaining to the 2010 sealift, summer field work, and employment information. It was hoped that this publication would reach a larger audience, including those who may not be able to attend the community meetings or site visits.

4.3.2 2011

In order to specifically address the proposed Mine changes, a round of community meetings were held in June 2011. The results of the June 2011 consultation are summarized below.

HBML visited five communities in early June 2011: Cambridge Bay, Gjoa Haven, Kugaaruk, Kugluktuk, and Taloyoak. Specific information pertaining to this Amendment Application was presented.

Comments and feedback pertaining to the information presented were documented and, where practicable, responses were provided by HBML staff in attendance. The overall attendance totalled 52 individuals, with the largest attendance being in Taloyoak. Meeting attendance was lower than anticipated in Kuglukuk as many residents were away fishing. Elders were present at the meetings in Kugaaruk and Taloyoak.

Comments, questions, and responses pertaining specifically to the proposed Mine changes were discussed in Cambridge Bay, Kugaaruk, and Taloyoak and have been summarized here.

Cambridge Bay

- A question was asked regarding the limited bed capacity at camp, being approximately 180 beds plus those on the floating barge, and if camp expansion was tied to the amendment. This was confirmed by HBML staff.

Kugaaruk

- Concerns were raised by an Elder about the salt and water being diverted from the TIA into Roberts Bay and whether the water will impact fish or fish habitat. An explanation was given that water will pass through a treatment system in the process plant which will remove metals such as zinc and copper and the discharge water from the TIA will pass through a second treatment plant that will filter out total suspended solids from the water before being diffused into Roberts Bay.

Taloyoak

- A meeting attendee wanted to know if the tailings and water in the TIA were dangerous. An explanation was made by HBML staff explaining that tailings are not dangerous but that they do contain metals and sediment. It is also likely that the water will have some salt content which is expected to be close to that of seawater.
- A meeting attendee wanted to know if a fence will be erected around the TIA to keep wildlife out. No fence is currently planned; however, the facility will include a road running down one side along the east side so that the pond can be patrolled.
- An Elder wanted to know if the Nunavut Water Board did routine inspections. It was explained that the Nunavut Water Board does not have inspectors but inspections are conducted by AANDC, Environment Canada, DFO, and by the KIA.
- An Elder asked if fish in the area were regularly inspected and tested. Fish sampling is conducted each year as well as sampling and testing of small aquatic organisms on a periodic basis.

Other general comments and questions discussed at the meetings pertained to employment opportunities, training, mine production timelines, Inuit benefits, environmental testing, and potential effects on human health and social issues. This feedback will be incorporated into future discussions and considered during on-going Project planning.

Also in July 2011, 24 KIA staff were provided a Site tour, including Community Liaison Officers. The tour was intended to familiarize KIA staff with the Hope Bay Project such that accurate information regarding the project could be provided to Beneficiaries through KIA representatives. In August 2011, two Cambridge Bay Elders participated in archeological field studies.

4.3.3 2012

In February 2012, a decision was made by HBML to place the Hope Bay project in Care and Maintenance, including the cessation of all development construction. Public consultation and communication for the rest of the year focussed on an explanation of project status, employee transitioning and lay-offs, steps being taken to demobilize the project site, Care and Maintenance management planning, and the impact of project status on existing licences and permits.

In May 2012, a regional community consultation tour was conducted throughout the Kitikmeot region. Public feedback during this tour centered on concerns for laid off workers and loss of contracting for local business, the duration and extent of Care and Maintenance, and environmental monitoring during the shutdown period. In September 2012, a presentation was made to Kitikmeot Mayors and municipal staff in Cambridge Bay. Again, presentation materials and feedback centered on Project status and the economic impacts of shutting the Hope Bay project down.

4.3.4 2013

In March 2013, TMAC acquired the Hope Bay project from Newmont Mining Corporation. In the following month, a regional community consultation tour was conducted throughout the Kitikmeot region, including face to face meetings with Hamlet Councils when possible. Consultation and communications focussed on project history, background information on project acquisition, introductions to the TMAC executive team, and announcing 2013 project plans, including the re-initiation of a water licence amendment application primarily to allow for the alternative discharge of TIA water to the ocean. Specific comments related to mine plan changes were:

- A Taloyoak Elder requested more information or clarification of the drainage plan for the TIA. A graphic of the proposed pipeline from the TIA to the ocean was shown, and the general discharge strategy explained.
- Another Taloyoak Elder requested information or clarification on what environmental and wildlife monitoring programs were in place. The number of monitoring programs required under the existing Water Licence and Project Certificate were referenced.

In April 2013, during the Nunavut Mining Symposium, representatives of TMAC met with AANDC, the NWB, and the NIRB staff in part to brief each organization about contemplated Doris Mine modifications that could be the subject of a future permitting submission.

4.3.5 2014

Community relations in 2014 focused providing information to the public on Doris North Care and Maintenance activities, Advanced Exploration activities, supporting the TMAC/KIA/NTI Inuit Land Tenure negotiations, and explaining Hope Bay permitting efforts, including that addressed herein.

TMAC relocated its Cambridge Bay office and is now on the 2nd floor of the Kitikmeot Center at #18 Mitik Street. This new location provides greater public exposure and easier access for walk-in traffic. TMAC maintains an open door policy and Cambridge Bay residents and Beneficiaries regularly visit the TMAC office for their own interest.

In 2014, TMAC continued the use of a project/company Facebook page to provide information on Hope Bay primarily to northern stakeholders. Content of this page includes permitting information, meeting notices, and pictures of site activities linked to Kitikmeot community news pages

In April, TMAC attended the 2014 Nunavut Mining Symposium in Iqaluit. A number of meetings with regulators were held during this event, and a project update provided to delegates.

At the end of April, TMAC attended a NIRB Kitikmeot Community consultation tour aimed at soliciting feedback on Project Certificate amendment application submitted to the NIRB in 2013.

In December, TMAC conducted a Kitikmeot Community Tour. The primary purpose of this tour was to conduct public meetings in all Kitikmeot communities to provide information on the Hope Bay project, 2014 activities, 2015 plans, and in particular, information on the amendment to the Project Certificate and Type A Water Licence, addressed herein. All Kitikmeot communities were visited during this tour. In person meetings were held with the KIA, the NIRB, the NWB, Hamlet personnel and public meetings in each community. In total, 141 attended the public meetings, with the highest attendance in Taloyoak. Specific comments/questions pertaining to the current mine plan changes included:

- What is the current statistics on northern hires and when does the project plan to start hiring again;
- There are no northern hires from some communities, why is that;
- When is the project going out of Care & Maintenance;
- How does the planned design for ocean discharge work and what, if any, impact will it have on ocean habitat;
- What are the plans for the Old Windy Camp;
- What is the projected life span for the project once it goes into production;
- Do you have a monitoring wildlife program for the project;
- Are there any training plans in place for the project; and
- Are they any plans to use Bathurst Inlet Port and Road (BIPR) if it goes ahead?

4.4 INUIT QAUJIMATUQANGJIT

Inuit Qaujimatuqangjit has been considered throughout development of the Doris Mine, particularly as a component of the original effects assessment completed by Miramar. The mine plan changes presented in this submission are primarily located within the permitted footprint, so additional IQ was not collected to inform the assessment of effects associated with the changes.

As part of the Inuit Impacts and Benefit Agreement (IIBA) signed with KIA in March 2015, an Inuit Environmental Advisory Committee will be established. This group will be very helpful to TMAC in understanding and responding to community comments regarding Hope Bay developments.

Regarding the change to marine discharge of treated mine effluent, TMAC plans to engage with the Inuit Environmental Advisory Board in setting up the monitoring framework, and identifying suitable offsetting options. Collection of IQ is expected to inform monitoring locations, parameters, timing and frequency.

5. Closure and Reclamation

Execution of the Project changes presented herein will result in changes to site infrastructure which, in turn, will have an influence on the estimated cost of reclamation and closure. Closure and reclamation principles have not changed from previous submissions. Current interim closure and reclamation planning as well as the closure costing estimate can be found in *Packages 5 and 6 (*documents *P5-2 and P6-5*, respectively). The current estimated closure cost for the Project is $25.3M.

References

HBML. 2011. *Phase 2 Hope Bay Belt Project Proposal: Madrid, Patch, Boston Mining Districts.* Hope Bay Mining Ltd. December 2011.

Indian and Northern Affairs Canada (INAC). 2009. Guidelines for Designing and Implementing Aquatic Effects Management Programs for Development Projects in the NWT. Overview Report.

Miramar. 2005. Final Environmental Impact Statement. *Doris North Project, Nunavut, Canada.* Miramar Hope Bay Ltd. October 28, 2005.

Price, W.A. 1997*. Guidelines and recommended methods for the prediction of metal leaching and acid rock drainage at minesites in British Columbia,* DRAFT. British Columbia Ministry of Employment and Investment, Victoria, BC. April 1997.

Rescan. 2001. 2000 *Supplemental environmental baseline data report, Hope Bay Belt Project, Nunavut, Canada.* Report prepared for Hope Bay Joint Venture by Rescan Environmental Services Ltd., Vancouver, BC. March 2001.

Roscoe Postle Associates Inc. (RPA). 2015. *Technical Report on The Hope Bay Project, Nunavut, Canada*. Report for NI 43-101. Toronto, ON.

SRK Consulting (Canada) Inc. (SRK). 2015a. *Hydrogeological Modeling of the Proposed Doris Mine, Hope Bay Project, Nunavut*. Prepared for TMAC Resources Inc. May 2015.

SRK Consulting (Canada) Inc. (SRK). 2015b. *Doris North Project: Roberts Bay Discharge System Water Management Options*. Prepared for TMAC Resources Inc. May 2015.

SRK Consulting (Canada) Inc. (SRK). 2015c. *Doris North Project: Roberts Bay Discharge System Surface Infrastructure Design Brief*. Prepared for TMAC Resources Inc. May 2015.

SRK Consulting (Canada) Inc. (SRK). 2015d. *Doris North Project: Roberts Bay Discharge System Pumps and Pipeline Requirements Brief*. Prepared for TMAC Resources Inc. June 2015.

SRK Consulting (Canada) Inc. (SRK). 2015e. *Doris North Project - Tailings Management System Design*. Prepared for TMAC Resources Inc. May 2015.

SRK Consulting (Canada) Inc. (SRK). 2015f. *Doris North Project – Water and Load Balance*. Prepared for TMAC Resources Inc. June 2015.

TMAC Resources Inc. (TMAC). 2015a. *Hope Bay Project, Waste Rock and Ore Management Plan, Hope Bay.* June 2015.

TMAC Resources Inc. (TMAC). 2015b. *Air Quality Management Plan, Hope Bay*. June 2015.

TMAC Resources Inc. (TMAC). 2015c. *Interim Water Management Plan, Hope Bay*. June 2015.