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Dr. Joe Dragon, Deputy Minister
Environment and Natural Resources
Government of the Northwest Territories
PO Box 1320
Yellowknife, NT X1A 2L9
Canada

30 June 2018

Dear Dr. Dragon:

Subject: DDMI 2017 Environmental Agreement Annual Report

Please find attached a copy of Diavik Diamond Mines (2012) Inc. (DDMI) Environmental Agreement Annual Report for 2017. In accordance with the requirements of the Environmental Agreement, a draft copy of this report was provided for review to the Environmental Monitoring Advisory Board (EMAB) and the Government of the Northwest Territories Environment and Natural Resources department (GNWT-ENR) prior to finalizing and distributing this document.

Despite our best efforts, DDMI was unable to obtain an Innuinaqtun translation of the Executive Summary prior to the report due date. Once this translation is received, DDMI will distribute it to all parties.

Please do not hesitate to contact the undersigned if you have any questions.

Yours sincerely,

Sean Sinclair
Superintendent, Environment

cc: Distribution List

Attach: 2017 Environmental Agreement Annual Report

RioTinto

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2017 Environmental Agreement Annual Report

Diavik Diamond Mines (2012) Inc.

Document #: ENVI-845 -0618 R0

Published: 30 June 2018

Executive Summary

The Diavik diamond mine is located on the East Island of Lac de Gras, in Canada's Northwest Territories, approximately 300 kilometers northeast of the capital city, Yellowknife. Diavik signed an Environmental Agreement ("the Agreement" or EA) with 5 Aboriginal organizations and the federal and territorial governments in 2000. The Agreement says what Diavik is to do to protect the environment while operating the mine. There was also an Environmental Monitoring Advisory Board (EMAB) formed as part of the Agreement; the Board is a public watchdog of the regulatory process and the implementation of the EA. The Diavik diamond mine was in its fifteenth (15^{th}) year of operations during 2017, and all mining was done underground. Construction of a dike for a new open pit mine, A21, was also close to being finished at the end of 2017.

This report talks about the results of Diavik's environmental monitoring and management programs during 2017. Copies of the reports listed can be found in the EMAB registry (in their office, or on-line library) or Wek'èezhìi Land and Water Board public registry.

Summary of 2017 Environmental Activities

Re-vegetation

In 2004, Diavik started doing research on ways to help plants grow back after the mine closes. This research continued and was finished in 2017. The goals were to determine: how best to grow plants from seed, how effective different planting methods are on plant growth and which conditions improve plant growth over time. The research looked at if it is good to use different planting techniques in patches around the mine site at closure, as this is something that has worked well for other large sites. This work also included more monitoring of the research plots from 2004, to see how well they were doing over time. A final report is expected in mid-2018.

Wildlife

Caribou monitoring continued to focus on behavioural observations (watching caribou to study their reaction to mining or other activities) when caribou were present in the study area. Movement patterns predicted in the Environmental Assessment have generally shown to be correct for the northern caribou migration, with animals travelling to the west of Diavik and Lac de Gras in spring. When compared to the prediction that caribou would move east of the lake in fall, 45% of collared caribou have moved east over the years. There were no caribou deaths related to the mine in 2017 and no herding events were done.

Wolverine, grizzly bears and falcons continue to be present in the mine area. Incidental observations are recorded to track the number of times a species is seen on site, including if they are using any of the mine buildings for denning or nesting. There were no wolverine or peregrine falcons found dead on site during 2017. Regional monitoring programs are also conducted in partnership with the

Government of the Northwest Territories and other mines. The grizzly bear hair snagging DNA study is one of these and it was conducted again during 2017.

Vegetation, Dust and Air Quality

Snow samples are taken every spring and they are melted to test for the amount of dust on the snow and the type and amount of chemicals in that dust. Dust particles are also captured in collectors and checked to see if there are patterns in the amount and location of dust from the mine. During 2017, the amount and quality of the dust was generally within expected levels and decreased from 2016. Permanent Vegetation Plots and a lichen monitoring study are checked every 3 years. They were last done in 2016 and showed reduced levels of dust on vegetation.

A total of 70.6 million litres of diesel were used to operate the mine site and construct the A21 dike.

Water and Fish

Diavik continued to do the Aquatic Effects Monitoring Program (AEMP) and on site Surveillance Network Program (SNP) monitoring in 2017. The AEMP studies different parts of the lake in different years in order to identify possible effects to Lac de Gras from mining activities. The types of samples taken close to the mine in 2017 included water chemistry (quality) and nutrients and plankton (tiny plants and animals in the water - amount and type). The next AEMP Traditional Knowledge Study of fish and water health is planned for 2018. There was also a 3-year summary and review of the AEMP completed for the years 2014-2016, including suggested changes to the AEMP Design and the Reference (baseline/normal) values used to study changes to the water and sediment in the lake.

Changes to the lake are mostly caused by an increase in nutrients from the groundwater and blasting. Diavik tries to reduce the amount of nutrients that reach Lac de Gras by using blasting controls, careful selection of blasting materials as well as water management and treatment.

The A21 dike was constructed starting in 2015 and was closed in 2017. The area inside the dike was fished out (309 fish) and then the water from inside the dike was removed (pumped out).

Community Engagement/Traditional Knowledge

Diavik values opportunities to share updates on environmental monitoring and closure planning progress with community members. Diavik works with each PA organization to try and determine a suitable way and time to carry out such events. A summary of Diavik's engagement about the environment with the PA community organizations during 2017 is provided.

Diavik also tries to bring community members to the mine site so that they can see the mine and observe the surrounding environment with their own eyes. While it is impossible to bring everyone to site, the hope is that those who have been involved share their experience with others back home in the community.

Diavik has a Traditional Knowledge (TK) Panel with a primary focus of considering and incorporating Traditional Knowledge into mine closure planning. The TK Panel's focus in 2017 was the South Country Rock Pile and monitoring at the mine site after closure.

New Technologies & Energy Efficiency

There are four wind turbines that operate at the Diavik mine, and staff continued to make the most of the efficiency of these turbines throughout the year. The wind turbines provided 9.2% of the mine's power needs and offset 3.9 million litres of diesel fuel use in 2017. The turbines have flashing lights to help deter wildlife and reduce bird strikes from the rotating blades.

Diavik began a test to possibly change how the Process Plant operates. The Plant removes diamonds from kimberlite rock, and the rock ends up as either a wet slime (like Jello) or in small pieces similar to sand. The Plant makes more slimes than sand, but slimes will be harder to deal with at closure. Diavik is testing new technology that could continue to be used in the Plant to make more sand and less slime. The results have been positive and Diavik plans to continue using this method.

Compliance and EMAB

During 2017, Diavik found a mistake in the way they were handling waste rock from the mine. They also found melt water that ponded against the PKC dam, which wasn't allowed by the Water License. Diavik is working with the Inspector to fix the waste rock problem and the WLWB has now allowed for melt water to pond against the PKC dam for up to 14 days.

There were no direct communications or letters expressing concerns from the public about the mine or its operations during 2017. The 2016 Environmental Agreement Annual Report (EAAR) was deemed to be satisfactory by the Deputy Minister of the GNWT, Environment and Natural Resources on 21 September 2017. The letter identified a few outstanding comments for Diavik to address in an Addendum to the 2016 EAAR that was sent to the GNWT and other parties to the EA on 13 November 2017. These have been provided as Appendix I.

The Environmental Monitoring Advisory Board (EMAB) and Diavik exchanged letters relating to topics such as the budget, Traditional Knowledge and the TK Panel, as well as reviews of various environmental monitoring programs.

Thank you/Marsi Cho/Masi Cho/Quana to the Kitikmeot Inuit Association, Tłı̨chǫ Government, Yellowknives Dene First Nation, Łutsel K'e Dene First Nation and the North Slave Métis Alliance for the efforts of their staff, businesses and individual members who worked with Diavik staff in 2017. The continued support of Diavik's PA partners helps to make sure that environmental impacts are minimized and our resources are used wisely.

K’àodèe Godı Nek’ǫ̀ą

Dıavık sǫǫ̀mbakweę̀ degoo gha sǫombak’è gòɔǫǫ sı̨ı Ek’atı̨ k’e East Island gǫ̀yeh k’e gòɔǫ. Canada wek’ę̀ezhı̨ı Edzanę̀k’e Sǫǫ̀mbak’ę̀ kǫ̀godeę̀ gǫ̀ɔǫǫ gots’ǫ taı kw’eę̀nǫ echı̨, chı̨k’ę̀ eyıts’ǫ k’ą̀batsǫ̀ ts’ǫnę̀e gòɔǫ hǫt’e. 2000 ekò Dıavık, dǫne sı̨lą̀ı hageèɔaa, Ję̨daą̀ Dę̀ek’ą̀owodeę̀ eyıts’ǫ Edzanèk’e Dèek’àowo goxę̀ Gomǫǫ̀ Gòɔǫǫ gha Nąowo (EA) gèhtsı̨ ı̨lè. Eyı̨ı nąowo hǫ̀lı̨ı̨ k’e dıızı̨ dek’enę̀gı̨ı̨tł’èe sı̨ı Dıavık sǫǫ̀mbak’ę̀ gǫ̀ɔǫǫ k’e eghàlageda-t’ıì dè wemǫǫ̀ goòɔàa ts’ǫ̀ dè eyıts’ǫ tı whelaa sìı tsı̨gowıı ts’ą̀ gıxoehdı ha hanì dek’eèhtł’è. Eyıts’ǫ Dè Gomǫǫ̀ Wexoehdıı K’e Dèhkw’ee (EMAB) gǫ̀hłı, nàowo xè gıhòlı̨ hǫt’e, eyìı dǫ dèhkw’ee sìı dǫ hazǫǫ̀ gha kehogıihdıı dǫǫ̀ agı̨ı̨t’e, dànì nàowo k’ę̀ę̀ weghàlada ha eyıts’ǫ dè gomǫǫ̀ wexoedıı xè eghàlageda ha. Dıavık sǫǫ̀mbakweè degoo gha sǫǫ̀mbak’è gòɔǫǫ sìı 2017 ekò hoònǫ-daà-sı̨lą̀ı xo gots’ǫ wek’e eghàlahodaà hǫt’e, eyıts’ǫ sǫǫ̀mbakweè xàgelee sìı dègotł’a zǫ agot’ı̨. Dè weyìı gǫǫ̀ɔàa t’à sǫǫ̀mbak’è wegòò, A21, gha eɔèè gogehtsı̨ı̨ sìı 2017 welǫ nèhoı̨woò ekò k’àhdzǫ gıghǫ nǫt’e ı̨lè.

Dıavık dànì eghàlagı̨ı̨dàa sìı dıı wegodiì nek’ǫ̀ą k’e dek’eèhtł’è. 2017 k’e dè gomǫǫ̀ xogıihdı eyıts’ǫ asìı dǫ hoghàetǫǫ sìı wek’e dek’eèhtł’è. Eyìı nı̨htł’è gogha nahohłèe ha dìì-le sìı Dè Gomǫǫ̀ Wexoehdıı K’e Dèhkw’ee (EMAB) nı̨htł’è gehłaakǫ̀ whela, (hanì-le-dè on-lıne k’e dek’eèhtł’è) hanì-le-dè Wek’èezhìı Land and Water Board, nı̨htł’è dǫ hazǫǫ̀ gha whela k’è.

2017 Dè Gomǫǫ̀ k’e Eghàladaa Wegodiì Nek’ǫ̀a

Dè Nagoehsee

2004 ekò Dıavık wedaètı̨ gha dànì dè nagoehseè agele gha gıxàeta kèhogı̨ı̨hde. Eyìı gıxàetaa sìı ı̨łaà aget’ı̨ ı̨lè hanìkò 2017 k’e weghǫ nahǫ̀t’e. Dànì nı̨dè ı̨t’ǫ̀ą wejı̨ı̨ gots’ǫ denahk’e nezı̨ı̨ xàehse ade ha, dànì nı̨dè dè goyìı gewa t’à denahk’e nezı̨ı̨ dehse ha eyıts’ǫ whaą̀ hoowo tł’axǫǫ̀ dàgǫ̀ht’e t’ą̀ deɔǫ̀ nezı̨ı̨ dehse ha gıxàetaą̀ aget’ı̨, eładı̨ı̨ hàɔaa k’ę̀ę̀ ı̨t’ǫ̀ą ts’eehshee eyıts’ǫ sìghàı̨wa dè ı̨t’ǫ̀ą wexè dàgǫ̀ht’e t’à ı̨t’ǫ̀ą nezı̨ı̨ dehshe ha, gha aget’ı̨. Sǫǫ̀mbak’è wedaàtǫ nı̨dè dè wemǫǫ̀ gòɔǫǫ k’e eładı̨ı̨ hàɔaa k’ę̀ę̀ ı̨t’ǫ̀ą dehshee agele ha, ek’èat’aa lanì ı̨t’ǫ̀a dehshe, sǫombak’è gǫtsàa eyìı-le dè k’e hanì agı̨ı̨là t’à nezı̨ı̨ agodzà ı̨lèe t’à. Eyìı weghàladaa wexè 2004 k’e dè k’e hagı̨ı̨làa sìı wexè wexoedı ha hǫt’e, whaą̀ hoǫ̀wo tł’axǫǫ̀ nı̨dè dànì dezeh lì gha aget’ı̨. 2018 tanı nèhoı̨wo dè nǫde wegodiì geetł’è ha.

Tıts’aàdìı Edegeedaa

ı̨łaą̀ ekwǫ̀ wexoedı hǫt’e, sǫǫ̀mbak’è gǫ̀ɔǫǫ, eyıts’ǫ dǫ eghàlagìıdèe gà aget’ı̨ nı̨dè ekwǫ̀ dànì k’ehogeɔa, dànì k’egeɔà; ekwǫ̀ wexoedıı k’è aget’ı̨ nı̨dè̩ gıxoedı ha dìì-le. Gomǫǫ̀ Goòɔàa Wexàetaa (EA) k’e edı̨ı̨ ts’ǫ̀ nadąą̀ k’egeɔàa ha gedıı sìı ɔehkw’ıahodı lanì wègaat’ı̨. Edaèhk’ǫ nı̨dè Dıavık gots’ǫ dą̀ą̀ ts’ǫ nadeeɔà eyıts’ǫ xat’ǫ̀ nı̨dè̩ Ek’atı̨ gots’ǫ k’àbatsǫ̀ǫ ts’ǫ̀ nadeeɔà. 2017 k’e sǫǫ̀mbak’è ts’ıhɔǫ̀ ekwǫ̀ ełaı̨wo gǫ̀hłı̨-le eyıts’ǫ ekwǫ̀ nı̨htł’èk’et’aa t’à nagıdeèzìı whìle.

Nǫ̀gha, sahcho eyıts’ǫ tatsea ı̨łaà sǫǫ̀mbak’è gòɔǫǫ gà aget’ı̨. ʔı̨hk’èa tıts’aàdìı dàhòt’ı̨ı̨ ekǫ aget’ı̨ taàt’eè dek’enèts’eetł’è, ekǫ kǫ̀ gòlaa gonı edeɔǫ gogehtsı̨ nı̨dè eyìı sı wexè. 2017 ekò sǫǫ̀mbak’è gòɔǫǫ k’e nǫ̀gha eyıts’ǫ tatsea ełaı̨wo ełaı̨wo-le. Sǫǫ̀mbak’ę̀ weghǫhk’eę̀ gǫ̀ɔǫǫ sı

wek’aąhotǫ. Edzanèk’e Dèek’àowo eyıts’ǫ sǫǫ̀mbak’è eyıì-le gòla gıxè kǫ̀ta sɻlài gınèk’e tıts’aàdìı gıxoedı, hazǫǫ̀ ełexè eghàlageda hǫt’e. Sahcho weghàà et’àıkaa t’à gìhchıı sìı DNA gha wexàetaa sìı eyìı ɻłè hǫt’e, 2017 k’e k’atsɻ hagįį̀là.

Ɉt’ǫ̀ Nagoehsee, ʔehtł’èe Daedıı eyıts’ǫ Nɻhts’ı ta Dàgǫ̀ht’e

Edaàhk’ǫ taàt’eè zah ɔìchı, ɔehtł’ę̀ dàtłǫ weta at’ɻ gha eèk’ǫ̀ ats’ehɔɻ, eyıts’ǫ nàèdı dàhòt’ɻɻ eyıts’ǫ nàèdı dàtłǫ zah ta whelaa gha wek’aàhota. ʔehtł’è daıdıı gots’ǫ tǫ yìı ɔehtł’è nàgehtsį̀ gehła, weghàà dànì ɔehtł’è k’etł’òo k’ahota, ɔehtł’è dàtłǫ agot’ɻ eyıts’ǫ edɻį̀ ts’ǫ̀ ɔehtł’è at’ɻɻ sǫǫ̀mbak’è gòɔǫǫ gots’ǫ. 2017 k’e ɔehtł’è dàtłǫ eyıts’ǫ weta dàgǫ̀ht’ee sìı dàgode ha ts’ɻɻwǫǫ sìı k’ę̀ę̀ agòdzà eyıts’ǫ 2016 gots’ǫ dek’aɔ̀ agodzà. Łǫ̀ǫ̀ dè nagoehsee k’è gòlaa eyıts’ǫ adzį̀į̀ wexàetaa gha wexoedıı sìı taı xo taàt’eè gık’ahota. 2016 k’e nǫdè gık’aàhoètǫ ekò dè nagoehsee k’e ɔehtł’è dek’aɔ̀ adzàa wègoèht’į̀.

Hazǫǫ̀ t’à tłets’ıtłeè (diesel oıl) łǫ̀hdɻ-akw’eę̀nǫ daats’ǫ̀ nàke lìgalǫ̀ haątłǫ t’à sǫǫ̀mbak’è gòɔǫǫ etłeè agįį̀hwhǫ eyıts’ǫ wet’à eɔ̀ę̀ę̀ A21dıke hǫ̀lɻ.

Tı eyıts’ǫ Łı

Dıavık ɻłaà tı xè ładɻį̀ agot’ɻɻ xogıihdıı (AEMP) eyıts’ǫ sǫǫ̀mbak’ę̀ gòɔǫǫ gà tı xogıihdıı gòlaa k’è (SNP) sı 2017 gots’ǫ. AEMP eładɻį̀ xo k’e Ek’atì tı whehtǫǫ eładɻį̀ ts’ǫneè tı k’ageehta, sǫǫ̀mbak’è gòɔǫǫ gots’ǫ Ek’atì xè ładɻį̀ agot’ɻɻ gha gıxàeta. 2017 k’e sǫǫ̀mbak’è gòɔǫǫ gà asìı k’ageehtaa sìı tı weta dàgǫ̀ht’e eyıts’ǫ tı ta ɻt’ǫ̀ą wedìı gǫ̀hłɻɻ; dlakw’òa eyıts’ǫ asìı kw’òa godìı dàtłǫ eyıts’ǫ dàhòt’ɻ tı ta whela xàgeeta. Ɉdaà 2018 k’e, k’atsɻ AEMP Whaèhdǫǫ̀ Nàowoǫ̀ xè łıwe eyıts’ǫ tı xè dàgǫ̀ht’ee xàgeeta ha. Eyìı wexè taı xo gha AEMP godı nek’ǫ̀ą gɻɻtł’èe eyıts’ǫ 2014 -2016 ghoò k’e asìı k’ageèhtǫǫ sìı gıghǫnǫt’e. Eyìı godı nek’ǫ̀ą eyıts’ǫ asìı k’ageèhtǫǫ, eyıts’ǫ AEMP *Desıgn* ładɻį̀ awedle gedı eyıts’ǫ *Reference* (xo taàt’eè ełèht’eè agot’ɻ/dàgode ha hǫǫwǫǫ) asìı weta gewa ha weghàà tı xè ładɻį̀ agot’ɻɻ eyıts’ǫ tı whehtǫǫ wetł’a ɔehtł’è nììtł’ìı sìı gıxàeta gha.

Tı whehtǫǫ xè ładɻį̀ agot’ɻɻ sìı dèe goka tı whetł’ıı weta ɻt’ǫ̀ądìı gǫ̀hłɻɻ ts’ıhɔǫ̀ agot’ɻ eyıts’ǫ kwe nageehk’èe sı t’à. Dıavık, eyìı ɻt’ǫ̀ą dìı Ek’atì ta tł’ìı sìı dek’aɔ̀ ade ha hogeèhdzà kwe nàek’èe hok’èts’ǫǫ ageh ɔɻ t’àa, kwe nàek’èe gha kwìıtso gǫ̀hłɻɻ sìı t’à aget’ɻ ha, eyıts’ǫ tı sı xè hotìı nezɻį̀ eghalageda ha eyıts’ǫ tı sìıgɻɻhwhǫ ha.

2015 k’e eɔ̀èè A21 dıke gogèhtsɻ eyıts’ǫ 2017 k’e wedaàtǫ ɻlè. Eɔ̀èè weyìı łıwe hazǫǫ̀ xagɻɻwa (309 lıwe) eyıtł’axǫǫ̀ eɔ̀èè weyìı tı whetł’ıı hazǫǫ̀ xàgɻɻhsǫ.

Kǫ̀ta xè Ełats’àadìı / Whaèhdǫǫ̀ Nàowoò

Dıavık, dànì dè gomǫǫ̀ wexoedıı eyıts’ǫ dànì wedaìtį̀ agele ha sìı dìı wegodìı wheɔǫǫ sìı t’à kǫ̀ta dǫ xè gogedo gıgha wet’àaɔà hǫt’e. Dıavık, dǫ PA xè aget’ɻɻ sìı hazǫǫ̀ goxè eghàlageda hǫt’e, hanì-ɻdè ɔehkw’I goòɔàa gıghàlada ha eyıts’ǫ gıgha hòɔǫǫ dè eyìı hazǫǫ̀ hagele gha gık’èezǫ agede ha. Godı nek’ǫ̀ą t’à Dıavık, 2017 k’e dè gomǫǫ̀ wexoedıı ghǫ kǫ̀ta PA xè aget’ɻɻ sìı xè ełegeèhdı gha nɻhtł’è dǫ gha whela ha.

Dıavık, kǫ̀ta ts’ǫ dǫ sǫǫ̀mbak’è gòɔǫǫ ts’ǫ̀ gogewa ha gɻɻwǫ, hanì-ɻdè ededɻ ededaà t’à sǫǫ̀mbak’è gòɔǫǫ ghàgeda ha eyıts’ǫ wemǫǫ̀ dę̀ k’e dàgǫ̀ht’ee sı ghàgeda ha. Dǫ hazǫǫ̀ ekǫ

k’egogele ha dìì-le sǫnı kò, edahxǫ dǫ gıxè agedzàa sìı edekǫ̀ nǫǫ̀gįįde nįdè wegodıì t’à dǫ xè gogedo welį̀ gįįwǫ.

Dıavık sǫǫ̀mbak’è gòɔǫǫ ekǫ Whaèhdǫǫ̀ Nàowoò k’e Dèhkw’ee gǫ̀hłį, sǫǫ̀mbak’è wedaàtǫ ha nįdè dànì whaèhdǫǫ̀ nàowoò k’èè wedaètį̀ agele ha gıts’ǫ̀ hoòlį. 2017 k’e Whaèhdǫǫ̀ Nàowoò k’e Dèhkw’ee South Country Rock Pıle ghǫ ełegıadì eyıts’ǫ sǫǫ̀mbak’è gòɔǫǫ wedaàtǫ tł’axǫǫ̀ wetł’axǫ wexoedıì agįįlà.

Nàowo Wegòò & Deghàà Etłee

Nıhts’ı t’à satsǫ̀etłee dį gǫ̀hłį wet’à Dıavık sǫǫ̀mbak’e gòɔǫǫ etłe hǫt’e. Dǫ gıghàladaa sìı xoghàà nezįį etłeę agįį̀hwhǫ. Eyìı nįhts’ı t’à satsǫ̀etłee sìı sǫǫ̀mbak’è gòɔǫǫ etłe gha 9.2 % yìıdıkǫ̀ ehtsį hǫt’e eyıts’ǫ 2017 k’e 3.9 lemıyǫǫ̀ litres dek’aɔį̀ t’à etłe. Eyį̀ı nįhts’ı t’à satsǫ̀etłee webeę k’e ekaàk’ǫǫ naìtł’įį dawhelaa wet’à tıts’aàdìı ekǫ aget’į ha-le eyıts’ǫ webeè ets’aetł’òo dek’eɔį̀ det’ǫk’edèe k’e ade ha-le.

Dıavık, sǫǫ̀mbakweè xàgelee k’è eładįį̀ gıghàlada ha nehogį̀įɔǫ. Kwe kimberlite weyìı gots’ǫ sǫǫ̀mbakweè xàgele nįdè kwe weghàhoòwoo sìı įloò įkw’àa ɔìłèe (jello lanì) hanì-le-dè kwe nechà-lea agehɔį gà ewaà gehtsį. Ewaà nahk’e įloò hołè, hanìkò sǫǫ̀mbak’è wedaàtǫ nįdè įloò sıìdle gha denahk’e dezì agode ha. Dıavık, nàowoò gòò ha geèhdzàa sìı satsǫ̀kǫ̀ goyìı ats’ǫǫ̀ gıt’àat’įį̀ agede ha, wet’à denahk’e ewaà hołè ha eyıts’ǫ įloò dek’aɔį̀ hołe ha. Eyìı hagįįlàa t’à hagode ha lanì wègoèht’į̀ eyıt’à Dıavık, įdaa t’à hanì agele ha gįįwǫ.

Ek’èhogį̀įɔǫǫ eyıts’ǫ EMAB

2017 eko Diavik, sǫǫ̀mbak’è gòɔǫǫ gots’ǫ kwets’ıì k’egele ekò ekǫ-le agòdzà įlè gıgǫ̀hɔǫ. Eyıts’ǫ PKC eɔèè wets’ǫhk’e tı eèhk’ǫ t’à daehk’òo sìı Water License gıgha wets’àat’ǫ hǫt’e. Dıavık, kwets’ıì xè gots’eèdìı sìı la k’aehtaa dǫǫ̀ xè sıìgele gha eghàlageda, eyıts’ǫ tı eèhk’ǫ̀ǫ t’à eɔèè PKC gà daèhk’òo sìı WLWB hoònǫ-daà dį dzęę̀ gots’ǫ̀ asanì-le gedı.

2017 sǫǫ̀mbak’è gòɔǫǫ, dànì weghàladaa ghǫ t’asahǫǫwǫǫ̀-le t’à dǫ wıızìı gots’ǫ̀ gįįtł’è-le. 2016 Xo Taàt’eę̀ Dè Gomoǫ̀ Wexoedıı Nàowoǫ̀ Wenįhtł’è (EAAR) Edzanèk’e Dèek’àowo t’ǫ̀whedaa, Environment and Natural Resources gıgha nįhtł’è deghàà adlà, Łıwedahtèe zaà 21 k’e.

Envıronmental Monıtorıng Advısory Board (EMAB) eyıts’ǫ Dıavık ełets’ǫ̀ gįįtł’ę̀e t’ą̀ sǫǫ̀mba dàtłǫ wheɔǫǫ ghą̀ą̀ eghàlageda, Whaèhdǫǫ̀ Nàowoò eyıts’ǫ Whaèhdǫǫ̀ Nàowoò k’e Dehkw’ee, eyıts’ǫ dè gomǫǫ̀ wexoedıı gha la whelaa ghǫ dàhǫǫwǫǫ ghǫ atł’èe sı wexè.

Dǫ haàtłǫ goxè eghàlagįįdàa sìı hazǫǫ̀ masìcho gìts’edı: Hotedą̀ - Kıtıkmeot Inuıt Assocıatıon, Tłįchǫ Dèek’àowo, Sǫǫ̀mbak’è Dǫne Nàdèe, Łìhtsok’è Dǫne Nàdèe, eyıts’ǫ Waàk’ǫ̀ą - North Slave Metıs Allıance, gıchekeè goxè eghàlagįįdàa, la hołèe hàɔaa, eyıts’ǫ 2017 k’e dǫ hazǫǫ̀ Dıavık wechekeè xè eghàlagįįdàa, masìcho gìts’edı. Dıı hanì Dıavık xè PA ełexè eghàlageda t’à dè gomǫǫ̀ dek’aɔį̀ ładįį̀ agot’įį ts’àdı eyıts’ǫ wet’à dè k’e asìı whelaa sìı gots’įįzǫǫ̀ wet’àhot’į.

ʔerehtł’ís Hálı̨ Ts’ı̨ Hanı Nedúwé

Dıavık dıamond mıne tsamba k’é theʔą sí, Lac de Gras húlye Jadízı́ ʔedzagh Nén theʔą sí ʔeyër East Island húlye nu theʔą sí ʔeyër t’a theʔą ʔat’e, Beghúldesch ts’ı̨ yudázé ts’én tonona dechën hánıłtha húk’e theʔą. 2000 kú, Dıavık sǫlághe ʔełk’éch’a dëne dédlıne ts’ı̨ʔáne xa k’áldé dálı̨ sí xél chu yunághé ts’ı̨ nié ts’én k’aldhër chu jadízı́ nén ts’ı̨ nié ts’én k’aldhër xél t’at’ú ní hadı xa límashı hełts’ı̨, that’ín yatı t’á Envıronmental Agreement húlye. ʔedërı límashí sí Dıavık tsamba k’é thełʔą ghár t’at’ú nié ts’ędhır ch’á yałnı xaʔą sí bek’oréhtł’ıs, yeghár ʔeghálana xa. ʔedërı límashí hálı̨ sí ʔeyı beghár ʔedërı Envıronmental Monıtorıng Advısory Board (EMAB) húlye nuhút’ągh, thëne ts’én t’así hałnı xa: ʔedërı Board sí t’at’ú ʔerehtł’ís beghár ʔeghálada xaʔą sí hałnı-u, tth’ı ní ts’ędhër ch’á t’at’ú beghálada xa snı sí ʔeyı hát’e-u háʔą xa hałnı ʔat’e. Dıavık dıamond mıne tsamba k’é thełʔą sí, dų sǫládhel (15) gháy xa yeghálana ʔat’e, 2017 ts’én-u, ʔeyı gháy k’e tsamba k’é beghálada sí, harelyú nághayaghe beghálada. 2017 belągh ts’én hadhër-u, dıke bets’ı̨ ní háger-u beyághe ts’ı̨ tsamba tthe hálye xa ʔeyı goth hałé A21 húlye, ʔeyı ʔahjën not’e.

ʔedërı ʔerehtł’ís sí, 2017 k’e t’at’ú Dıavık ní hałnı-u, t’at’ú ní hadı yeghálana sí, ʔeyı ghą t’e. ʔedërı ʔerehtł’ís sí, EMAB húlye t’a ʔerehtł’ís theła sí (bets’ı̨ office theʔą sí ʔeyër-u, tth’ı computer yé t’ąlásí ʔerehtł’ís nełʔı̨ xadúwíle bek’ání, ʔeyër tth’ı thela ʔat’e) ʔeyër thela-u, hat’ele dé, Wek’èezhìı Land and Water Board húlye ʔeyı t’a ʔerehtł’ís theła sí ʔeyër tth’ı thela ʔat’e.

2017 K’e T’at’ú Ní Badı Beghálahdą Sí Ghą Dënexél Hadı

T’ą́nch’ay nanelye

2004 kú, Dıavık tsamba k’é dárétą tł’ą́ dé t’at’ú t’ánchay dánanílye xa sí k’aunetagh húníłthër hı̨lé ʔat’e. ʔedërı ʔalǘ bek’aunetagh sí, 2017 ʔeyı kú noot’é. ʔedërı t’a hołé hunıdhén xa beghálada sí: t’así huneshe bet’át’ı̨ t’á ʔedlát’u t’a ʔaté nezų t’ası neshe-u, tth’ı ʔełk’éch’a ts’én t’ánchá dániye sí, ʔedlát’u t’a deʔą́ás nezų neye t’á-u, tth’ı ʔedlát’u háʔą dé t’ánchá deʔą́ás nezų neye -a. ʔedërı bek’aunetagh sí, tsamba k’é theʔą bedárétągh tł’ą́ dé, ʔeyër náré t’at’ú t’ánchá nanelye sí, ʔedlát’u t’a deʔą́ás nezų dániye t’á, ʔeyı t’a net’ǫ́-u, t’a hurıchá sí ʔeyër nezǘ t’ánchá dánílye búret’ı̨ t’á. ʔedërı beghálada sí, 2004 kú t’así neshe xa nílya hı̨lé sí, dų t’at’ú dániye sí ʔeyı tth’ı net’ı̨ xa. 2018 k’e ʔedërı ghą report húlye ʔerehtł’ís hałé xa.

Ch’ądí

ʔetthén badı háʔą sí, ʔeyër náré ʔetthén dólı̨ dé ʔetthén t’arát’ı̨ sí (tsamba k’é theʔą t’á to ʔeyër nár t’así ʔeghálada t’á to ʔetthén t’arátų sí ʔeyı badı) ʔeyı xa badı. Envıronmental Assessment hálı̨ hı̨lé kú, ʔeyër tsamba k’é nút’ągh dé, ʔetthén t’arát’ı̨ xa snı sí ʔeyı ʔełtth’ı ʔáádı, łuk’é dé, Dıavık chu Lac de Gras ch’asǫ́ nas ts’ën ʔat’ı̨-u, xayt’ás dé yutth’ǰzı ts’én ʔat’ı̨. 2017 k’e tsamba k’é theʔą ts’ı̨ʔáne ʔłágh hulı ʔetthén thaıdhër hı̨lǫ́le - u, ʔłágh hulı ʔetthén yuwé níjú hulǫ́le.

Nághaye-u, dleze-u tth'ı jíschogh tth'ı ʔeyër tsamba k'é theʔą nár búretʼį natʼį́. ʔeyër nár ch'ądí hetʼį dé bek'úríltł'ıs ʔat'e, ʔeyı ghár t'aníłt'e k'éneth t'at'ı ch'ądí hetʼį́ sí bek'óreją xa t'á, tth'ı ʔeyër tsamba k'é theʔą kǫ́é dáthela sí, ʔeyı náré betʼógh níle dé xa tth'ı badı. 2017 k'e tsamba k'é háʔą ʔeyër nár nághaye thaıdhër húlʔą hulı́le-u, ʔɻyes ʔeldél thaıdhër húlʔą hulı́le. Tsamba k'é háʔą ʔeyër benáré Jadízı́ ʔedzagh Nḗn Ts'ı Níé Ts'ḗn K'aldhër ʔeyı bexél chu, yuʔáné tsamba k'é dáthela ʔeyı tth'ı bexél t'ası́ hadı háʔą ʔat'e. ʔeyı ʔɻlághe t'ası́ beghálada sí dleze betth'íghá nálts'í-u, bets'ı DNA húlye netʼI, ʔeyı 2017 k'e beghą́lahdągh.

T'anchay Neshe-u, Ts'ḗr Dzérédhı-u, tth'ı Nıłts'ı Ts'ejí Dzérédhı T'at'e Sí

Haluka hant'u, yath nálts'í-u, nalghɻ-u, bet'a t'aníłt'e ts'ḗr hulı netʼı-u, t'at'ı ts'ḗr-u, tth'ı ʔeyı ts'ḗr betagh t'at'ı náídíshıne hulı sí ʔeyı tth'ı netʼı. ʔeyı beghą́łthën ts'ḗr náłtsı xa t'ası́ dáthela sí, ʔeyı beyé netʼı-u, tsamba k'é theʔą t'at'u ts'ḗr t'at'ú dzérédhı-u, t'aníłt'e ts'ḗr dzérédhı sí ʔeyı tth'ı hultá-u badı. 2017 kú, t'aníłt'e ts'ḗr dzérédhı-u, t'at'ı ts'ḗr dzérédhı xa hunıdhën sí, hát'e ʔunt'e húlí, 2016 ts'ı dek'áʔǫ ʔaja. T'ánchay dánıshe chu tthetsı́ dánıshe chu ʔeyı bek'áúneta sí tagh ghay hant'u netʼı ʔat'e. 2016 k'e nade netʼį́ ʔat'e-u, t'aníłt'e ts'ḗr bek'e náítł'ır hultágh sí yuyághe ʔajá ʔat'e.

Harelyǫ́ t'á 70.6 límëlyǫ́ lígalǫ́, that'ín yatı t'á lıtres snı sı, háníłt'e gëslín, dıesel húlye, bet'áát'į́, tsamba k'e beghálada xa-u, tth'ı A21 dıke húlye hałé xa.

Tu

2017 k'e, Dıavık ʔedërı Aquatıc Effects Monıtorıng Program (AEMP) húlye hálʔą ghár tu yághe t'ası́ dáníshe t'arát'e badı ʔeyı ʔałǫ́ yeghálana-u, tth'ı Surveıllance Network Program (SNP) húlye ʔeyı tth'ı ʔałǫ́ yeghálana. ʔeyı AEMP beghár ʔeghálada sí, ʔɻlágh ghay hant'u Lac de Gras tu theʔą sí, netʼı ʔat'e hat'e húlí, ʔɻlágh ghay k'e t'asízı́ netʼı-u, ʔeyër tsʼı yunedhe ghay dé, ʔedǫ́ ts'ḗn netʼı, ʔeyı beghár tsamba k'é theʔą sí bet'á Lac de Gras ts'édhır dé xa badı t'á. 2017 tsamba k'é theʔą ts'ḗn nıdhíle tsʼı tu t'at'e lí xa netʼı-u, tu betł'agh t'at'e sí xa te tł'a hatł'és hílchu-u, te yé tsʼı t'ası́ dánechílaze búretʼıle dáníye (t'aníłt'e-u, tth'ı t'at'ı) náłtsı-u, tetł'agh t'ası́ dána dólı (t'aníłt'e-u, tth'ı t'at'ı) ʔeyı tth'ı náłtsı. ʔedërı AEMP húlye beghár xa-u, 2018 kú dé, dëne ch'ání beghár łue chu tu t'at'é sí ʔeyı netʼı xa nút'ą ʔat'e. ʔeyı beghą́łthën, tagh gháy ʔeyı AEMP húlye beghálada hɻlé sí, 2014 tsʼı 2016 ts'ḗn t'at'ú beghálahdá netʼį́-u, ʔeyı AEMP t'at'u ʔedǫ́ ʔolne snı chu tth'ı t'a beghą́łthën t'a hultágh dé súghá hunıdhën sí háádı, beghár tu chu tu tł'a tsʼı hatł'és ʔedu ʔajá dé xa bedı, ʔeyı xa.

That'ín yatı t'á nutrıents snı sí nítúé beta hát'ı hulı sí tátł'ír tsʼıʔḗn chu bet'á ní nálk'éth, ʔeyı bet'a tu ʔedu ʔatʼı. ʔeyı háne ch'á xa Dıavık tu t'at'u surıłthën-u, t'at'u tu hałnı-u, tth'ı t'at'ú bet'á ní nálketh bet'átʼı sí hałnı-u, tth'ı t'aníłt'e bet'átʼı sí tth'ı hałnı.

2015 k'e ʔeyı A21 dıke húlye hałé búnídhër-u, 2017 k'e bedárétągh. ʔeyı dıke hálı beyé tsʼı łue te hálya-u (tonona ts'ḗn łǫ́ta łue) ʔeyër tsʼı ʔeyı dıke yé tu hulı sí, hátsës (pump t'á ʔalyá).

Háyǫrı́la Ts'ı Dëne Bexél Yatı/Dëne Ch'ání Ts'ı Haní

Dıavık t'at'ú níé ts'ędhır ch'a xa yałnı chu yuneth haɂa tsamba k'é dárétı ghą núdhër dé, t'at'u ɂeyı xa ts'ę́n ɂeghálana sí ghą háyǫrı́la ts'ı dëne xél halnı nélı. Dıavık t'ą xél PA húlye bets'ı sí ɂeyı xél ɂedërı t'at'ú súghá hunıdhën k'e ɂeghálana-u, tth'ı t'o hunıdhën sí, hát'u dëne xél ɂeghálana. 2017 k'e Dıavık t'ó t'ą xél PA húlye bets'ı sí ɂeyı xél ní t'at'ú yeghálaıhena sí ghą dëne xél halnı sí, ɂeyı bek'uréhtł'ís sí, ɂedërı ɂerehtł'ís bexél hełchúth ɂat'e.

ɂeyı beghąłthen, Dıavık tsamba k'é thełɂą sí, háyǫrı́la ts'ı dëne ɂeyër náílí réłdzágh, dëne ɂeyër tsamba k'é t'at'ú háɂą sí, denı té benágh t'á yeɂı rélɂı t'á. Harelyú dëne kós nálye xaɂąile húlí, t'ą kos nádél sí, háyǫrı́la nıdel dé, t'a heɂı ghą dëne xél halnı nıdé yıdhën ɂat'e.

Dıavık ɂedërı Tradıtıonal Knowledge (TK) Panel húlye sí dëne ɂeła déłtth'ı-u, t'at'ú dëne ch'ání ts'ı hanı bet'át'ı ghár tsamba k'é dárátı xa ts'ę́n ɂeghálada sí ɂeyı hát'u háłɂą ɂat'e. 2017 k'e, ɂedërı TK Panel húlye t'a k'e ɂeghádálaıhıná sí, South Country Rock Pıle húlye ɂeyı chu tsamba k'é dárátą tł'ą́ dé t'at'ú ɂeyër náré t'así badı xa, ɂeyı ghą nádáıhıłtı.

T'así Góth Xél ɂeghálana-u, Kún K'áɂǫ́ Bet'átı

Dıavık tsamba k'é thełɂą sí, ɂeyër dı satsán nıłts'ı hełtsı nechá dáthela ɂat'e-u, dëne ɂeyër ɂeghádálena sí ɂeyı satsán kón hełtsı t'árát'ı, harelyú ghay k'e. ɂedërı nıłts'ı hełtsı satsán, bet'á 9.2% háníłt'e bets'ı kón t'át'ı́ -u, 2017 k'e 3.9 límëlyǫ́ lígalǫ́ gę́słín t'át'ı ɂeyı bet'á k'áɂo bet'át'ı́. ɂeyı satsán dáthela bet'óth naratl'ír sí, bek'e kón dék'ën nareltth'ı dólı t'á chadí chu ɂı̨yes chu yet'árádel ɂat'ele.

Dıavık t'at'u ɂeyı tthe beghálada kǫ́é, Process Plant húlye ɂeyı t'at'u tthe beghálada sí ɂedı ɂane xa yek'auneta húníłthër ɂat'e. ɂeyı dı satsán tthe, kımberlıte rock húlye ts'ı dıamonds háíla dé, ɂeyı tthe t'a beghádhër sí, hatł'és lat'e (Jello lát'e) ɂat'ı́ tó, thay lát'e ɂat'ı́. ɂeyı satsán dǫ́ hatł'és lát'e ɂǫ́łı ɂungą hełtsı, thay lát'e hanúnıle-u, tsamba k'é dárétı ghą núdhër dé, ɂeyı hatł'és lat'e sí bet'á ɂeghálada búrenıle xa t'e. Dı Dıavık satsán kóth t'á ɂeghálana réłdzagh, thay lát'ı ɂǫ́łı ɂungą hełtsı relɂı t'á.

T'a Ghár ɂeghálada Xaɂą Hát'u ɂeghálada chu EMAB chu

2017 kú, Dıavık t'at'ú tthe ts'ı tsamba náłtsı tł'ą́ dé tthedhír ɂáldél t'at'ú yeghálaıhena sí, ɂełtth'ı yehełɂı́le k'é yehúłɂą. ɂeyı beghąłthën PKC ɂél theɂą sí tu nalghı bek'ás nítł'ír k'é, ɂeyı hájá sí tu t'áíhet'ı xa ɂerehtł'ís behetł'alchúth ghár xa dé, hát'e xaɂąile. Dıavık ɂeyı tthedhír ɂáldél ɂełtth'íle yeghálaıhena sí, Inspector húlye xél séyehíle ghálaıhena -u, WLWB húlye, tu nalghı ɂeyı PKC ɂél theɂą k'as nítł'ír xadúwíle yéhéédedı dıadhel dzı ts'ę́n.

2017 kú, ɂı̨łágh húlı nezǫ ɂeghálaınaıle nuwéłnı-u nuwets'ę́n rıtł'ís hulı́le. 2016 ts'ı Envıronmental Agreement ghą ɂı̨łágh ghay hant'u dënexél hadı ɂerehtł'ís hałé (EAAR) sí, Jadízı́ ʔedzagh Nę́n Ts'ı Níé Ts'ę́n K'aldhër bechëlekuı Envıronment and Natural Resources húlye xa k'aldhër helı sí 2017 Łuedałtí Zá nónas ts'ę́n ɂı̨łágh núltá k'e, ɂeyı ɂerehtł'ís sát'ele hénı. ʔeyı

ʔerehtł’ís beba nílchúth yé ʔats’edı-u, ʔeyı 2016 ts’ı EAAR húlye ʔerehtł’ís 2017 ʔeyundzı́ Za k’e taghadhel núltagh k’e Jadízı́ ʔedzagh Nę́n Ts’ı Nié Ts’ę́n K’aldhër chu t’ą bexél EA bets’ı sí tł’aıłchúth sí Addendum húlye yé t’a ghą relker sí yek’urúhtł’ıs-u, dëneba néyułchuth héts’edı.

Envıronmental Monıtorıng Advısory Board (EMAB) húlye chu Dıavık chu ʔełts’éheret’ís ʔanat’ı́, t’así ʔełk’éch’a ghą, tsamba ghą to, Dëne Ch’ání chu Dëne Ch’ání ghą nátı xa ʔełahts’éltth’ı tó, t’at’ú ní badı xa surıdhën tó, ʔeyı ghą.

2017 k’e Kıtıkmeot Inuıt Assocıatıon-u, Tı̨cho Government-u, Yellowknıves Dene Fırst Natıon-u, Łutselk’e Dene Fırst Natıon-u, North Slave Métıs Allıance-u, ʔeyı harelyú t’ą yeba ʔeghádálana nuwets’éráínı sí márs bélídı rílʔı̨-u, bets’ı̨ busıness dólı̨ sí-u, tth’ı nay dëne denı thën Dıavık bechëlekuı xél ʔeghádálana xa, ʔeyı tth’ı márs hílídı. Dıavık t’ą xél PA húlye bets’ı̨ sí chu ʔeła ʔeghálaıhena, ʔeyı bet’á ní ts’ędhır k’áʔǫ́ ʔat’e-u, ní ts’ı̨ t’a t’áít’ı̨ ʔeyı nezú súghá ts’ę́n bet’át’ı̨.

Diavik Diamond Mine Location Map

List of Acronyms (abbreviations found in this report)

AEMP	Aquatic Effects Monitoring Program
ARD	Acid Rock Drainage
AANDC	Aboriginal Affairs and Northern Development Canada
BOD	Biological Oxygen Demand
CCME	Canadian Council of Ministers of the Environment
DDMI	Diavik Diamond Mines Inc.
EA	Environmental Agreement or Environmental Assessment
EAAR	Environmental Agreement Annual Report
EMAB	Environmental Monitoring Advisory Board
EMS	Environmental Management System
ENR	Environment and Natural Resources
GNWT	Government of the Northwest Territories
ICRP	Interim Closure and Reclamation Plan
LDG	Lac de Gras
MVLWB	Mackenzie Valley Land and Water Board
NIWTP	North Inlet Water Treatment Plant
NTU	Nephelometric Turbidity Units (measurement of water turbidity)
PA	Participation Agreement
PK/PKC	Processed Kimberlite/ Processed Kimberlite Containment
PVP	Permanent Vegetation Plot
QA/QC	Quality Assurance/Quality Control
SNP	Surveillance Network Program
SOP	Standard Operating Procedure
TEK/TK/IQ	Traditional Ecological Knowledge/Traditional Knowledge/Inuit Qaujimajatuqangit
TP	Total Phosphorous
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
WLWB	Wek'èezhìi Land and Water Board
WMMP	Wildlife Monitoring and Management Plan
WTA	Waste Transfer Area
ZOI	Zone of Influence

Definitions

Abundance – a count or measurement of the amount of any one thing

Action Level - a level of environmental change which, if measured in an aquatic effects monitoring program, results in a management action well before effects that could be harmful to the lake can happen

Adaptive Management - a systematic way of learning from monitoring results or management actions with the intent to improve operating or management practices

Benthic Invertebrates – small bugs without a backbone that live in the sediments on the bottom of a lake or river; can include flies, worms, clams, etc.

Chlorophyll *a* - found in tiny plants and traps light energy from the sun

Density – total amount of a given substance within a defined area

Deposition Rate – the speed at which something settles on to a surface, e.g. how slow/fast a piece of dirt falls through water to settle on the bottom of a lake

Distribution – how any one thing may be spread out over an area

Effluent – cleaned/treated water from the sewage or water treatment plant that is discharged from the plant after cleaning

Enrichment – addition of an ingredient that improves quality; if too much is added, it may then start to reduce quality

Environmental Assessment – process to review potential environmental impacts for a project that is being considered for development and decide if the project can be developed

Eutrophication – water bodies like a lake receive a lot of nutrients and then start to grow a lot of plants within the water

Habitat Compensation – replacement of natural habitat lost during construction of the mine; done using man-made features to improve areas of natural habitat

High-level Effects – change noticed between different areas that may start to be higher than an agreed-upon standard

Indicator – information used to try and understand what is happening in the environment

Interim Closure & Reclamation Plan – a document that outlines ways to close a mine, including what needs to be done with water, land and wildlife. 'Interim' means that it is less detailed than a final plan, as there are still questions to answer before the final design or plan can be done.

Low-level Effect – early-warning level where little change is detected

mg/dm^2/y – milligrams per decimeter squared per year, the amount of dust deposited in a given area each year

Mitigation Measures – things that are done to control or prevent a risk or hazard from happening

Moderate Effect – some change noticed between different areas that may start to be higher than an agreed-upon standard

Monitoring – a way to check on performance and compare it against an expected result, e.g. is anything changing

Parameters – chemical and physical signs that can be used to determine water or soil quality

Plume – an area in air, water or soil that is affected from a nearby source, e.g. a plume of smoke around an erupting volcano

Prediction – an educated guess of what will happen in the future, can be based on existing knowledge or experience where possible

Progressive Reclamation – starting to repair certain areas of land damage by mining activity while the rest of the mine is still operating; focus is on areas where mining activities are complete

Research – a structured way to test questions on unknown features of the environment, e.g. reasons why a change may be happening

Risk Assessment – a way to identify possible harmful effects by looking at how harmful the effect could be and how often it could occur. After risks have been identified, management actions are defined.

Sediment Chemistry – the mineral content of dirt particles that sit on the bottom of the lake

Seepage – a release of water or other liquid material that flows through or out of a containment area

Total Suspended Particulates - small particles in the air that measure 100 micrometers in size (which is slightly larger in size than the diameter of a human hair at 75 micrometers)

Trophic Status – a measure of lake productivity based on how many plants are in the lake

Water Quality – an overall characterization of the chemical (nutrients or metals), physical (temperature) and biological (algae) features of water in a lake or river

Weight-of-Evidence (WOE) – an estimate of the strength (weight) of proof (evidence) that is provided by jointly considering the results from each type of sample (e.g. water quality) throughout a season or across multiple years, to determine the overall effect of mine operations on Lac de Gras.

Zone of Influence (ZOI) – area of reduced wildlife occupancy as a result of mining activities.

1. Introduction

Diavik and the Environmental Agreement

The Diavik diamond mine is located on the East Island of Lac de Gras, in Canada's Northwest Territories, approximately 300 kilometers northeast of the capital city, Yellowknife. The lake is roughly 60 kilometers long and drains into the Coppermine River, which flows north to the Arctic Ocean. Diavik Diamond Mines Inc. (DDMI) undertook an Environmental Assessment that started in 1998 through the Canadian Environmental Assessment Agency. The mine has been operating since 2003, and protecting the environment around the mine continues to be important.

Diavik signed an Environmental Agreement ("the Agreement" or EA) with 5 Aboriginal organizations and the federal and territorial governments in 2000. The Agreement says what Diavik is to do to protect the environment while operating and closing the mine.

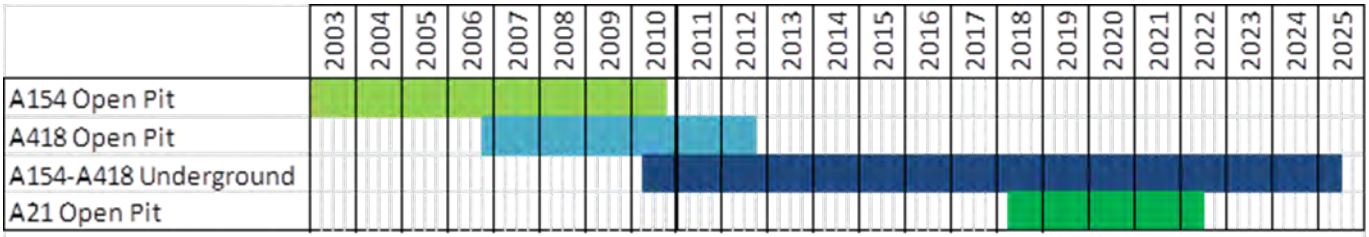
There was also an Environmental Monitoring Advisory Board (EMAB) formed as part of the Agreement; the Board is a public watchdog of the regulatory process and the implementation of the EA.

This report summarizes the results of Diavik's environmental monitoring and management programs during 2017. Complete copies of the numerous reports that Diavik submits each year can be found in the EMAB library (at their office, or on-line library) or Wek'èezhìi Land and Water Board public registry.

Operational Plans

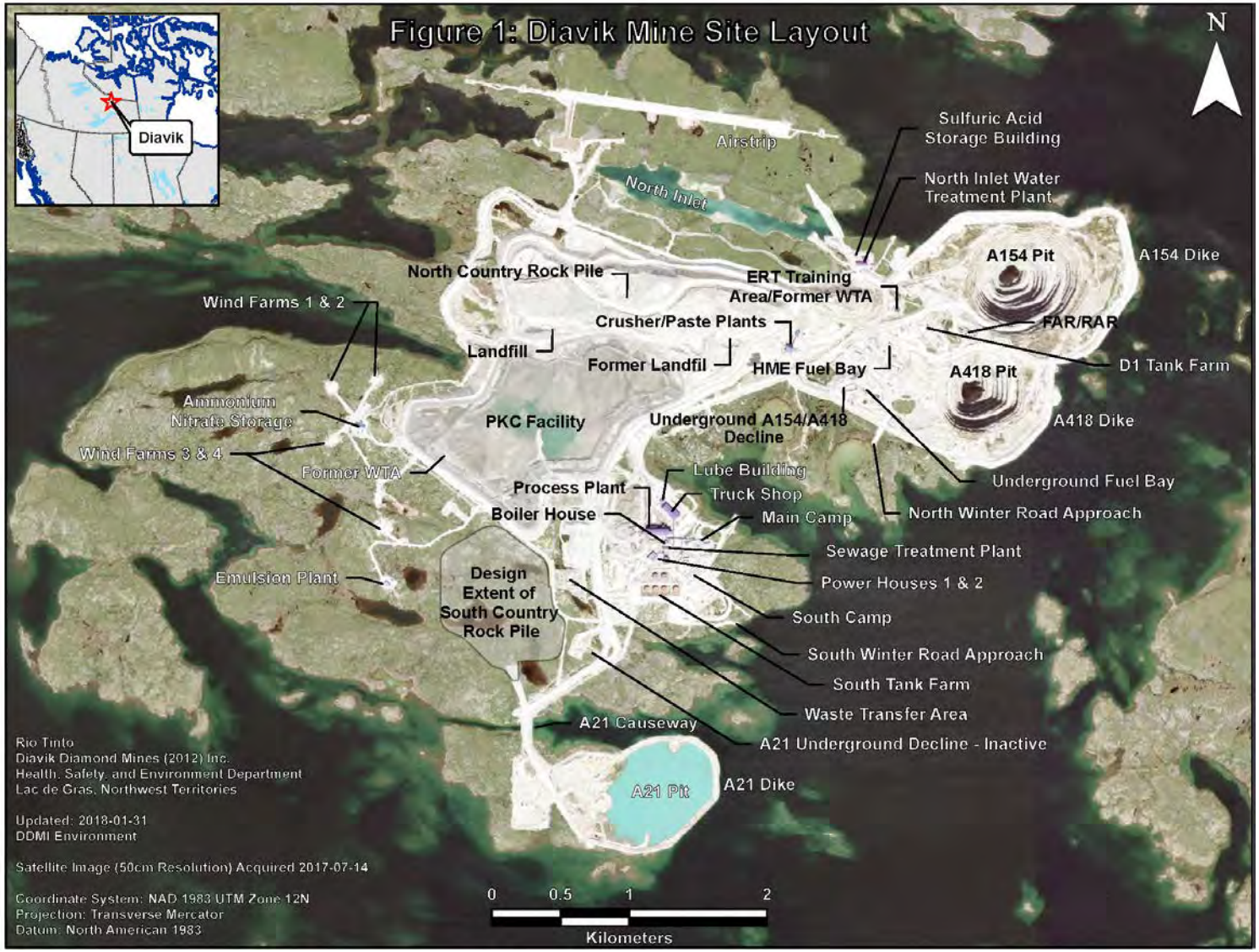
The Diavik diamond mine was in its fifteenth year of operations during 2017, and operated as an all-underground mine. Underground mining will continue into 2018 from both the A154 and A418 pipes. Construction of a third dike to support open pit mining of the A21 kimberlite pipe began in 2015, and was nearly finished in 2017. The dike was closed off from Lac de Gras, it was fished out and the water from inside the dike was pumped out. Diavik also began removing the lake bottom sediments from the area at the end of 2017. The figure below shows a timeline of Diavik's mine plan, which shows mining activities planned for the next several years and closure planned around 2025.

Diavik's Planned Schedule of Operations



Mining schedule as of Mar 2018 - subject to change due to market conditions, further mineral resource evaluation, ongoing mine planning updates, etc.

Figure 1 **Diavik Diamond Mine Labelled Site Satellite Photo**



2. Environmental Agreement Annual Reporting Commitments

Section 12.1 of the EA outlines the content to be reported annually to the Parties, the Government of Nunavut, and the Advisory Board on June 30th (submission date revised from March 31st in 2003), as outlined in Table 1.

Table 1: Summary of EA Commitments in Relation to the EAAR

EA Commitment	Plain Language Interpretation (from EMAB)	Report Section
Comprehensive summary of all supporting information, data and results from the Environmental Monitoring Programs and all studies and research	A full summary of all supporting information, data and results from the Environmental Monitoring Programs, plus all studies and research related to these	3, 4
Rolling summary and analysis of environmental effects data over the life of the Project; compare results to predictions in environmental assessment & CSR, and illustrate any trends	A summary that adds in data of each year and an analysis of environmental effects data over the life of the Project - to show patterns over the years	4
Comprehensive summary of all compliance reports required by the Regulatory Instruments	A full summary of all reports on how Diavik has followed all rules and regulations in the Regulatory Instruments	6
Comprehensive summary of operational activities during the preceding year	A full summary of mining activities during the year up to the annual report	1, 6
Actions taken or planned to address effects or compliance problems	The ways Diavik is fixing any environmental effects or problems following rules and regulations	6
Operational activities for the next year	A summary of mining activities for the next year	1, 6
Lists and abstracts of all Environmental Plans and Programs	Lists and summaries of all Environmental Plans and Programs	3
Verification of accuracy of environmental assessments	A check that environmental assessments are correct	4
Determination of effectiveness of mitigation measures	A report on how well steps to lessen effects are working	Appendix II
Comprehensive summary of all adaptive management measures taken	A full summary of all adaptive management steps taken	Appendix II
Comprehensive summary of public concerns and responses to public concerns	A full summary of public concerns and responses to public concerns	Executive Summary, 5

EA Commitment	Plain Language Interpretation (from EMAB)	Report Section
Comprehensive summary of the new technologies investigated	A full summary of the new technologies Diavik has looked into	Executive Summary
Minister's comments, including any Minister's Report, on the previous Annual Report	The Minister's comments on the Annual Report from the year before, including any Minister's Report	Executive Summary, Appendix I
Plain language executive summary and translations into Dogrib/Tłı̨chǫ, Chipewyan, and Inuinnaqtun using appropriate media	Plain English executive summary translated into Dogrib/Tłı̨chǫ, Chipewyan, and Inuinnaqtun	Executive Summary

3. Environmental Programs and Plans - 2017

This section outlines the various environmental plans and programs that Diavik follows. For each plan/program, a brief outline is provided that explains why the program is being done and/or how it is completed. Many of these plans and programs are the same from one year to the next. As stated in Diavik's Water License, plans that have not changed do not require updates; those that have been updated and submitted for regulatory approval during 2017 are identified in Table 2. Additionally, Appendix II contains a list of mitigation measures and adaptive management actions that have been implemented during mine operations.

Management & Operations Plans

Management and operations plans are site-specific documents that identify potential environmental issues and outline actions to minimize possible impacts that could result from mining activities. They are reviewed by DDMI each year and updated as required (i.e. if something changes). Table 2 lists the management and operations plans required under DDMI's water license, summarizes the purpose of the plans and identifies which plans were updated for 2017.

Table 2: Management & Operations Plans for the Diavik Mine

Plan & Version Number	Purpose	Updated in 2017 (Y/N)	Updates/ Comments
Ammonia Management Plan (AMP), v6	To assist in achieving the lowest practical amount of ammonia from explosives that would enter the mine water and waste water streams. The plan details how ammonia management performance is evaluated, and includes details of ammonia management techniques.	Yes – submitted Dec 2016 to WLWB, V6.1 approved 2017	- Incorporate A21 operations - Required to submit 12 months prior to mining

Plan & Version Number	Purpose	Updated in 2017 (Y/N)	Updates/ Comments
Waste Rock Management Plan (WRMP) v7.1	Rock types that surround the kimberlite may have minerals in them that can cause water to become acidic when it runs over the rock. The plan describes how DDMI identifies, separates, and stores the rock to reduce acid runoff.	Yes – submitted Nov 2016 to WLWB, approved 2017	- Address Board directives from V7 - Schedule change to Water License - A21 updates
Closure & Reclamation Plan (CRP) v4	Outline closure goals (overall vision for what Diavik would like to achieve), objectives (steps the organization needs to take to achieve the goals – specific and measureable) and criteria (a standard against which success is measured), and includes engineering designs and research programs for closure of all the major components of the mine. Because it is a plan that evolves over time, it does not yet include final closure designs or details on specific after-closure monitoring programs.	Yes – submitted to WLWB April 2017	- Advancement of closure plans and options from last (2011) update
North Country Rock Pile (NCRP) Final Closure Plan, v1.1	Outlines closure plans for the waste rock from the A154 and A418 mines. The final closure design includes re-shaping of the pile to better fit the landscape and to provide a good surface for placement of a rock cover with caribou access ramps.	Yes – submitted to WLWB April 2017, awaiting approval	- Address Board directives - Discussion on water quality and other standards (criteria) for closure
Hazardous Materials Management Plan (HMMP), v19	Describe procedures for the safe and efficient transport, storage, handling and use of chemicals for mining. Prevention, detection, containment, response, and mitigation are the key elements in the management of hazardous materials. The plan also describes how hazardous materials will be removed from site during closure.	No	N/A
Contingency Plan (CP, used to be called the Operational Phase Contingency Plan), v22	Describe response procedures for any accidental release (spill) of hazardous or toxic substances, as well as procedures for water management. The CP outlines the responsibilities of key personnel and gives guidelines for minimizing impacts to the environment, including contingencies for the underground mine.	Yes – submitted Sept 2017 to WLWB, approved	- A21 updates - Address Board directives from V21

Plan & Version Number	Purpose	Updated in 2017 (Y/N)	Updates/ Comments
Water Management Plan, v14	Describe how water around the site is moved, treated, monitored and controlled. Also includes a 'water balance', which gives Diavik an idea of the amount and location of water on site at any given time, so that plans can be made for handling and treating water.	Submitted Dec 2015 to WLWB, not approved	- DDMI to submit V14.1 to address Board directives in 2018
Waste Management Plan, V2 (includes Incinerator v1, Hydrocarbon Impacted Materials, Solid Waste & Landfill v1, Dust)	Identify the types of waste generated on site and outline methods for the minimization, collection, storage, transportation and disposal of wastes in a safe, efficient and environmentally compliant manner. Characterizes and segregates waste streams according to their on- and off-site disposal requirements.	Yes – submitted Dec 2017 to WLWB, approved 2018	- New landfill location
A21 Construction Environmental Management Plan, v5.1	Outlines how Diavik plans to reduce environmental effects from A21 dike construction activities. Includes a description of on-land and in-lake construction activities, including dewatering. Environmental management controls and monitoring requirements are also described.	No	N/A
Engagement Plan, v2	Outlines the outreach and engagement process with communities in relation to the requirements set out in the WLWBs Engagement Guidelines for Applicants and Holders of Land Use Permits and Water Licences (2014) and Water Licence W2015L2-0001.	No – not approved by WLWB in 2017	- DDMI to submit V2.1 to address Board directives in 2018
Processed Kimberlite Containment (PKC) Facility Operations Plan, v3.2	Outlines how to handle the water and solids within the PKC facility. Includes information on PKC design, dam construction, monitoring programs for water, ice & solids stored within the PKC.	Yes - submitted May 2017 to WLWB, approved	- Extend timeline for tests being done to make drier PK
North Inlet Water Treatment Plant (NIWTP) Operation Manual, v1	Provide information about the plant (area layout, treatment capabilities, etc.), operational requirements of the plant (as it relates to water management both on site and within the plant) and plant maintenance requirements.	No (2012)	N/A

Plan & Version Number	Purpose	Updated in 2017 (Y/N)	Updates/ Comments
Sewage Treatment Plant (STP) Facility Operations Plan, v3	Outlines the design and layout, operating rules, monitoring requirements, what to do in case of an emergency, maintenance and closure of the plant.	No (2011)	N/A
Wildlife Management and Monitoring Plan R3	Outlines methods to limit impacts to wildlife as a result of mine operations and programs to determine if the distribution (location as it relates to the mine, habitat and region) and abundance (number) of wildlife species are affected by the mine.	No (2013)	N/A

Monitoring Programs

Monitoring programs are designed to track changes to the environment as a project develops, and are usually linked to predictions from an Environmental Assessment (EA). Monitoring programs required for Diavik are summarized within the water license (W2015L2-0001), Fisheries Authorization or EA. A summary of the monitoring programs conducted during 2017 is outlined in Table 3.

Table 3: Monitoring Programs for the Diavik Mine

Monitoring Program	Purpose	Completed (Y/N)	Comments
Wildlife			
Caribou Behaviour Observations	If/how caribou behaviour changes in relation to distance from mine	Y	
Aerial Caribou Surveys	Zone of Influence of mining activities in the LDG region	N	Suspended
Caribou Road Surveys	Effectiveness of mitigation measures	Y	Initiated based on collar data or reported sightings
Wolverine Track Survey	Wolverine presence in the area of the mine	Y	
Wolverine DNA	Wolverine numbers in the LDG area	N	Regional program with GNWT & other mines; not completed annually

Monitoring Program	Purpose	Completed (Y/N)	Comments
Grizzly Bear DNA	Bear numbers in the LDG area	Y	Regional program with GNWT & other mines; not completed annually
Raptor Survey	Regional estimate of number of nests with birds in them and how many chicks are alive	N	Completed every 5 years with GNWT & other mines; 2020
Building Inspections	Survey mine buildings and pit walls to identify bird nests and/or wildlife use	Y	
Waste Inspections	Monitor waste disposal that may attract animals	Y	
Wildlife Presence	Track wildlife observations and numbers on the mine site	Y	
Wildlife Mortality & Injury	Track any wildlife deaths or injuries associated with mine operations	Y	
Water			
Mine Site Water Quality	Test water against Water License limits at a set frequency (Surveillance Network Program, SNP)	Y	
Lake-wide Water Quality	Changes to water quality in LDG over time (part of Aquatic Effects Monitoring Program, AEMP)	Y	
Nutrients, small Plants & Bugs in Water	Changes to nutrients, plants and bugs that live in the water column, over time (part of AEMP)	Y	
Lake Sediments	Changes to sediment quality in LDG over time (part of AEMP)	N	Not required for sampling in 2017
Lake Bottom Bugs	Changes to number and type of bugs that live on the lake bottom, over time (part of AEMP)	Y	Completed every 3 years
Fish Health	Fish health tests through palatability and/or tissue chemistry	N	Not required for sampling in 2017
Water Quantity	Measure levels and sources of water used, added or moved on site	Y	

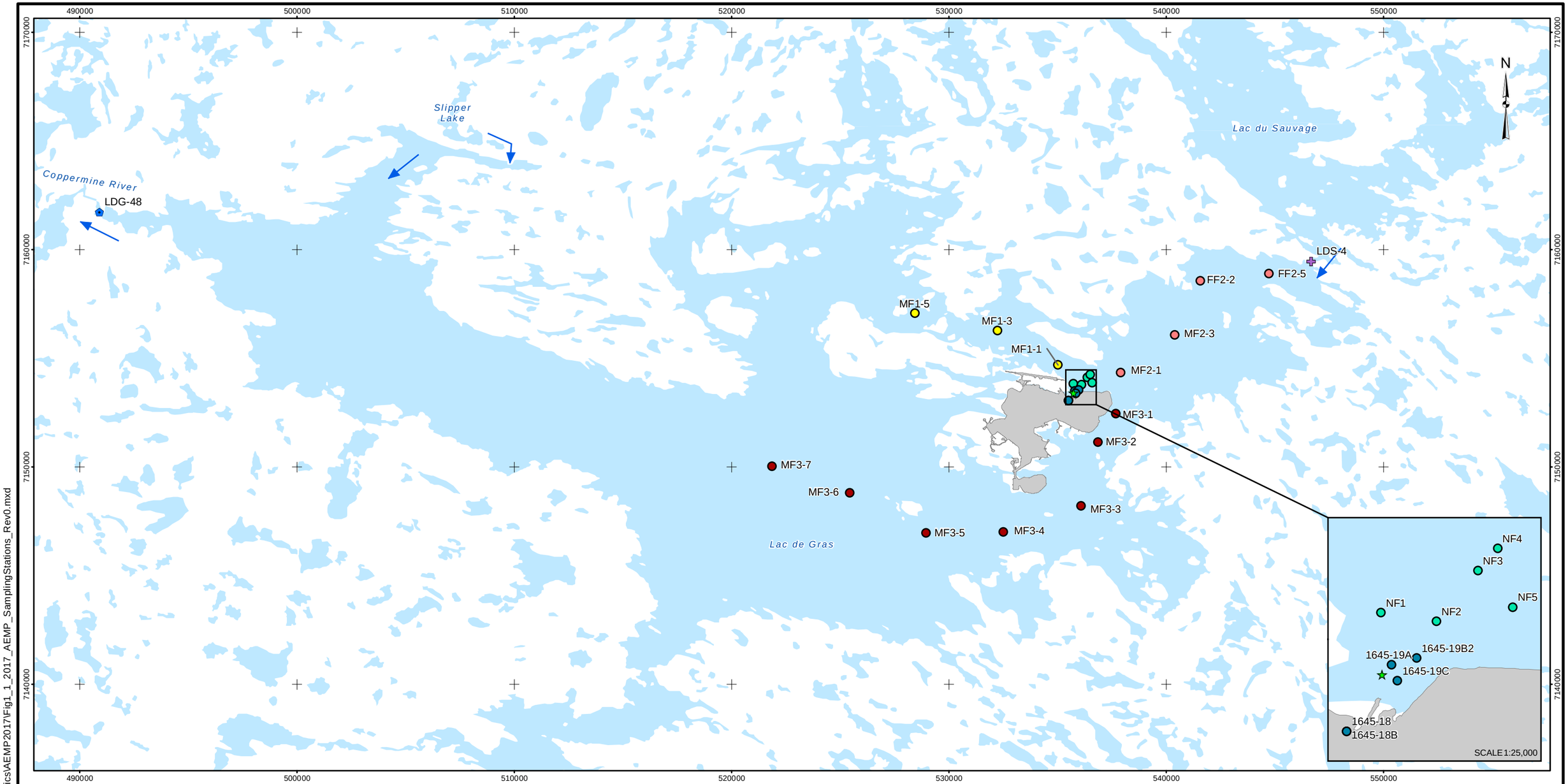
Monitoring Program	Purpose	Completed (Y/N)	Comments
Air Quality, Dust & Vegetation			
Dust Deposition	Amount and chemistry of dust collected in dust gauges and on snow, close to and far from the mine	Y	
Total Suspended Particulates	Continuous monitoring of the amount of small dust particles that are emitted from mine operations	Y	
Meteorological	Weather trends and influence on water balance and dust deposition	Y	
Wildlife Habitat Loss	Track habitat lost due to mine development; total loss and preferred habitats for individual species	Y	
Vegetation Plots	Changes to type and amount of plants over time, near and far from the mine	N	Completed every 3-5 years
Lichen Study	Metal levels in lichen and soil, near and far from the mine; included health assessment for caribou consumption	N	Completed every 3-5 years

Aquatic Effects (Lake Water Quality & Fish Health)

The AEMP is designed to measure short and long-term changes in Lac de Gras. Sampling efforts focus on sampling stations in Lac de Gras that are located closer to the mine (where effects would first be expected to be measured). There are also sampling stations far away from the mine (where effects would take much longer to measure). Comparing information from both places allows changes in the lake caused by the mine to be measured over time (temporal) and can be measured near the mine site and further away (spatial).

There are 37 sample locations (Figure 2) where many different types of samples are taken. The types of samples that were collected in 2017 included: water quality (e.g. ammonia, metals), the amount and quality of dust deposited, nutrient indicators (information used to understand the lake environment, e.g. chlorophyll *a* (material found in tiny plants that traps light energy from the sun)), phytoplankton (tiny plants) and zooplankton (tiny animals).

Figure 2 2017 AEMP Sample Locations



LEGEND

- DIFFUSERS
- LDG 48
- FLOW DIRECTION
- DIAVIK FOOTPRINT
- WATERBODY

EXPOSURE

- NEAR-FIELD
- MID-FIELD 3
- MID-FIELD 1
- FAR-FIELD 2; MID-FIELD 2
- SURVEILLANCE NETWORK PROGRAM

REFERENCE

HYDROGRAPHY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA.
ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

PROJECT: DIAVIK DIAMOND MINES INC.

TITLE: **SAMPLING STATIONS, 2017 AEMP**

GOLDER

PROJECT		1771843	FILE No.	
DESIGN	LJ	02 Sep. 2016	SCALE AS SHOWN	REV. 0
GIS	SS	06 Mar. 2018		
CHECK	RS	12 Apr. 2018		
REVIEW	ZK	12 Apr. 2018		

I:\CLIENTS\DIAVIK\1771843\Mapping\MXD\AquaticsAEMP2017\Fig1_1_2017_AEMP_SamplingStations_Rev0.mxd

Air Quality (Dust & Emissions)

The program goal is to understand dust deposition rates (how much dust falls onto the tundra and lake) caused by project activities and the program provides information to support the Wildlife Effects and Aquatic Effects monitoring programs.

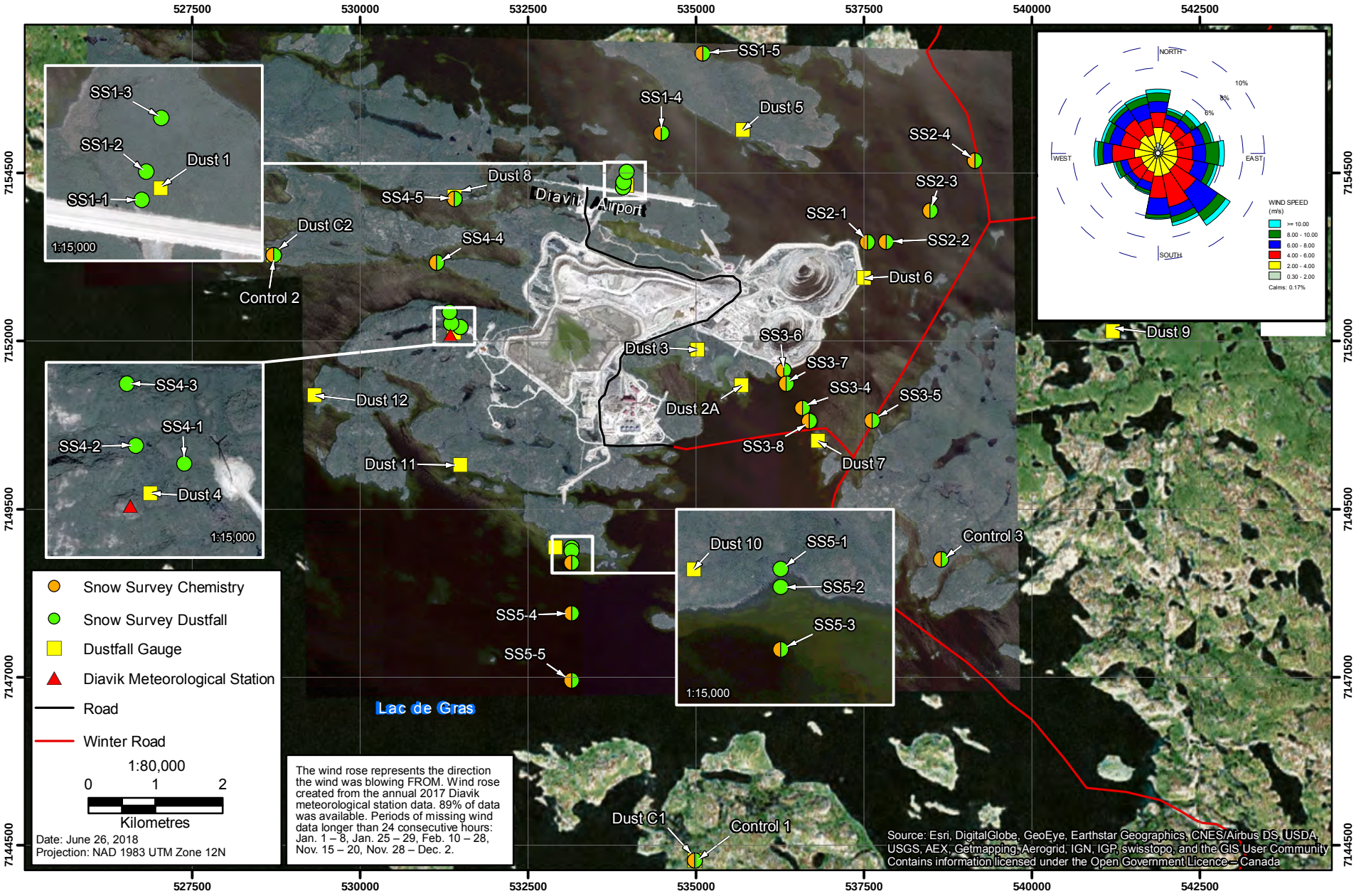
The sampling stations for the Dust Deposition Monitoring Program (Figure 3) were set up using a transect approach (series of sample locations that extend outwards on ice and land from the mine site). In October 2017, two new sample stations were added (i.e., Dust 11 and Dust 12) and Diavik now monitors:

- 14 permanent dust gauges - fixed-location sampling devices that collect dust for analysis all year long; and,
- 27 seasonal snow survey stations - GPS locations where Diavik collects snow samples to measure the amount of dustfall over the winter (27 samples) and the water quality of the snow where dust was deposited on the lake (16 samples).

They are sampled each year and results have been compared with the former British Columbia (BC) dustfall objective for the mining, smelting, and related industries. This objective is used by some mines in the Northwest Territories (NWT) for comparison purposes only, as there are no standards or objectives for the NWT.

The goal of the Air Quality Monitoring Program is to help with finding trends in dust levels beyond the area of the mine. Two (2) continuous background air sampling stations monitor TSP concentrations (TSP – small particles in the air that measure 100 micrometers in size, which is slightly larger in size than the thickness of a human hair at 75 micrometers) continuously, and hourly amounts are recorded. Diavik also keeps track of their diesel fuel use.

Figure 3 2017 Air Quality Sample Locations – Dust and Snow Surveys



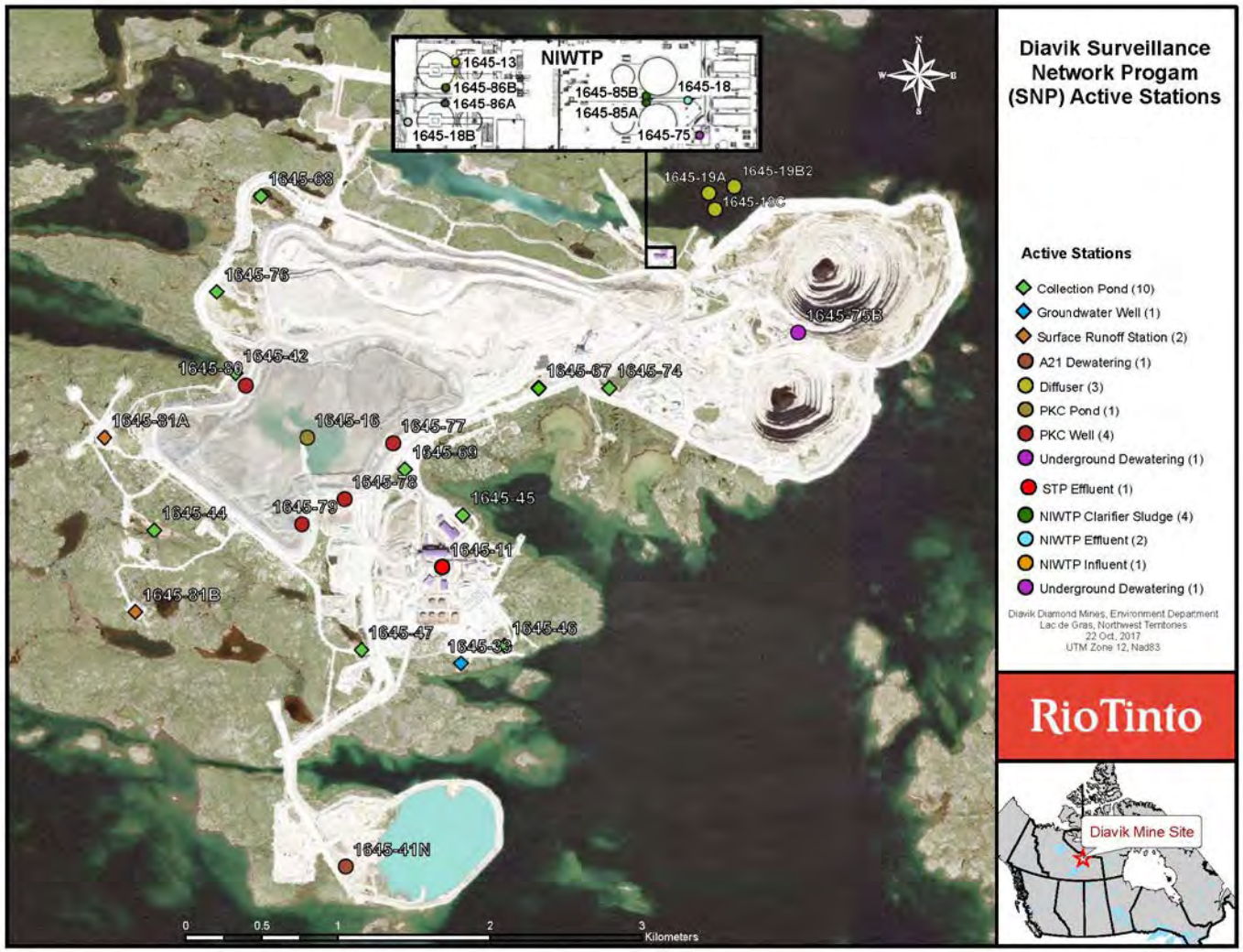
Surveillance Network Program (Water Quality at the Mine Site)

Diavik monitors water quality around the mine site in accordance with the Surveillance Network Program (SNP), which is a component of Diavik's water license. The SNP outlines where Diavik collects water samples, how often samples are collected, and what parameters (metals, nutrients and other water quality characteristics) are measured. The SNP also outlines sampling requirements for water that flows into Lac de Gras during dewatering activities (e.g. dike construction).

Diavik monitors dams and dikes around the mine site for potential seepage (water from inside the dam that may flow through the dam to the environment). The dikes and dams are designed to hold back water; however, some seepage (leaks) through these structures is expected. The purpose of the survey is to check areas for potential leaks so that Diavik can take appropriate measures to stop the water. The monitoring includes regular inspections of the dam and dike structures and recording the amount of water; some water samples are also taken. The PKC holds enough water that it does not completely freeze in the winter, so water can move within the dam all year round.

Diavik has seepage interception (capture) wells and a water control system to collect water from the dams before it enters Lac de Gras. It includes a number of collection wells and ponds (Figure 4), which surround major structures such as the PKC, and are monitored. There are some times where runoff from other areas of the mine may not go into a pond and will enter Lac de Gras, but it is usually a small amount of water for a short period of time.

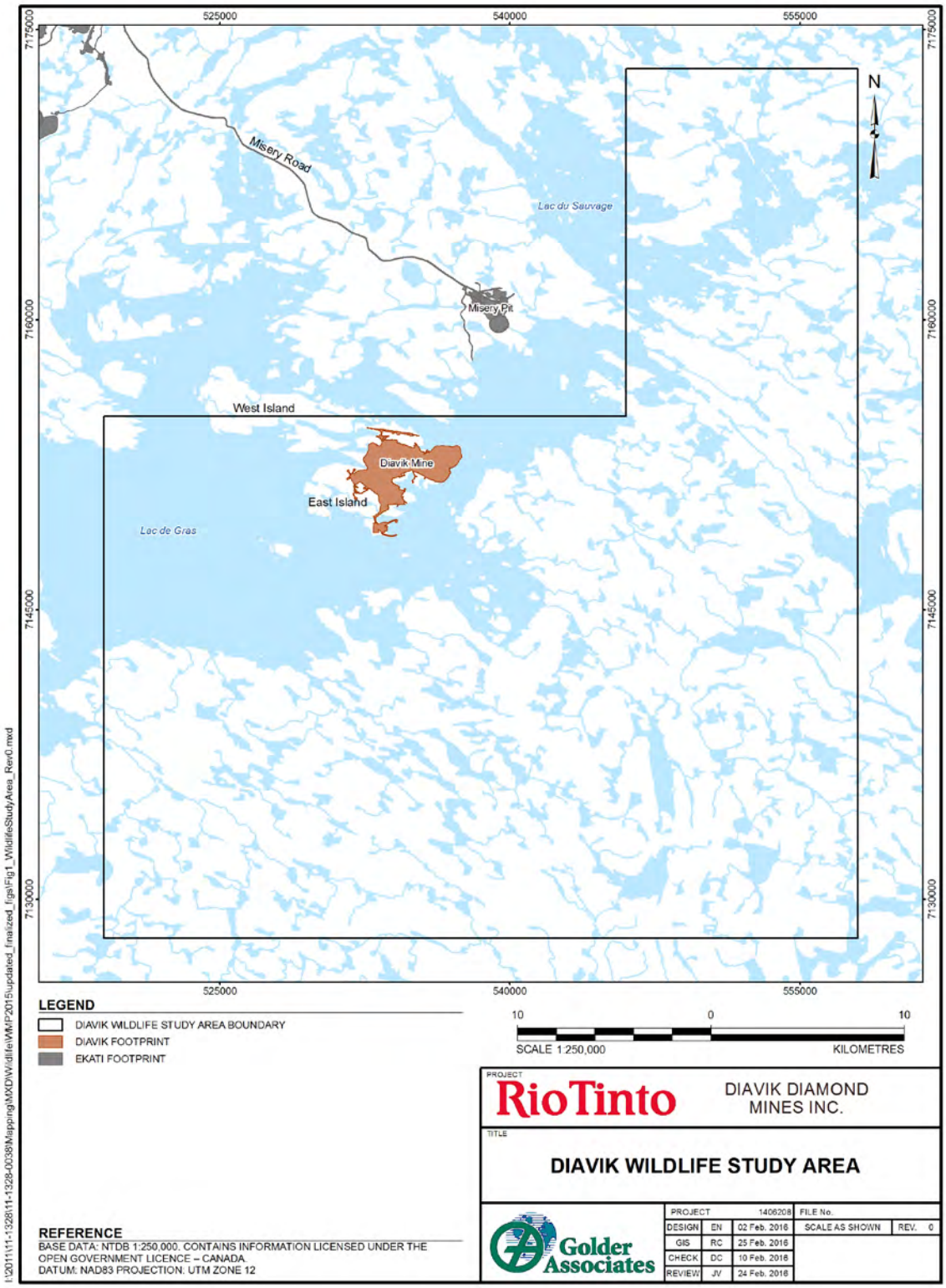
Figure 4 **2017 Mine Water Quality (SNP) Sample Locations**



Wildlife & Plant Monitoring

Diavik developed a wildlife monitoring program to check if the actions taken to reduce impacts to wildlife are working. The program is called the Wildlife Monitoring and Management Plan (WMMP) and is a method for detecting, modifying and improving procedures for wildlife and habitat management at the mine site. The WMMP is therefore closely linked with Diavik policies, guidelines and management plans. As outlined in Table 3, the program includes monitoring for vegetation/wildlife habitat, caribou, grizzly bear, wolverine, raptors and waste management.

Figure 5 Regional Wildlife Study Area for the Diavik Mine



4. Results: Summary of Rolling Effects & Monitoring Program Changes

This section gives a summary of monitoring results and changes that have occurred to each program over time. Many of the changes have been made in response to information collected, items missing from study designs or based on feedback from various stakeholders. The Environmental Assessment included predicted indicators (things we can watch for change) that would either stay the same or change over time. The predictions (estimates) for each indicator have been included in this section, followed by a summary of the information collected to confirm those predictions over the years. Graphs and figures or tables are given where practical to show the trends over time. Where trends are not similar to those predicted, DDMI has included a brief discussion of possible reasons. Further details can be found in the full reports that Diavik produces for each topic and a plain-language summary of what the results from the environmental monitoring programs mean is included as a 'Report Card on the Environment' in EMAB's Annual Report.

Water and Fish

At Diavik, water quality and fish health are monitored through the AEMP. The discussions below regarding fish and water come from the results of the AEMP.

Water

What effect will the mine development have on water quality?

EA Predictions and Overall Status:

- Water will remain at a high quality for use as drinking water and by aquatic life (i.e. meet CCME thresholds);
    - *Confirmed to date based on AEMP sample results; there is strong evidence for nutrient addition in Lac de Gras and weak evidence that toxic effects are occurring*
- Localized zones of reduced quality during dike construction;
    - *Confirmed based on water samples during construction – all dike construction completed*
- Nutrient enrichment (increased nutrients) is likely from the mine water discharge (and may change the trophic status (a measure of how productive the lake is) of up to 20% of Lac de Gras);
    - *Confirmed to date based on AEMP sample results – the area of Lac de Gras impacted varies by year and has exceeded 20% twice during ice cover but never during open water*
- Post-closure runoff (water flowing off the mine site) expected to affect the quality of two inland lakes.
    - *Post-closure effects cannot be measured at this time.*

2017 Observations:

- Sixteen water quality parameters showed an early-warning indicator of effects in Lac de Gras. Three additional variables (i.e., ammonia, lead and tin) were added to a list of substances of interest in 2017, because possible effects of dust were seen in lake areas a short way from the mine. The Regulated effluent parameters from the Water License were all below requirements.

  Elevated amounts of nutrients extending to various distances from the Mine (depending on variable and season) suggest the Mine is adding nutrients to Lac de Gras. In 2017, total phosphorus was above the normal range in 1.1% of the area of Lac de Gras. Effects on total nitrogen were seen in about 41.9% of the lake area. Effects on phytoplankton was19.4%, while that for zooplankton weight was less than 0.6% of Lac de Gras. Effects on chlorophyll *a* was estimated at around 26.2% of the lake area.

  These results show that nutrient addition is happening in Lac de Gras, however there is nothing that shows a toxic effect in Lac de Gras from mine operations. There was no clear pattern to show if increased nutrients followed the plume of water discharged from the mine's water treatment plant. For zooplankton there was a clear pattern showing decreasing amounts further from the mine's discharge. The results also indicated that there are different types of species that are seen closer to the mine.

2014-2016 3-year Summary Report Observations:

- The treated water that is put back in the lake has been tested between 2002 and 2016 and it was found to be generally not toxic when tested with fish and tiny animals that live in the water column. Over 700 toxicity tests were done during this period. The treated water from the mine continues to meet the requirements for quality described in the Water Licence. The importance of an effect was calculated by comparing the water chemistry in different areas in the lake to the background values (what is considered 'normal' for Lac de Gras) and Effect Benchmarks (similar to a water quality guideline) as well as by reviewing trends to see if amounts were higher or lower over time. Background values for Lac de Gras are those that fall within what is called the "normal range". The normal range describes the natural differences that are found within the chemistry of a lake that hasn't been impacted by development. An amount that is greater than the normal range would not be considered normal for Lac de Gras, but it also doesn't mean that it is harmful. Effect Benchmarks (similar to water quality guidelines) are a better way to measure when a chemical may be harmful to animals that live in the water. Concentrations of total dissolved solids, chloride, fluoride, calcium, potassium, sodium, and sulphate in Lac de Gras were greater than the normal ranges in both the ice-cover and open-water seasons, and are generally increasing over time. This increase matches up with the amounts of these chemicals we measure in the mine's treated water discharge. Water quality results from 2015 and 2016 also showed the effects of the A21 dike construction on the water closer to the mine. Results from the west side of the lake show possible cumulative effects in this area because of the Diavik and Ekati mine discharges. However, the amount of these chemicals in the affected area of Lac de Gras remain low and were not seen in all

years of monitoring. The majority of chemicals with Effects Benchmarks had levels below those values from 2002 to 2016 in the area where the treated mine water discharge mixes with the lake water.

Nutrient levels remain low throughout Lac de Gras, though chlorophyll *a* (which uses sunlight to help plants in the water grow) and plankton (small plants and animals that live in the water) show effects related to increased nutrients closer to the mine. The amount of nitrogen has been above the normal range in over 20% of the lake since 2008, with up to as much as 84% of the lake area being considered as affected in 2016. The area with greater amounts of chlorophyll *a* has also increased between 2007 and 2016, to over 40% of lake area. The EA predicted that the amount of phosphorus would not exceed 5 micrograms per litre in more than 20% of the area of Lac de Gras. So far, this prediction has been exceeded twice during the ice-cover season (2008 and 2013), but it has never been exceeded during the open-water season.

The sediment quality component of the AEMP measures chemicals in the mud at the bottom of the lake. Seventeen chemicals measured in sediment from 2007 to 2016 had greater amounts in areas closer to the mine when compared to areas further from the mine. However, none of these were in amounts above guideline values for protecting plants and animals that live in or near the sediments.

The plankton component of the AEMP evaluated whether there were any changes happening to the tiny plants and animals that live in the water in Lac de Gras. Changes in plankton can affect fish in the lake because fish eat them, and changes in plankton can happen before fish are affected. Differences in the plankton communities between areas closer to and further from the mine have been seen every year between 2007 and 2016. Conditions in Lac de Gras are suitable for growth of healthy plankton communities. Overall, the changes to plankton communities in Lac de Gras continue to reflect the increase in nutrients closer to the mine.

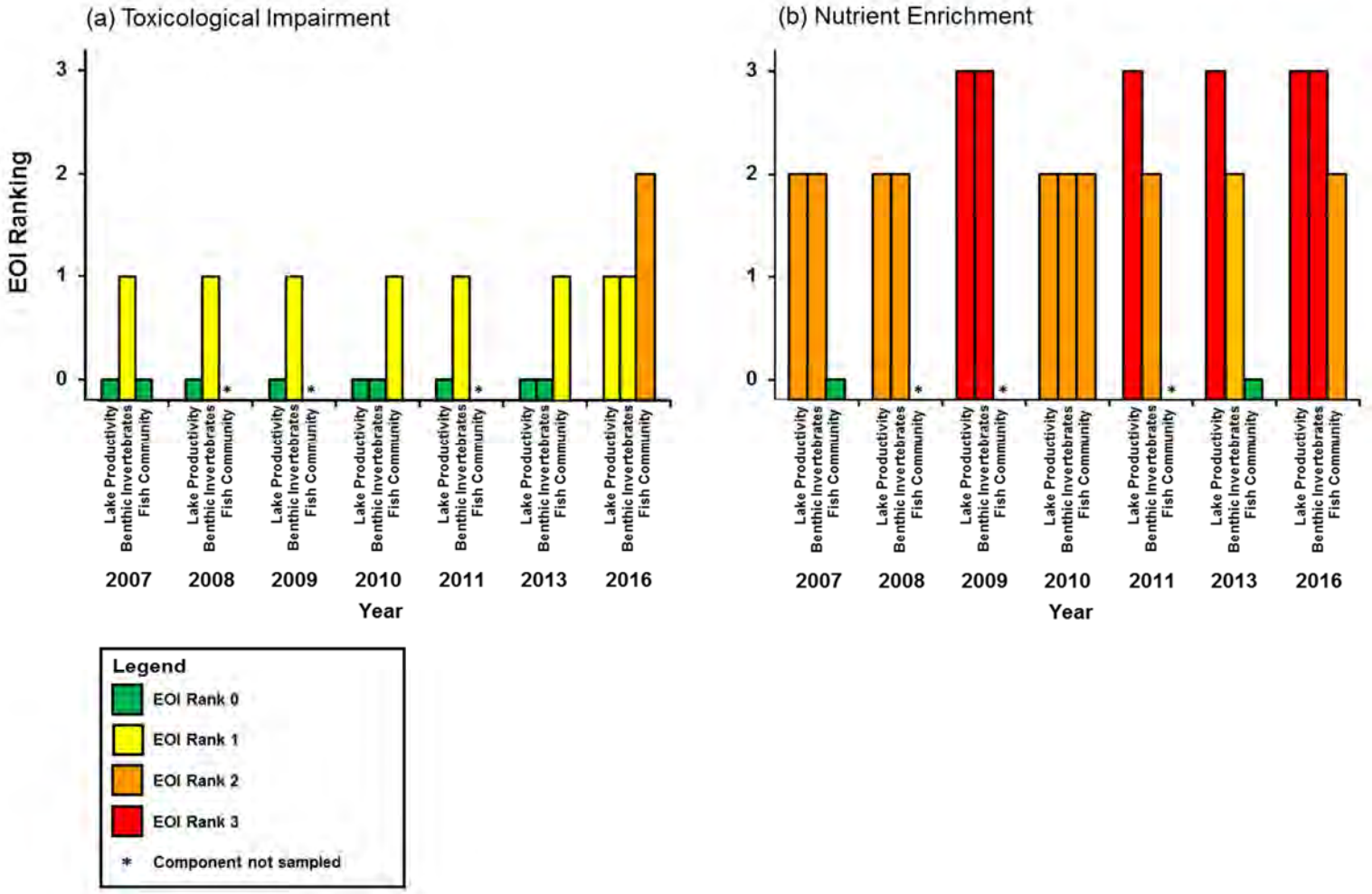
The benthic invertebrates component of the AEMP looks at whether the treated mine water put back into Lac de Gras has caused changes over time in the numbers and types of small bugs that live on the bottom of Lac de Gras. Benthic invertebrates include snails, clams, worms and insects. These bugs are food for fish and changes in the numbers and types of them can eventually cause changes in the numbers and types of fish in the lake. Effects of nutrient addition have also been observed for the bugs on the bottom of the lake, but recent results suggest a weakening of this effect.

Slimy Sculpin, which is a small fish that lives and stays in small local areas, that live close to the mine are generally smaller in size than those that live farther from the mine. The fish living close to the mine have stayed the same size over time, which suggests that the reason for the size difference is other factors (like fish habitat). For example, water temperature is colder closer to the mine and gets warmer farther from the mine; this might make some fish grow more slowly in

the near-field area. In general, while there are some small differences in fish size, fish are healthy overall, and able to grow and reproduce.

The weight-of-evidence section of the AEMP combines the information and conclusions of the sections of the AEMP report that look at lake and treated mine water quality, eutrophication indicators (signs of increased nutrient availability), sediment quality on the lake bottom, tiny plants and animals that live in the water, bugs that live on the bottom of the lake and fish health. It tries to summarize the overall health of the lake when all of these things are considered together. A process was used to estimate the strength (or weight) of evidence (proof) for nutrient addition or toxic effects occurring in Lac de Gras from 2007 to 2016 (Figure 6). Overall, there is strong evidence for nutrient addition in Lac de Gras and weak evidence that toxic effects are occurring.

Figure 6 Weight-of-Evidence Summary



EOI = Evidence of Impact

Updates to the AEMP Design (the document that describes what, when, where and how to sample the lake) and the Reference Conditions Report (the document that says the amount of each substance that is considered typical for Lac de Gras) were put forward in response to the results from the 3-year evaluation. This includes: studying mine-related effects by looking at trend across the lake (instead of comparing area results from near the mine and farther from the mine), changes to the number and location of sample points farther from the mine, changes to how Action Levels are evaluated and explained and minor updates to the list of what is tested for at the lab. The sampling schedule for tiny plants and animals that live in the water column has been changed to every year in the middle of the lake (it used to be once every three years), so that they can look at possible effects on tiny plants and animals in the main body of the lake on an annual basis.

2016 Observations:

- As noted in the 2015 EAAR, AEMP report submissions have been off schedule the past few years to address some information requested by the WLWB. As such, the 2016 EAAR includes AEMP updates for the 2015 and 2016 AEMP Annual Reports. The 2015 AEMP Annual Report was submitted to WLWB on 15 September 2016 and the 2016 AEMP Annual Report was submitted on 31 March 2017; both reports had not yet been approved by the end of 2016. Diavik developed a Reference Conditions Report (2015) that is used to calculate and record the expected range of values for water quality parameters so that these can be used for comparisons in AEMP data calculations going forward. It also provides reference area (natural background) levels for the lake. The 2015 and 2016 monitoring was based on the AEMP Study Design Plan, Version 3.5 (2014). This document describes the sampling program and actions to take in response to findings. Diavik submitted an updated version of the AEMP Study Design Plan (V4,) and the Quality Assurance Project Plan (V3, the document that describes the care taken in field, lab and data analysis procedures to provide reliable results) to the WLWB in July 2016. Approval of these documents was still pending at the end of 2016. Lastly, the 2014-2016 Re-evaluation Report, which summarizes AEMP findings to date on a 3-year basis, is due 6 months after approval of the 2016 AEMP Annual Report. Key results from the 2016 program are outlined below.

  Dust deposition rates in 2016 were higher than in 2015 because of A21 dike construction activities. Deposition rates were highest close to the Mine infrastructure and decreased with distance from the Mine. The effluent (treated water discharged from the water treatment plant) water quality limits in the Water License are often used as a comparison for snow water quality and the 2016 results were lower than those stated in the license.

  Mine effluent triggered Action Levels (which are considered an early-warning of possible effects in the area close to the mine) for 15 water quality variables, including turbidity, calculated total dissolved solids (TDS), calcium, chloride, sodium, sulphate, nitrate, aluminum, copper, lead, manganese, molybdenum, silicon, strontium, and uranium. Based on the amount of the following substances found in the treated mine water, eleven additional variables - total suspended solids (TSS), bismuth, chromium, cobalt, fluoride, iron, nitrite, thallium, titanium, vanadium, and

zirconium - were added to the list of parameters to watch for in Lac de Gras (also called Substance of Interest, or SOI). Action Levels, explained in the Design Plan, are triggered well before unacceptable effects could occur. Regulated effluent parameters were all below applicable effluent quality criteria (EQC) in the Water License. The 2016 effluent toxicity results indicated that the effluent discharged to Lac de Gras in 2016 was generally non-toxic.

Increased amounts of nutrients moved across the lake to reach various distances from the Mine (depending on the type and season), and concentrations of chlorophyll *a* were higher than the top of the normal range in areas close to the mine. This suggests the Mine is having a nutrient enrichment (increase) effect in Lac de Gras. In 2016, 6.5% of Lac de Gras was considered affected with respect to total phosphorus (TP) concentrations, the extent of effects on total nitrogen (TN) was 84.7% of the lake area and that for chlorophyll *a* was 43.7%. This triggered an Action Level response, as noted in the AEMP Design Plan, and a Response Plan is being developed.

The 2016 phytoplankton (tiny plants that float in the water) results show no signs of a Mine-related effect in Lac de Gras. However, zooplankton (tiny animals that float in the water) results suggest that changes are occurring in areas near the mine may be related to an increase in nutrients. Phytoplankton and zooplankton biomass (the total weight of these tiny plants and animals) was 13.0% and 0.5%, respectively, of Lac de Gras. The amount near the mine remained within the normal range of values expected for zooplankton and this tells us that the reason for the decrease is not likely to be contamination. An Action Level response was triggered because the amount of zooplankton close to the mine was lower than it is farther from the mine (the opposite of what would likely be expected) and DDMI plans to investigate the cause for this.

Nine sediment (mud on lake bottom) quality variables in the area near the mine were in amounts greater than areas far from the mine, including TN, bismuth, lead, molybdenum, potassium, sodium, strontium, tin, and uranium. These variables were added to the list of parameters to watch for in Lac de Gras. There are no Action Levels for sediment quality. Based on published studies and available sediment quality guidelines, concentrations of bismuth, lead, and uranium encountered in sediments near the mine are unlikely to contaminate species of plants and fish.

Differences in the benthic invertebrates (small bugs that live on the bottom of the lake) between the area close to the mine and those areas far from the mine demonstrated a slight response to increased nutrients. Greater densities (amount of bugs in a given space) were observed closer to the area where treated mine water flows back into the lake and there were a lot more midges in this area when compared to areas further from the mine. Species evenness (how close the number of each species is in different areas) was affected by the number of midges near the mine and this triggered an Action Level response to investigate the cause and confirm the effect. The average values for all of the measurements taken for lake bottom bugs close to the mine were within expected levels.

Overall, the weight of evidence evaluation showed more of an environmental response to increases in nutrients in Lac de Gras rather than signs of a contamination response. There appears to be a clear link between nutrient releases (i.e., TP and TN) to Lac de Gras from the

treated Mine water resulting in greater amounts of nutrients and lake productivity at areas closer to the mine. There was also a response that showed more and different distributions (midges) of bugs that can be linked to increased nutrients. Although there are differences between the areas closer to and farther from the mine for nutrients, there appears to be little effect on the ability of the lake to support and maintain its health.

2015 Observations:

Dust deposition rates in 2015 were higher than in 2014. Deposition rates were highest close to the project infrastructure and decreased with distance from the Mine. The effluent (treated water discharged from the water treatment plant) water quality criteria in the Water License are often used as a comparison for snow water quality and the 2015 results were lower than those stated in the license for all except one sample (which was taken from an incorrect location).

The treated water discharged back into Lac de Gras had an effect on 17 water quality parameters (total dissolved solids [TDS, calculated], turbidity, calcium, chloride, potassium, sodium, ammonia, nitrate, aluminum, antimony, chromium, copper, molybdenum, silicon, strontium, uranium and vanadium). The concentrations of these variables in the area near the mine were higher than those measured further from the mine (reference area). As a result, an Action Level response, explained in the AEMP Design Plan, was triggered. These are considered as early-warning signs of possible effects in the area close to the mine and are triggered well before unacceptable effects could occur.

Results from water quality sampling suggest that the Mine is causing a slight increase in nutrients, as also reported during previous years of monitoring. Higher amounts of total

phosphorus (TP) and total nitrogen (TN) were observed in the areas near the mine when compared to areas further away from the mine. Less than 20% of the lake area had concentrations of chlorophyll *a* higher than the normal range. This also triggered an early-warning Action Level response in relation to nutrient levels.

The 2015 plankton (small plants and animals living in the water) monitoring results suggest that zooplankton communities in Lac de Gras are exhibiting a Mine-related effect in response to increased nutrients, consistent with the results for water quality. The 2015 plankton results provided no direct evidence of contamination, as all measurements taken were within normal levels. However, the total weight of small plants in areas near the mine was lower than those further from the mine. This triggered an Action Level response for possible contamination and the presence of this early warning change will be confirmed during the 2016 AEMP analysis.

2014 Observations:

As noted in the 2014 EAAR, the Annual AEMP report submission was delayed due to a request for further information from the WLWB. An updated version of the 3-year (2011-2013) Summary Report of the AEMP was submitted to the WLWB in April 2016, and the 2014 AEMP Annual Report was submitted on 31 March 2016. The development of the Reference Conditions Report for Lac de Gras is the main reason for these delays. It is a report that calculates and explains the

background (natural) water quality and allows regulators to better determine the level of any effect on the lake. As such, the updated 3-year Summary Report and the 2014 Annual report are summarized in this section. The 2015 Annual AEMP Report as well as Version 4 of the AEMP Design document are both due on 30 June 2016.

Water quality tests showed that there were 19 elements that had amounts over two times higher close to the mine when compared to samples taken further away in Lac de Gras. Eight of these were also above what is considered the normal range for their concentrations in Lac de Gras. Diavik is taking the appropriate actions outlined for such a response, as detailed in the approved Action Level Framework for water chemistry.

Nutrient addition to the lake, as measured by nitrogen, phosphorous and parts of algae concentrations, continued to show mild enrichment (an increase in nutrients) close to the mine compared to other areas farther from the mine. The small plants and animals that live in the water column (plankton) have increased in light of the increased nutrients, and tests do not show signs of harm (toxicological impairment) to the number or types of organisms that are present.

2011-2013 3-year Summary Report Observations:

Below is a summary of the updated findings for each of the monitoring activities included in the Aquatic Effects Monitoring Program, and it focuses on results from 2011 to 2013.

- The treated water that is discharged back into Lac de Gras has shown changes in quality over the years. For example, salts such as calcium and chloride have decreased since 2010. Some metals have increased over time (molybdenum, strontium), however most have decreased (aluminum, barium, copper, manganese) or stayed the same (chromium, uranium, antimony, silicon). The tested mine effluent has continued to meet water license criteria. Additionally, most of the effluent tested over the years has been non-toxic, with over 500 toxicity tests conducted since 2002.

- A total of 25 different chemicals had levels that were greater near the mine versus further away. Of these, 14 had higher levels than what is considered normal for Lac de Gras, but this does not necessarily mean that it is harmful. None of the chemicals tested were higher than what are called benchmark values, which measures when a chemical may be harmful to aquatic life. With the exception of chromium in 2004 and 2006, water quality has remained below the guidelines for protection of aquatic life throughout the life of the mine.

- Increased productivity (eutrophication) was a predicted effect for Lac de Gras because groundwater and treated mine water would introduce more nutrients into the lake. This is why monitoring nutrients (phosphorous and nitrogen) and algae growth (determined by measuring chlorophyll *a*, the green pigment in algae) is important to measure over time. Concentrations of nitrogen and have been higher than the normal range in over 20% of the lake since 2008 and chlorophyll *a* had the same results in 2009 and 2013. Phosphorus was

predicted not to go over 5 micrograms per litre in more than 20% of Lac de Gras; this level has only been exceeded twice during ice cover in 2008 and 2013, and never during open water.

- Plankton (small plants and animals that live in the water column) are monitored because they are part of the food chain and changes in their population may be seen before any impacts are noted in fish. Since 2007, the amount of plankton has consistently been higher closer to the mine versus farther from the mine. Monitoring has shown that the mine is not having a harmful/toxicological effect on plankton. Changes to the type of plankton are being seen throughout Lac de Gras, suggesting that a natural change is also occurring. The number of small animals in the water (zooplankton) peaked in 2011 and has decreased since then, but has still been greater than the normal range for Lac de Gras since 2007. The amount of phytoplankton (biomass of small plants) was greater than the normal range in more than 20% of the lake in 2009 and 2011.

- Sediment samples showed that 15 metals were deposited onto the lake bottom near the mine in greater amounts than are present in areas of the lake farther from the mine. To date, the amount of metals present has stayed below the guideline that protects animals living in the lake bottom sediments. Concentrations of bismuth, lead and uranium increased near the mine from around 2002 to 2008, and it is thought that the construction of the dikes may have contributed to this increase. The amount of these metals in sediments has remained the same since 2008 and have not exceeded Soil Quality Guidelines.

- Benthic invertebrates (bugs such as snails, clams, worms and insects that live in the sediment on the bottom of the lake) are studied because they are food for fish. Since 2008, the number of bugs close to the mine has been higher than areas farther from the mine, but they are within the normal range for the lake. The types of these bugs have changed over the years, but similar to the findings with plankton, a change over time has also been seen in the reference areas and suggests that natural changes occur over time.

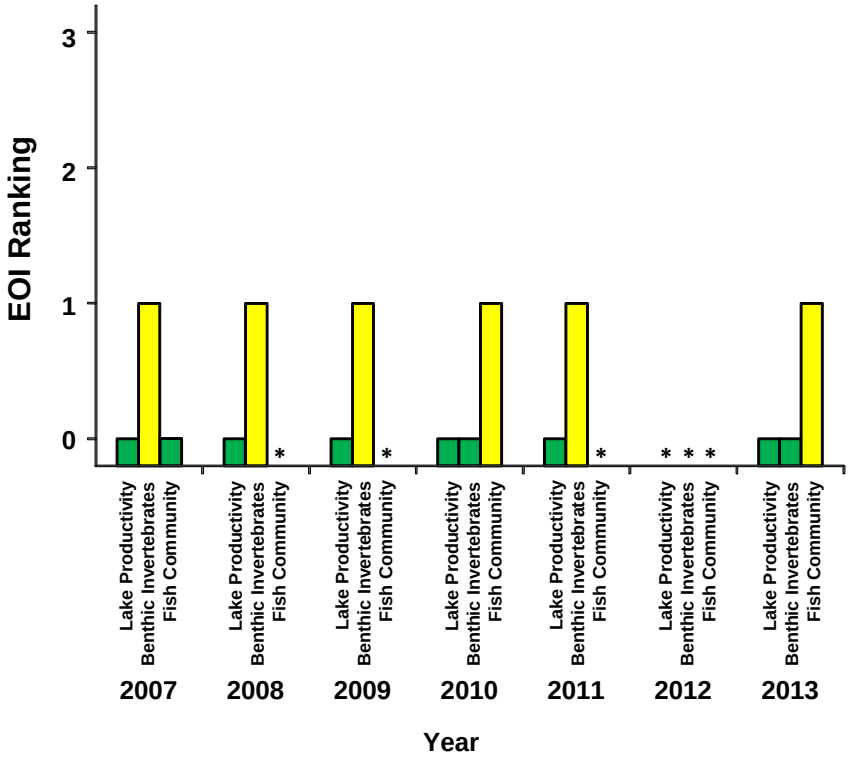
- Small (slimy sculpin) and large (lake trout) fish are sampled from Lac de Gras. Small fish are good to sample because they tend to live in one area. Large fish are good to sample because they are the top of the food chain and of value to community members. Results from small fish samples have consistently showed increased levels of lead, strontium and uranium even though water quality levels for these chemicals are not of concern. Outside of this, there have been no consistent trends in differences between small fish close to the mine when compared to those further from the mine. Lake trout flesh samples have shown an increase in mercury concentrations, but this has also been observed in fish from Lac du Sauvage, and other areas in the north. Traditional Knowledge studies have shown

that the taste and texture of the fish in Lac de Gras has not changed over the years the mine has been operating.

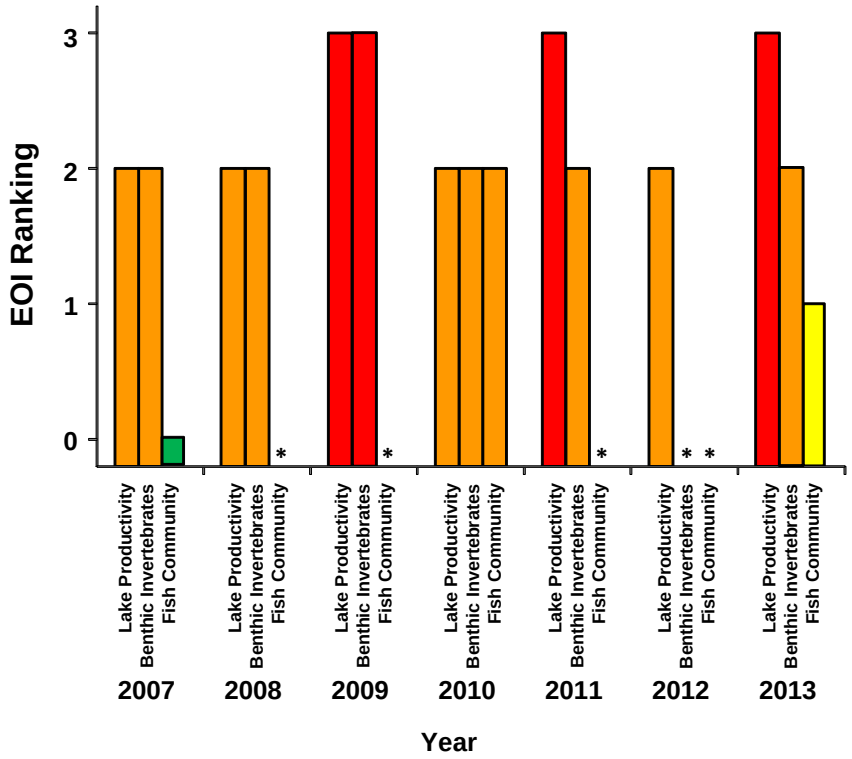
- A weight-of-evidence (refer to Definitions section) uses all of the above information in a qualitative process where professional scientists assess the strength of all the results in determining possible nutrient enrichment or harmful/toxicological impacts from the mine. There was strong evidence for nutrient enrichment and weak evidence for toxicological damage from 2011 to 2013. The effect of nutrient enrichment in Lac de Gras extends over approximately 20% of the lake, as was predicted in the 1998 Environmental Assessment.

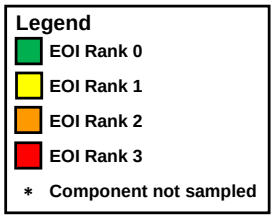
Figure 7 Overall Ranking of Effects

Toxicological Impairment



Nutrient Enrichment





EOI = evidence of impact

2013 Observations:

Revisions to the Aquatic Effects Monitoring Program design resulted in a more in-depth program being conducted on a 3-year cycle for the AEMP, and 2013 was a year where the majority of sampling requirements for the program were conducted. Overall, the program determined that nutrients (nitrogen and phosphorus) released into Lac de Gras from the treated mine water discharge continue to increase in Lac de Gras, near the East Island.

- Mine effluent had an effect on 15 water quality variables and the amount of chemical in each sample was highest close to the mine and lowered with increasing distance from the mine.
- Results relating to eutrophication indicators (chemicals and small plants that show early signs of increasing nutrients) suggest that the mine is causing an increase in nutrients in Lac de Gras as there were greater concentrations of some nutrients and small plants closer to the mine versus further from the mine.

  For example, algae (chlorophyll *a*) concentrations were higher than the normal range for Lac de Gras, and the higher amount of algae was found in over 20% of the lake. The approved AEMP (v3.3) has established an Effects Benchmark for chlorophyll *a* at a concentration of 4.5 µg/L; current results are below this value (Figure 11).

- The 2013 monitoring results for plankton communities (tiny plants and animals) in Lac de Gras suggest that there is a mine-related increase in nutrients because there was a difference in the amount and type of them in the exposure area (close to the mine) when compared to the reference areas (further from the mine). There was however no evidence of toxicological damage, so no Action Level has been reached.

- Effects of the mine discharge on bottom sediments (mud at the bottom of the lake) in the exposure area of Lac De Gras were evident for 13 metals, as areas near the mine had higher average amounts than those further from the mine. Of these 13 metals, three had average amounts that were higher than what would normally be found in the lake. When comparing these results to sediment quality guidelines, it is unlikely that the amounts found in Lac de Gras sediments would be harmful to fish and plants.
- Differences in the total amount of benthic invertebrates (small bugs that live on the lake bottom) were noted between the exposure area (close to the mine) and reference areas (further from the mine). This suggests an increase in nutrients, rather than a harmful effect, so no Action Level was reached. Benthic invertebrates are measured by density, which means counting the number of animals in a given area.
- The Weight of Evidence assessment is meant to rank impacts to Lac de Gras using the data collected by the AEMP, as summarized in the bullet points above and in the Fish section

below. Impacts from different parts of the program (e.g. Fish Health) are rated as being: negligible/none (score of 0), low (1), moderate (2) or strong (3). They are also categorized as either 'toxicological' (harmful response) or 'nutrient enrichment' (increased nutrients).

Table 4: Weight-of-Evidence Results, 2013 AEMP

Ecosystem Component	EOI Rating
Toxicological Impairment	
Lake Productivity	0
Benthic Invertebrates	0
Fish Population Health (see below)	1
Nutrient Enrichment	
Lake Productivity	3
Benthic Invertebrates	3
Fish Population Health (see below)	1

- During 2013, a batch of preservative that is provided by an external lab and added to water samples prior to shipping was found to be contaminated. After investigation, a total of seven metals (cadmium, chromium, cobalt, iron, manganese, molybdenum, and nickel) were found to be in higher concentrations than normal when the contaminated preservative was used, starting in July 2013. Further tests were then done to determine which sample results were incorrect because of this contamination. These seven metals from a total of 114 specific samples (21 samples from 1645-18, 24 samples from 1645-19 and 69 samples from the open water AEMP) were removed from the 2013 AEMP and SNP datasets, and these values were also not used in any analyses.

2012 Observations:

The Aquatic Effects Monitoring Program was successfully revised before the 2012 monitoring season so only certain aspects of water quality and fish monitoring were conducted. Overall, the program determined that nutrients (nitrogen and phosphorus) released into Lac de Gras from the treated mine water discharge are causing some enrichment in Lac de Gras, near the east island. A Traditional Knowledge study on fish and water health was also conducted as part of the AEMP during the summer of 2012.

Specific results of note from the 2012 Aquatic Effects Monitoring Program include:

- The analysis of effluent and water chemistry data collected during the 2012 AEMP field program and from relevant sites from the Water License SNP program stations indicated similar trends as observed in 2011, including an increase in arsenic and iron concentrations.

- Results to date of the plankton monitoring program, which examines changes in the amount, number and types of tiny animals (zooplankton) and algae (phytoplankton) that live in the water of Lac de Gras (LDG), indicate a pattern consistent with weak nutrient enrichment from mine effluent.
- Results of the eutrophication indicators component of the AEMP were similar. Based on the measured higher amounts of phytoplankton (chlorophyll *a*) and total phosphorus (TP) in the near field area relative to the reference areas, the observed enrichment effect has been given a "moderate" effect level designation. Zooplankton biomass resulted in a "low" effect level designation. More specifically, the area of the lake that has been affected was 24% of LDG for Chlorophyll *a* and less than 1% for TP in 2012.
- Toxicity testing on the treated mine water that is discharged back to Lac de Gras was done four times in 2012, as part of the SNP program in the Water License. No concerns or issues were noted with any of these tests.
- The results from the 2012 TK camp provided feedback on the context and process for sharing Traditional Knowledge as well as on the health of the fish and water in Lac de Gras. Camp participants noted the importance of TK's context, which is situated in, and interconnected with spirituality (e.g., human-animal transformations), codes of conduct (e.g., respect for and obedience of one another), and connection to the land, animals, and ancestors. Customs and practices (e.g., drumming, feeding the fire and water) and stories about the journey-based creation of unique landscape features (e.g., mountains, islands, and waterbodies) underscore this context of TK. So, the importance of the setting in which knowledge is shared and of being respectful to others becomes important to ensure proper transfer of knowledge.
- TK camp participants noted the environmental indicators that they use to assess water quality, such as condition of the shoreline and clarity of the water. Additionally, a tea test was used to assess water quality and participants noted that tea made from water of a poor quality results in film or scum on the surface of the cup. None of the water samples from Lac de Gras had this scum or film and all the samples tasted acceptable to participants.

2011 Observations:

Overall, the 2011 program determined that nutrients (nitrogen and phosphorus) released into Lac de Gras from the treated mine water discharge are causing mild enrichment in the bay east of East Island.

Specific results of note from the 2011 Aquatic Effects Monitoring Program include:

- The analysis of effluent and water chemistry data collected during the AEMP field program and from relevant sites from the Water License SNP stations continued to show a low level effect on water chemistry in the lake resulting from the mine.

- Analysis of the number and types of small organisms that live on the bottom of the lake (benthic invertebrates) indicated a range of effect terms, from no effect to a high level effect, depending on what was analyzed. Low level or early-warning effects were detected for some species between the reference areas and exposure areas. Effects on total density (amount) and other benthic species density were classified as moderate level. A high level effect was found for the amount of one species. Benthic invertebrate monitoring results show effects of mild nutrient enrichment.
- Results to date of a special study to examine changes in amount, number and types of tiny animals (zooplankton) and algae (phytoplankton) that live in the water of Lac de Gras show a pattern consistent with nutrient enrichment from the mine. Based on the measured higher amounts of algae (chlorophyll *a*) and total phosphorus near the mine versus farther from the mine, this effect remains at a "moderate" level effect designation. Higher zooplankton biomass near the effluent continued to result in a "high" level effects designation.
- Moderate nutrient enrichment from the mine water discharge has been shown for 15.5% of Lac de Gras, based on the amount of algae and phosphorous measured in the lake. This is below the predicted level of 20%.
- Results of the Lake Trout study suggest that there has been a slight increase in mercury in Lake Trout muscle tissue since 2005. This increase is seen in both Lac de Gras and Lac du Sauvage. The increase in mercury from before the mine was built resulted in a low level effect classification.
- A technical analysis confirmed the nutrient enrichment effect and concluded that there continues to be strong evidence for a mild increase in lake productivity, and associated enrichment of the benthic invertebrate community, as a result of nutrient increases in Lac de Gras. There is some evidence suggesting low-level impairment to the small organisms on the bottom of the lake due to contaminant exposure but these findings have a high uncertainty because the link to contaminant exposure is not strong. The slight increases in mercury levels in fish tissue since 1996 have occurred in both Lac de Gras and Lac du Sauvage (upstream from the mine), and it is not likely that the increase is linked to mine operations. Diavik continues to monitor mercury levels in big and small fish in the lake, as well as monitoring for other possible sources of mercury. This helps to try and find out what may cause any increases that do happen and catch any possible issues.

2010 Observations:

Overall, the program determined that nutrients (nitrogen and phosphorus) released into Lac de Gras from the treated mine water discharge are causing mild enrichment in the bay east of East Island.

Specific results of note from the 2010 Aquatic Effects Monitoring Program include:

- The analysis of effluent and water chemistry data collected during the AEMP field program and from relevant sites from the Water Licence SNP stations showed a low level effect on water chemistry in the lake resulting from the mine.
- Results of the sediment analysis did not identify conditions that are likely to affect fish, bug or plant life in the lake through enrichment or harm. Bismuth and uranium were, however, assigned "high level effects" designations as both areas near the mine and at least one halfway down the lake had average concentrations greater than the areas farther from the mine. Measured levels of bismuth and uranium are unlikely to pose a risk to fish, bugs or plant life.
- Analysis of the number and types of small organisms that live on the bottom of the lake (benthic invertebrates) indicated a range of effect terms, from no effect to a moderate level effect, depending on what was analyzed. Low level or early-warning effects were detected based on statistical differences between the reference areas and exposure areas. Effects on total density and other benthic species density were classified as moderate level. Early-warning/low level effects were detected for the amount, distance and density of one species. Benthic invertebrate monitoring results are indicative of nutrient enrichment.
- A study was completed in 2010 to determine the approximate area the treated effluent (a "plume") covers in Lac de Gras. The plume extent was similar between summer open-water and winter ice-cover conditions, but concentrations near the discharge point were higher during winter ice-cover conditions.
- One possible explanation for the 2007 finding of elevated mercury in small fish (Slimy Sculpins) was increased mercury being released from sediments because of nutrient enrichment from the treated mine effluent. A sediment core study was done to look in to this and it showed that this explanation was not likely, based on the results.
- Results to date of a special study to examine changes in amount, number and types of tiny animals (zooplankton) and algae (phytoplankton) that live in the water of Lac de Gras indicate a pattern consistent with nutrient enrichment from treated mine effluent. Based on the measured higher amounts of algae (chlorophyll *a*) and total phosphorus near the mine versus farther from the mine, this effect has been given a "moderate" level effect designation. Higher zooplankton biomass near the effluent resulted in a "high" level effects designation.
- Results for the small fish study indicate a pattern consistent with an increased availability of food and nutrients in the sampling areas near the mine compared to the areas farther from the mine. Despite the moderate-level effects seen in the fish tissue chemistry for bismuth, strontium, titanium and uranium, there was no evidence that tissue metals concentrations were negatively affecting fish health.
- Mercury levels in small fish (Slimy Sculpin) at sampling sites near the mine were lower than reported in the 2007 AEMP. There was no significant difference between samples taken near the mine and those taken farther away from the mine in 2010, most importantly in relation to

tissue concentrations of mercury. The reason for the differences between the 2007 AEMP results for mercury and the 2010 results is unknown; however, a different analytical laboratory using slightly different methods was used in 2010.

- A technical analysis confirmed the nutrient enrichment effect and concluded that there is strong evidence for a mild increase in lake productivity, and associated enrichment of the benthic invertebrate community and fish community, as a result of nutrient increases in Lac de Gras. There is little evidence of harm to lake productivity as a result of any contaminant exposure. Although there is some evidence suggesting potential low-level contaminant issues with benthic invertebrate and fish communities, these observations have a relatively high amount of uncertainty.

2009 Observations:

Similar to 2008, the 2009 Aquatic Effects Monitoring Program showed nutrient enrichment (increased levels of phosphorous and nitrogen in the water available for algal growth, where increasing algal growth is a sign of eutrophication, or increased lake productivity) in areas of the lake. Nutrient enrichment is the main change in Lac de Gras that leads to most of the other changes we see relating to the different animals that live in the water.

Specific observations that were noticed in the 2009 data include:

- The analysis of effluent (treated water discharged back in to the lake) and water chemistry (quality) data collected during the 2009 AEMP field program and from relevant stations from the Water License Surveillance Network Program stations indicated an early warning/low level effect on water chemistry within Lac de Gras resulting from the Mine. This means that there is a difference between samples taken near the mine and those taken farther away from the mine, but is within the expected range. Some values may be slowly increasing over time, though, so it is important to monitor for any changes that may occur from one year to the next.
- Results of the sediment analysis did not identify conditions that are likely to affect aquatic life through enrichment or impairment. Most of the metals and nutrients measured in the sediment had an early warning/low level effect on sediment chemistry. However, bismuth was assigned a "high level effect" designation; this means that samples near the mine and at least one sample part way across the lake had average concentrations that were higher than those of the reference area at the other end of the lake.
- Analysis of the number and types of benthic invertebrates (small organisms that live on the bottom of the lake) indicated a range of effect designations, from no effect to a high level effect, depending on what was analyzed. Low level/early warning effects were detected based on significant differences between the reference areas further from the mine and the exposure areas near the mine in eight of twelve benthic invertebrate community variables compared (variables include things like the number of species found, whether one species was found more than another, number of organisms in a given area, number of midges, etc.). Total

invertebrate densities, as well as two species densities (Pisidiidae and Heterotrissocladius sp.) were higher closer to the mine than the range measured in areas farther from the mine. Densities of Pisidiidae near the mine and part way across the lake were greater than the range measured in areas at the other end of the lake; for that reason, it was assigned a high level effect. These results relate back to the nutrient enrichment happening in the lake.

- Findings to date on a special study to examine changes in amount, number and types of zooplankton (tiny animals) and phytoplankton (algae) that live in the water of Lac de Gras show a pattern linked to nutrient enrichment from mine effluent. Because there are higher amounts of phytoplankton (chlorophyll a/algae) and total phosphorus in areas near the mine compared with areas farther from the mine, this effect has been given a "moderate" level effect designation. Higher zooplankton biomass (the amount of small animals in an area) near the effluent resulted in an early warning/low level effect designation; this means that there is a difference between the areas closer to and further from the mine, but that it is within the expected range.
- A weight-of-evidence (WOE) analysis compares all the information collected (water quality, sediment quality, benthic invertebrates, etc.) to try and answer two questions:
    - Could damage to aquatic animals happen due to chemical contaminants (primarily metals) released to Lac de Gras?
    - Could enrichment occur in the lake because of the release of nutrients (phosphorus and nitrogen) from treated mine effluent?

  The weight-of-evidence analysis confirmed nutrient enrichment and concluded that there is strong evidence for a mild increase in lake productivity due to nutrient enrichment. There was not a lot of evidence of damage to aquatic animals as a result of contaminant exposure. The observation of potential low-level harm of the benthic invertebrate community has a fairly high amount of uncertainty.

2008 Observations:

Overall, the 2008 Aquatic Effects Monitoring Program determined that nutrients (nitrogen and phosphorus) released into Lac de Gras from the treated mine water discharge are causing mild nutrient enrichment in the bay east of East Island. Nutrients are essential to the growth of plants and animals in land and in the water. Adding nutrients to natural waters can result in increased production of plants or algae. Too many nutrients can cause environmental problems generally known as nutrient enrichment or eutrophication. These problems include increased oxygen consumption in the water by algae (fish need this oxygen too) and a reduction in the amount of light getting to plants at the bottom of the water body.

Special Effects Studies for mercury detection limits (measuring mercury at very low levels), chromium VI (a compound Diavik investigated because it could be a concern at lower levels compared to other forms of chromium) and trout fish tissue metals levels (based on previous AEMP studies that showed possible elevated level of metals in fish) were also completed.

Other results of note from the 2008 Aquatic Effects Monitoring Program include:

- The analysis of effluent and water chemistry data collected during the 2008 AEMP field program and from locations around the mine site (from Surveillance Network Program) indicated a low level effect on water chemistry within Lac de Gras resulting from the mine.
- Results of the sediment analysis did not identify conditions that are likely to affect aquatic life through enrichment or impairment. Bismuth and uranium (metals) were however assigned "high level effects" designation as both near-field and at least one mid field area had mean (average) concentrations greater than the reference area (sites far away from the mine) range.
- Analysis of the number and types of small organisms that live on the bottom of the lake (benthic invertebrates) indicated a range of effect designations, from no effect to a high level effect, depending on the variable analyzed. Low level or early warning effects were detected based on differences between the reference areas (far away from the mine) and exposure areas (near the mine) in eight of eleven benthic invertebrate community variables compared. Density (number of individuals in a specified area) of the midge Procladius in the near-field area were greater than the range measured in the reference areas and was assigned a moderate level effect. Density of Sphaeriidae in the near-field and mid field areas greater than the range measured in the reference areas and was assigned a high level effect. Both results are indicative of nutrient enrichment.
- The fish liver tissue analyses from 1996, 2005, and 2008 has not indicated that there has been an increase in the concentration of metals, including mercury, in lake trout over that period and therefore a no effect classification has been assigned for lake trout usability.
- Findings to date on a special study to examine changes in amount, number and types of tiny animals (zooplankton) and algae (phytoplankton) that live in the water of Lac de Gras indicate a pattern consistent with nutrient enrichment from mine effluent. Based on the measured higher amounts of phytoplankton (chlorophyll a) and total phosphorus in the near field areas compared with the reference areas this effect has been given a "moderate" level effect designation. Higher zooplankton biomass near the effluent resulted in a "high" level effects designation.
- Mercury and chromium VI levels in the treated mine water discharge, both subject of special studies in 2008, were determined to be at concentrations below the best analytical detection limits available.
- The AEMP confirmed that there is a nutrient enrichment effect and concluded that there is strong evidence for a mild increase in lake productivity due to nutrient enrichment. There is negligible evidence of impairment to lake productivity as a result of any contaminant exposure. The observation of potential low-level impairment of the benthic invertebrate community has a relatively high degree of uncertainty.

Special studies on dust sampling frequency, mercury detection limits, and chromium VI are now complete.

2007 Observations:

- Effluent and water chemistry data collected indicated a low-level effect on water chemistry within Lac de Gras from the mine.
- Lakebed sediment chemistry data indicated a potential low-level effect for lead, and a potential high level effect for bismuth and uranium on sediment chemistry within Lac de Gras from mine activities, although benthic results suggest that sediment exposure concentrations are unlikely to pose risk to aquatic life.
- Benthic invertebrate analyses indicate a low-level nutrient enrichment effect on benthic invertebrates within Lac de Gras.
- The fish study indicated a pattern consistent with an increased availability of food and nutrients in near-field and far-field exposure areas compared to far-field reference areas. Elevated barium, strontium, mercury and uranium in slimy sculpin was assigned a moderate-level effect.
- Dike monitoring results revealed potential dike-related minor changes to water quality and concentrations of lead and uranium in sediment. Overall, analyses suggest benthic communities near the dikes are more likely responding to habitat variation than to changes in water quality or sediment chemistry.
- Eutrophication indicators showed a moderate-level nutrient enrichment effect within Lac de Gras, with the mine being a significant contributor to this effect.
- As with the previous year's results, despite the proximity of SNP Station 1645-19 to the effluent diffuser (60m), open-water and ice-cover water quality results remain within Canadian Council of Ministers for the Environment (CCME) Guidelines for the Protection of Aquatic Life.
- Ice-cover concentrations at SNP Station 1645-19 still tend to be higher and more variable than open-water concentrations. This is likely a result of increased wind driven lake circulation in the open-water, resulting in better initial dilution or mixing.

2005/2006 Observations:

Due to pending changes to the AEMP, data reports were completed for the 2005 and 2006 programs, however, a report of the analysis and interpretation was not submitted.

2004 Observations:

- As with the previous year's results, despite the very close (60m) proximity of SNP Station 1645-19 to the effluent diffuser, open-water and ice-cover water quality results remain within Canadian Council of Ministers for the Environment (CCME) Guidelines for the Protection of Aquatic Life.

- Ice-cover concentrations at SNP Station 1645-19 still tend to be higher and more variable than open-water concentrations. This is likely a result of increased wind driven lake circulation in the open-water, resulting in better initial dilution or mixing.
- As with the previous year, the results for several of the parameters indicated a possible change when the actual reason for the positive results was a low baseline statistic. There are also locations (LDG50) or parameters (nitrite at LDG46) where baseline data are not available and so the data analysis is not possible. Finally there are parameters where baseline detection limits have dominated the baseline statistic and could result in changes not being detected.

2003 Observations:

- Despite the very close (60m) proximity of SNP Station 1645-19 to the effluent diffuser, open-water and ice-cover results remain within CCME Guidelines for the protection of aquatic life.
- Ice-cover concentrations at SNP Station 1645-19 tend to be higher and more variable than open-water concentrations. This is likely a result of increased wind driven lake circulation in the open-water resulting in better initial dilution or mixing.
- The results for several of the parameters indicated a possible change when the actual reason for the positive results was a low baseline statistic. There are also locations (LDG50) or parameters (nitrite at LDG46) where baseline data are not available and so the data analysis is not possible. It is therefore recommended that in the future the data analysis method be modified so that the baseline references are from the combined mid-field and far field sites instead of each individual monitoring site. This change would reduce the number of false positives results.

2002 Observations:

- Water quality at all Lac de Gras monitoring locations, including sites immediately adjacent to effluent diffuser remained high.
- Increases from location specific baseline levels were measured for turbidity and suspended solids at 3 mid-field monitoring stations, however all remained within typical baseline values for the area.
- Predicted nutrient enrichment effects were not realized although phytoplankton biomass was determined to have increased over baseline at one far-field location but not at any mid-field locations.
- No trends or specific concerns were noted for zooplankton, benthic invertebrates and sediment quality, based on two sampling results.
- Snow chemistry results were all below discharge limits.

Previous Years Observations:

- Localized increases in turbidity, suspended solids and aluminum were measured due to dike construction.
- Water and sediment quality, zooplankton, phytoplankton and benthic invertebrate results were generally consistent with baseline, however some results, particularly benthic invertebrate numbers, showed larger year-to-year variability.

Fish

What effect will the mine development have on fish?

EA Prediction and Overall Status:

- On a regional scale the only effect on the fish population of Lac de Gras would be due to angling;
  - *Fish populations do not appear to have been impacted by mine operations*
- The effect of increases in metal concentrations in fish flesh would be negligible (i.e. metal concentrations in fish flesh would not exceed consumption guidelines (500 µg/kg for mercury);
  - *Two lake trout tissue samples have exceeded the 500 µg/kg for mercury and both were large, old fish (28 and 33 years) and mercury is known to increase over time*
  - *An increased amount of mercury was detected in tissue from small fish (slimy sculpin) taken from the lake in 2007 but levels since then have remained normal*
- Mercury concentrations will not increase above the existing average background concentration of 181.5 µg/kg; and,
  - *The average mercury concentration in lake trout from Lac de Gras has been similar to that found during 2008*
- Local effects due to blasting, suspended and settled sediment from dike construction, increase in metal concentrations around dikes and post-closure runoff.
  - *Effects due to blasting and construction were minimal based on monitoring and research results; post-closure runoff cannot yet be assessed.*

Observations:

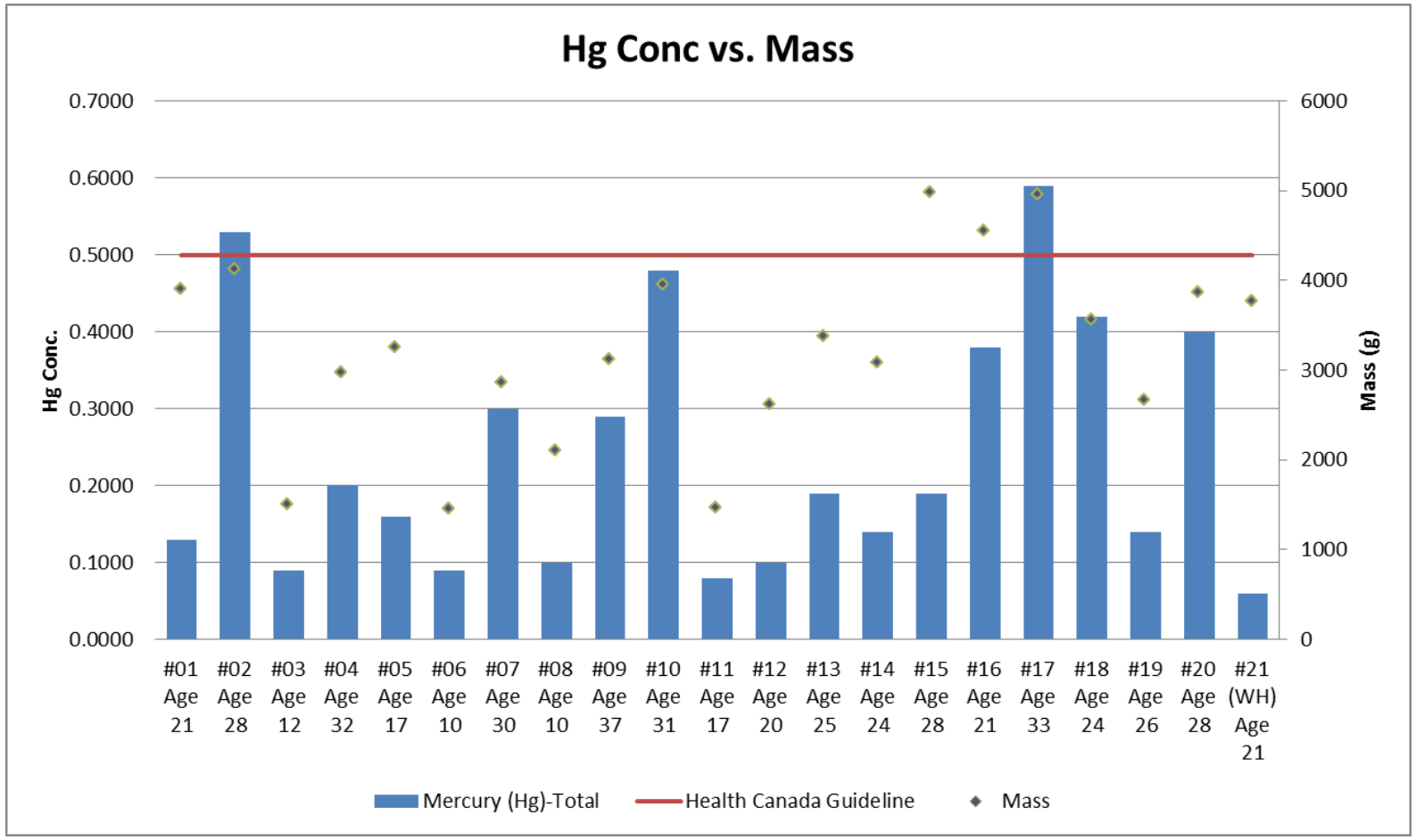
- *AEMP TK Study of Fish Health*
  Overall, participants in the 2015 AEMP Traditional Knowledge (TK) Study commented that the present status of the fish and water in Lac de Gras beside the Diavik mine is good and better than they expected given how close it is to industrial activity. People appreciated

experiencing the current state of the environment personally and evaluating both water and fish "with their own eyes". Participants acknowledged that it is also important to pair TK with science so that all aspects of the environment can be understood to its full potential.

A total of 31 fish were caught and 20 were Lake Trout while 9 were Whitefish (lake and round). Eight (8) fish were selected for inspection using TK and science. Of all the fish caught, only one fish was considered 'sickly' by participants due to its heart being smaller than usual and the presence of cysts on its liver. Participants chose to include this fish as part of the fish tasting. Four fish were officially tasted for the palatability study and all scored a 1 or 2 rating (i.e. this fish tastes excellent(1)/good (2) and tastes better (1)/similar (2) to fish we usually eat).

Scientific samples to test for mercury in fish tissue were taken for 21 fish. Results were compared against the Health Canada consumption guideline of 0.500 mg/kg of mercury in the edible portion of fish tissue (http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/contaminants-guidelines-directives-eng.php). Two fish slightly exceeded this value; both were large (over 4 kg), old (33 and 28 years) fish and mercury is known to increase in the body over time (Figure 8).

Figure 8 **2015 Mercury (Hg) Levels for Fish Tissue Based on Age and Weight**



Participants from the 2012 Traditional Knowledge fish camp, conducted as part of the AEMP, noted that the status of the fish in Lac de Gras near the Diavik mine is good. Thirty-nine fish were caught and, of these, two fish were identified as being of poorer condition, noting that these fish were skinny and, in the case of one, had a larger head. Another fish was also observed as having some intestinal worms and was of poorer condition. Participants noted that this tends to occur in all fish populations and that the fish are not eaten. Those that were tasted as part of the palatability study resulted in scores of 1 (excellent for eating, looks better than fish usually caught) or 2 (good for eating, looks similar to fish usually caught) from all participants.

Based on the results of the 2008 trout survey, it was determined that mercury levels were safe for consumption so a fish palatability study was done in 2009. Four fish were cooked for tasting using the same methods as previous studies, and 10 fish tissue and organ samples were taken for metals testing, including mercury. Each of the four fish that were cooked for the palatability study also had metals samples submitted for testing. Results for the metals levels in the fish tested during the 2009 fish palatability study showed mercury levels below Health Canada's guideline for consumption and that fish were okay for eating.

From 2003 until present, the fish from Lac de Gras (LDG) have tasted good according to participants in the community-based monitoring camps that are held in some summers. Scientific testing for metals levels in fish tissue and organs that were caught during these camps were also as expected - the results have showed no concerns.

- *M-lakes and West Island Fish Habitat Restoration*
  These programs were started in 2009 in order to make up for the fish habitat lost to dike/pit construction. This is a requirement from the Department of Fisheries and Oceans. Streams in these areas were improved to encourage fish use and movement between smaller inland lakes and Lac de Gras. Construction was finished in 2012 and monitoring of these areas continued through 2013. Some retrofits were completed after the first year of monitoring, as one type of flow structure created was ineffective in sustaining a suitable depth and was not being used by fish. After these were re-sloped and some additional boulders were added, flows and depths became suitable to support fish use and fish were detected in these streams.

- *Slimy Sculpin*
  Fish (slimy sculpin) were healthy, with few irregularities observed in 2016. Body condition and liver size were similar throughout the lake. All sizes of fish were captured in each area, which shows that reproduction is successfully occurring. Parasites (i.e., tapeworms) were common in each study area, but more prevalent in the fish caught closer to the mine. Average values of all measured fish health variables were within normal levels. Fish closer to the mine were 9% to 29% shorter and lighter than fish caught in areas further from the

mine. Differences in habitat (i.e., water temperature, lake bottom sediments) or the difference in numbers of parasites between sampling areas in 2016 may account for, or contribute to, the difference in the size of fish between the areas closer to and further from the mine in 2016. Concentrations of some metals, such as molybdenum, strontium, and uranium, bismuth and tin, as well as calcium and phosphorous, were higher in areas closer to the mine and in the vicinity of A21 construction. These differences found in fish size may be a response to the chemicals present in fish flesh closer to the mine and as such, they triggered an Action Level response to investigate the cause and confirm the effect. Results of the fish health study seemed as though they could be the result of possible contamination; however, these were considered low-level and there was a lack of contamination in the small plants, animals and bugs, which would be expected to occur before effects are noticed in fish. The fish health responses for 2016 could represent normal changes that can occur within the lake, or they could be caused by other biological or physical factors.

These small fish were sampled in 2013. Differences in the body size (length and weight) of the fish, as well as the condition factor (how 'fat' the fish is, or length in relation to weight), relative liver size, and relative gonad size were observed in fish caught near the mine compared to those in areas further from the mine. This demonstrates a potential toxicological response (a reaction to exposure). These observations are not consistent with the results of previous fish surveys in Lac de Gras or with the other findings of the AEMP that all indicated a nutrient enrichment response. Overall, the fish data indicate that an Action Level 1 (confirm the effect) has been reached, which means this study will be repeated in 2016.

The small-bodied (slimy sculpin) fish survey was also done in 2010. Results showed that there was some change to size and condition of the fish that would be consistent with nutrient enrichment (more availability of food and nutrients); this was found closer to the mine. There were some metals in the fish tissue that could have a moderate effect on fish, but there did not appear to be any impacts to fish health. Mercury levels in the fish tissue were lower than previously reported in 2007 and were within the expected range. A different lab was used to analyze the tissue samples, but the reason for the differences between the 2007 and 2010 studies is not known.

An increased amount of mercury was detected in tissue from small fish (slimy sculpin) taken from the lake in 2007.

- *Lake Trout and Mercury*
  A large-bodied fish tissue sample program was done on Lake Trout between 29 July and 10 August 2014 in Lac de Gras and Lac du Sauvage (LDS). Samples were taken using a non-lethal technique, and fish were also aged and weight and length of each were recorded. Except for one fish from LDS, all sample results, were below the Health Canada guideline

of 0.50 mg/kg. Based on the amount of mercury in fish in 2014, Lake Trout in LDG and LDS would not be expected to have health concerns or pose a risk to human health.

A large-bodied (lake trout) fish survey was done in 2011 to test mercury levels in fish. The results from this study showed that mercury levels are increasing slightly in both Lac de Gras and Lac du Sauvage. The average mercury concentration in lake trout from Lac de Gras was similar to that found during 2008. This number is a length-adjusted number because mercury concentrations increase with size and age. The lake trout in Lac du Sauvage were found to have average mercury concentrations higher than those found during 2008; this lake is upstream from Diavik. A low-level effect was given for fish mercury levels, though it doesn't appear to be linked to the mine.

A special study was conducted in 2009 as a joint research program with Fisheries and Oceans Canada (DFO) to assist in understanding if mercury in the slimy sculpin tissue (identified in 2007) is related to the treated mine water discharge. Results from this study did not support the idea that higher levels of mercury may be because of increased mercury being released from sediments due to nutrient enrichment from the treated mine effluent.

In 2008, Diavik conducted a study to further evaluate the elevated mercury in fish tissue, this time studying large-bodied fish (lake trout). The fish liver tissue analyses indicated that there is no concern relating to the concentration of metals, including mercury, in lake trout, but that some very large/old fish did show higher levels of mercury than smaller fish, as can be expected. A mercury study was also completed on treated mine water discharge and determined that concentrations are below the best analytical detection limits available.

- Global concern over mercury levels has increased due to human activity and industrial processes. Increased levels have been noted in the past in small fish in Lac de Gras (Diavik 2007), as well as in other lakes located throughout the Northwest Territories (http://www.hss.gov.nt.ca/health/environment-and-your-health/mercury-levels-fish).

- *Other*

  A study was also done to see if big fish like Lake Trout move between Lac de Gras and Lac du Sauvage, as it was unclear if LDS could be used as a reference lake for the mercury monitoring program. To do this, 126 Lake Trout (120 from LDG and 20 from LDS) were tagged with a transponder to track their movement between 2014 and 2015. Over the course of one year, 29 fish (23%) travelled between the two lakes by using the Narrows. The majority of the fish that moved between lakes were originally tagged near the Narrows, but nine of the fish travelled greater distances of up to 20 km away. Of the 29 fish that moved between lakes, 4 were detected only once, and the remaining 25 were detected multiple times. One fish was tagged moving between the two lakes 128 times.

  Since 2000, no fish have been taken by recreational fishing from Lac de Gras by Diavik.

Fish habitat utilization studies showed that lake trout continue to use both natural and man-made shoals near the A154 dike.

A Blasting Effects Study was done starting in 2003 and showed no effects on fish eggs.

Other observations made include:

- Sediment deposition rates measured during the construction of the dikes were below levels predicted in the Environmental Assessment.
- In 2002, 2526 fish were salvaged from inside the A154 dike pool and released in Lac de Gras. 526 fish were salvaged from the North Inlet and released to Lac de Gras.
- In 2006, 725 fish were salvaged from inside the A418 dike pool and released in Lac de Gras.
- In 2017, 309 fish were salvaged from inside the A21 dike pool and released in Lac de Gras. Of the 309 fish captured, 148 fish were transferred and released into Lac de Gras. In total, 16.7 kg of fish were sacrificed and frozen for distribution to local communities, with 30 kg of fish transferred live into Lac de Gras.

Runoff and Seepage

There are locations where seepage and runoff occur at the Diavik mine site. There were historically 22 seepage stations that included: 7 survey stations, 5 groundwater monitoring stations and 10 collection ponds. In 2013, 4 groundwater and all 7 survey stations were discontinued. Working with the WLWB, Diavik's program was changed in the fall of 2013 to include the following stations, as identified in Figure 4:

- 2 freshet surface runoff stations;
- 1 groundwater well;
- 4 seepage interception wells (within the PKC dams); and
- 10 collection ponds.

Potential seepage is monitored and managed by DDMI staff and the Inspector is kept informed of seepage issues, as well as the short and long term plans for monitoring and repairs. No seepage has been seen downstream of seepage collection areas since 2013, as the upstream interception systems successfully captured and diverted any runoff. Five (5) seepage samples were taken during 2012.

Water Quantity

What effect will the mine development have on water quantity?

EA Prediction and Overall Status:

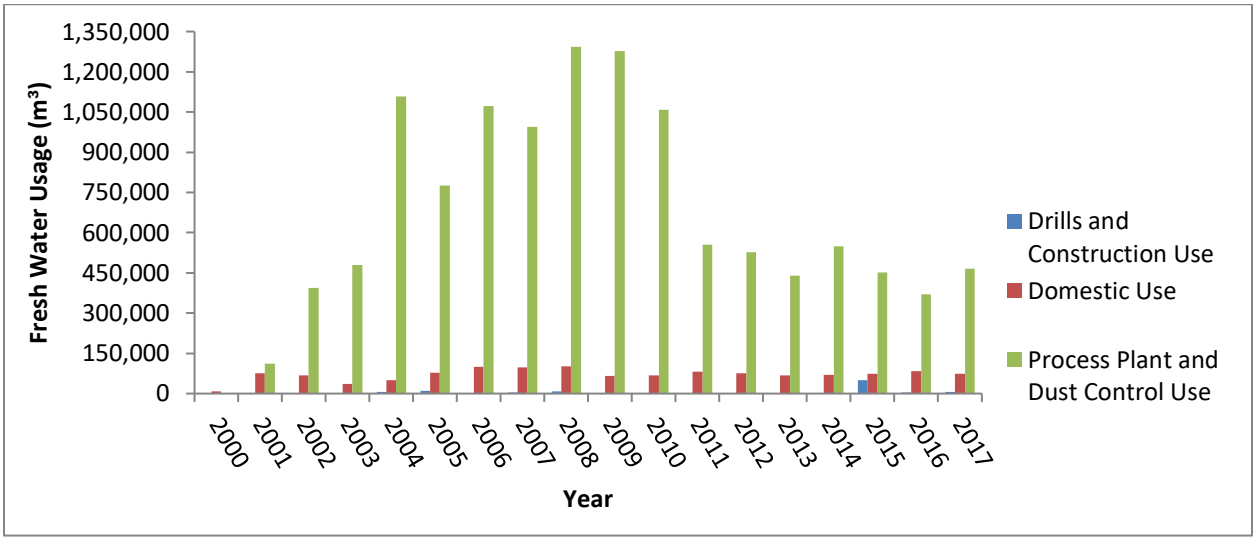
- Water supply to the mine is not limited and use of the resource will not cause changes in water levels and discharges from Lac de Gras beyond the range of natural variability.

- *Monitoring and modelling results have not shown a significant change in water levels or discharges from Lac de Gras*

Observations:

The figure below shows the purpose and amounts of fresh water used from 2000 to 2017 (Figure 9). Diavik recycles water from the PKC and North Inlet as much as possible in order to reduce the amount of fresh water needed; in 2017, this amounted to 2.5 million m^3 of recycled water. The Water License allows Diavik to use a total of 1.28 million m^3 of Lac de Gras water per year; Diavik only used 543,764 m^3 in 2017. Use of water from Lac de Gras by Diavik is not causing changes in water levels beyond natural variability. Further information can be obtained from the Water Management Plan.

Figure 9 Freshwater Use Volumes from 2000-2017



Climate and Air Quality

Will the mine development affect air quality around Lac de Gras?

EA Predictions and Overall Status:

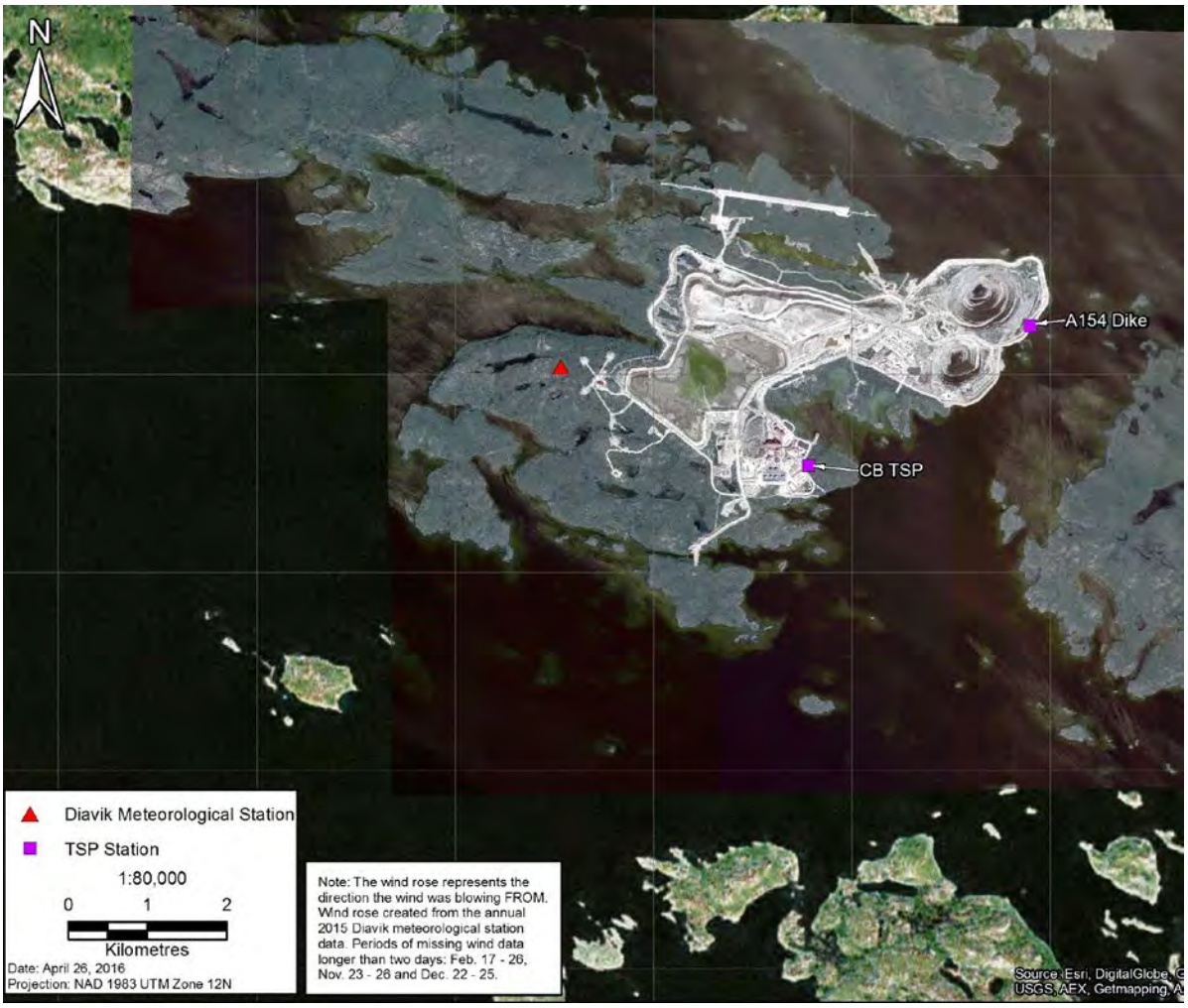
- Ambient air quality objectives will not be exceeded; and
    - *Dustfall levels were higher than originally predicted during open pit mining but have remained below BC Objectives (used for comparison) and TSP levels have generally remained below NWT Guidelines*
- The mine will be a very minor contributor of greenhouse gases.
    - *Emissions are tracked and reported; levels remain relatively stable across years*

Observations:

As predicted, dust deposition decreases as one moves away from the mine. The rate of dust being deposited is affected by activities at the mine (for example, higher dust deposition is typically measured at the airport compared to the west part of East Island where there is very little activity) as well as by wind direction (because wind carries the dust). These trends have been measured each year since dust monitoring began in 2001. Dust suppressants were investigated for use on the airstrip, but the small runway size and nearness to the lake have prevented the safe use of such chemicals. Suppressants are used on the helipad, taxiway, parking lot and apron areas.

- *Total Suspended Particulates (TSP)*
  During 2012, a revised air quality modeling and monitoring approach was used to update the prediction of deposition rates from the EA. An Air Quality Monitoring Program was finalized and implemented as part of this process and included two TSP monitoring stations; one located by the Communications building and the other on the A154 dike (Figure 10).

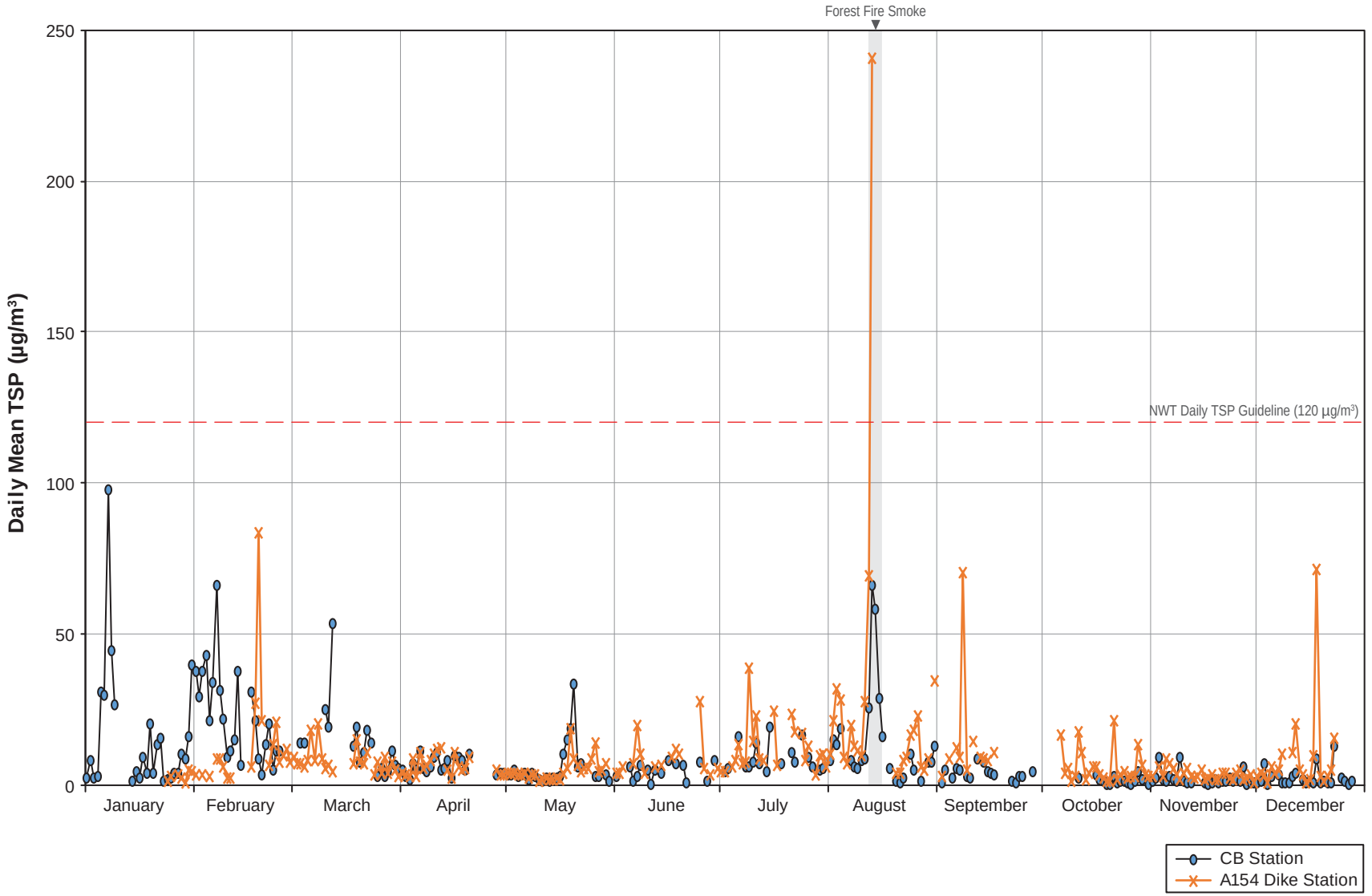
Figure 10 TSP Monitoring Station Locations



From January to December 2017, TSP stations had valid daily data for 71% and 69% of days at the communications building and A154 Dike stations, respectively. TSP levels at the communications building remained below the GNWT Department of Environment and Natural Resources (ENR) 24-hr standard of 120 micrograms per cubic meter (µg/m^3), and 5 samples were above the 60 µg/m^3 annual standard (Figure 11). From January to December 2017, samples from the A154 station showed one sample above the 24-hr standard and 4 above the annual standard. These results agree with Diavik's prediction that there would be up to two (2) exceedances of the 24-hr standard per year (Figure 11).

There was one high reading (120 µg/m^3) above the 24-hr standard during 2016, though the TSP monitoring station on the A154 dike was not working for 10 months of that year. During 2014 and 2015, TSP readings did not exceed the GNWT -ENR standard of 60 µg/m^3, and there was only one daily exceedance of the 24-hour standard at the Communications building. These results agree with Diavik's prediction that there would be up to two (2) 24-hour exceedances per year.

Figure 11 2017 Daily (24-hr) Mean TSP Amounts, Communication Building and A154 Dike



Even with the monitoring stations being located on the mine site, all TSP values measured during 2013 were below the GNWT Ambient Air Quality Guideline, save for one day in December 2013 that was thought to be due to snow clogging the sensor, and the results agreed with DDMI's updated dispersion model predictions completed in 2012.

- *Dust Gauges*

  Dust deposition rates in 2017 were lower than in 2016, 2015 and 2014. Deposition rates were highest close to the Mine and decreased with distance from the Mine.

  Estimated dustfall rates were compared to the former British Columbia Ministry of Environment dustfall objectives for the mining, smelting, and related industries (BC MOE 2016). The dustfall objective ranges from 1.7 to 2.9 milligrams per square decimetre per day (mg/dm2/d), or 621 to 1,059 milligrams per square decimeter per year (mg/dm2/y). While this dustfall objective is no longer used in British Columbia, it is used here to be consistent with prior dust deposition reporting for Diavik and other mines in the region. There are no dustfall standards or objectives for the Northwest Territories. Comparisons of mean and maximum dustfall values suggest that dustfall rates during 2017 remained within the range of dustfall rates typically recorded at the Mine site, and were lower than the British Columbia dustfall objective for the mining industry. A21 dike construction activities likely contributed to the amount of dust during 2016 and 2017.

  Dust fall levels continued to show a decreasing trend in 2014 and 2015, based on distance from the mine. The lowest dust fall level was recorded at one of the control sites located 5.5 km away from the mine. Values recorded for each of the 12 dust gauges and 27 snow survey stations were below the BC objective range of 621 to 1,059 mg/dm^2/y.

  In 2013, dust fall levels were lower than in previous years, with the exception of the area close to the airstrip (common with gravel runways) and an area downwind of the prevailing winds. Dustfall values for most stations remained below the BC dustfall objectives for the mining industry. The two stations that exceeded the BC objective were located beside the airstrip.

  In 2012 there was a decrease in dust levels at 7 of the 12 dust gauges as construction slowed down and Diavik transitioned from an aboveground to underground mine. Dust levels were still higher than predicted, most notably 250 meters (750 feet) from the airstrip. Dust levels were also higher near the PKC area, due to construction activities.

  Overall, dust deposition rates have been more than what was originally predicted by models in the Environmental Effects Report, because that model did not account for additional construction and operational activities relating to underground mine development. However, all except one of the average dust deposition levels remained below the BC Objectives for mining.

- *Snow Water Chemistry*

  For comparative purposes, the snow water chemistry results were screened against effluent quality criteria in the Water License (the limits for treated mine water being released back to the lake); however, there is no regulatory requirement for snow water chemistry to meet these criteria. Concentrations of snow water chemistry variables were below effluent quality criteria, with the exception of 4 variables (i.e., aluminum, chromium, nickel and zinc), that were higher than these numbers at a single station (Station SS3-4, 200-1000 m away from the mine, and east of A21 construction).

  Measurements of the amount of chemicals in the water from melted snow indicate that the concentrations measured in 2016 and 2014 were also below the levels outlined in the Water License. In 2015, results were below water license levels for all snow cores except SS3-6 where elevated levels of aluminum, chromium, nickel and zinc were found. However, this sample was accidently taken closer to the mine site than it should have been so the ability to compare the results is limited.

- *Greenhouse Gas Emissions*

  Total greenhouse gas emissions for Diavik in 2017 was 194,968 tonnes of CO_2e and 2016 was 191,632 tonnes of CO_2e, an increase from 2015 due to A21 dike construction. *"CO2 e"* is an abbreviation of 'carbon dioxide (CO_2) equivalent'. CO_2 is a greenhouse gas, but there are many more greenhouse gases. To make it easier to understand greenhouse gases, a standardized method is to report all of the greenhouse gases from a site together as if they were equal to a set volume of CO_2; this is the *CO2e* referred to above. The wind turbines were able to offset 3.9 million liters of diesel fuel use in 2017.

Vegetation and Terrain

How much vegetation/land cover will be directly affected by the mine development?

EA Predictions and Overall Status:

- Approximately 12.67 km^2 of vegetation/land cover will be lost at full development; and
  - *Total vegetation/cover loss to date remains below the amount predicted*
- Slow recovery of vegetation following mine closure.
  - *Recovery of vegetation after mine closure cannot yet be determined.*

Observations:

- There was a very slight increase in direct vegetation/habitat loss in 2017 due to mine development. Total habitat loss to date from mining activities is 11.31 km^2. This is within the predicted amount of 12.67 km^2. The table below shows a running total of the habitat loss to date.

Table 5: Cumulative Habitat Loss Each Year

Predicted Vegetation Habitat Loss (km^2)	Up to 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
12.67	3.12	5.88	6.32	7.30	8.15	8.86	9.40	9.66	9.78	9.65	9.71	10.1	10.12	10.15	10.55	11.22	11.31

How will the vegetation communities outside the mine footprint be changed as a result of mine development?

EA Prediction and Overall Status:

- Localized changes in plant community composition adjacent to mine footprint due to dust deposition and changes in drainage conditions.
    - *Limited and local effects on plant types have been seen between areas closer to and further from the mine*

Observations:

- *Vegetation Plots*

  Permanent vegetation plots (PVPs) were established close to and far from the mine site in 2001 to monitor if there are differences in vegetation and ground cover near the mine and farther away from the mine. The program is conducted every 3 years and in 2004, the program expanded to include 15 mine plots and 15 reference plots (far from the mine). In each of these areas, 5 sample plots for each of 3 vegetation types (heath tundra, tussock-hummock and shrub) were set up so as to reduce within site variability of plant communities (which was high) and increase the likelihood of capturing true change in plant abundance between mine and reference areas over time.

  PVPs were sampled in 2016. The results of the analysis of dust deposition and vegetation data show differences in the amount and types of plant species in mine and reference plots (natural tundra at a far distance from the mine) over time that are likely due to Mine-related effects, such as dust deposition. Natural changes in conditions among PVPs prior to and after mining, annual differences in weather, plants being eaten by wildlife/caribou, personnel variability and difficulty in identifying uncommon species have also probably influenced results for plant species. However, the differences between mine and reference sites have remained largely the same over the past 10 years, with limited and small effects. Importantly, the data show no potential towards a disagreement in the observed patterns of the amount and types of plant species. Based on the principles of adaptive management and the slow response of vegetation in the Arctic, it is recommended that this program be continued to confirm if the observed differences and changes in plants continue during mining operations; however, the sampling frequency should be reduced to once every 5 years.

The PVP's survey done in 2013 had results that showed that dust on vegetation may be changing the amount (abundance) and types (composition) of some plant species in vegetation types near the mine. Lichen cover on heath tundra and shrub mine plots continues to decrease over time, while the average numbers of vascular plants (e.g. grasses, small plants) in these same areas are increasing. This has also been observed in other studies looking at the effects of road dust on different types of plants.

Observations of PVPs done in 2010 showed that there were more grasses and flowering plants closer to the mine versus further from the mine, and there was also lower soil lichen cover and higher litter cover values closer to versus further from the mine. During the previous sampling year, there was no ecologically significant difference in vegetation and ground cover between mine and reference plots for each of the plant communities assessed.

- *Lichen*

  A lichen study was conducted in 2016 (every three years) to determine the amount of metals in lichen from dust deposition closer to and further away from the mine. Sample areas for lichen near the mine were in the same areas as the dust collectors, while the sample sites further away from the mine were previously chosen by TK holders at a distance approximately 40 km (24 miles) away. In 2016, a far-far-field sampling area was used to collect lichen at three stations approximately 100 kilometres from the Mine site.

  Metals concentrations in lichen were compared between areas close to and far from the mine, and among the 2010, 2013 and 2016 sampling events. The amount of metals in lichen confirmed the observations of Elders that dust deposition was higher near the Mine when compared to areas further away. However, most metals in lichens from the areas near the mine in 2016 were also a lot lower than those found in 2010 and/or 2013. This decrease may be due to the change in mining operations from open pit to underground mining since 2012, resulting in an overall reduction in dust levels. Also, most metals levels in lichen from the far-far-field sampling area (100 km away) were similar to levels in the far-field sampling area (40 km away).

  The lichen monitoring program was also designed to determine whether the increased metals levels in lichen near the mine pose a risk to caribou health. A risk assessment was done in 2010 and showed no effects of concern to caribou health. Since the majority of metals levels have decreased below those reported in the 2010 risk assessment, a follow up risk assessment based on 2016 data is not required. Metal levels in lichen are predicted to remain within safe levels for caribou. Based on the principles of adaptive management, it is recommended that the sampling frequency for this study be reduced to once every 5 years to coincide with the suggested change in the vegetation monitoring program.

  The 2013 sampling program had a scientific component focusing on metal levels in lichen and soil, as well as a TK component focused on assessing the type of landscapes caribou prefer for forage, use and migration, and to assess lichen conditions at various sample sites to

see how dust from the mine potentially affect caribou use of the area. During the program, Elders noticed dust on lichen in near-mine areas, but did not see dust on lichen in areas further from the mine. The analysis of metal concentrations in lichen confirmed the Elder's observations, as the amount of most metals in lichen samples near the mine were significantly higher than those further from the mine. The Elders suggested that caribou would avoid near-mine sites because of poor food quality. It should be noted that the amount of metals found in lichen during the 2013 sampling program was lower than those found in 2010; this means that a follow-up risk assessment is not necessary as the level of exposure to metals remains at a safe level for caribou. Similar to the PVP program, lichen is sampled every 3 years, with 2016 being the next year this program is scheduled.

The 2010 lichen study also looked at the metals data to find out how much dust caribou are exposed to (could eat) by eating the lichen with dust on it. With the exception of 4 metals, concentrations of all other parameters were higher close to the mine, as was expected. Aluminum levels were slightly high but the assumptions made for the risk assessment were very conservative (meaning that it was assumed that caribou feed in the area of the mine 100% of the time). Based on the risk assessment performed, the level of exposure to metals was within safe levels for caribou.

- *Re-vegetation*
  Research conducted to date has indicated that soils can be constructed from many different materials salvaged from mine operations (e.g. gravel, till from the bottom of the lake, treated sewage sludge) and used effectively for re-vegetation. Seed loss (erosion) may be an issue and use of erosion control techniques, such as erosion control blankets (straw mats) and the addition of some protective mounds, bumps and rocks on the ground, are showing some success for increasing plant growth. Lastly, the regrowth process at reclamation sites is faster than for natural recovery but it still takes a long time, with soil and plant development taking 2 to 3 years. A final report summarizing the results of the re-vegetation research done for Diavik to date is planned to be completed by mid-2018.

Wildlife

Caribou

Will the distribution or abundance of caribou be affected by the mine development?

EA Predictions and Overall Status:

- At full development, direct summer habitat loss from the project is predicted to be 2.97 habitat units (HUs). (A habitat unit is the product of surface area and suitability of the habitat in that area to supply food for caribou and cover for predators);
    - *Direct summer habitat loss from the project has remained below the value predicted*
- The zone of influence (ZOI) from project-related activities would be within 3 to 7 km;
    - *The most recent estimate of the ZOI has been calculated as 14 km*
- During the northern (spring) migration, caribou would be deflected west of East Island and during the southern migration (fall), caribou would move around the east side of Lac de Gras; and
    - *Northern migration generally occurs west of the mine; southern migration occurs east and west of the mine*
- Project-related mortality is expected to be low.
    - *Mine-related caribou deaths have remained low*

Observations:

- *Habitat*

  There was no loss of direct summer habitat in 2017 due to mine footprint expansion. The total amount of Habitat Units (Hus) lost to date is 2.82 HUs (see table below). This is less than the amount that was predicted.

Table 6: Caribou Habitat Loss by Year

Prediction	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	2009	**2010**	**2011**	**2012**	**2013-2014**	**2015**	**2016**	**2017**	**Loss to Date**
2.97	0.39	0.59	0.28	0.15	0.32	0.23	0.15	0.18	0.13	0.04	0.00	0.02	0.13	0.00	0.13	0.06	**0.00**	**2.82**

Caribou summer habitat loss was greatest in 2001, when the majority of haul roads and laydown areas for mine infrastructure were constructed. The loss of habitat in 2008 was associated with expansion of mine infrastructure to support underground mine development, and that for 2012 related to development of the wind turbine pads.

- *Zone of Influence*

  An external, independent review of the Diavik and EKATI survey data was done by Boulanger et al. and the results indicated that the estimated Zone of Influence (ZOI - the size of area where caribou avoid the mine) on the probability of caribou occurrence around the mines was approximately 14 km. This ZOI prediction is largely supported by stakeholders. While it is double the size of the original prediction, it does not appear to be directly related to the level of activity at the mine site. It is not known what kind of influence large lakes like Lac de Gras have on the distribution of caribou, but it is likely a contributing factor to the ZOI.

  Due to low caribou numbers and community concern, aerial surveys have been suspended since 2009 (with the exception of 8 July to 13 October 2012), and re-analysis of the data is not expected to result in different information about the animals or their habitat use. Aerial surveys continue to be suspended in favour of other studies that support the GNWT Barrenground Caribou Management Strategy and Bathurst Caribou Range Plan. The GNWT (Environment and Natural Resources, ENR) has been leading a working group to determine the best approach(es) to ZOI monitoring and DDMI will consider the recommendations developed as a part of this process. Diavik contributed financial support to the GNWT to develop models for Bathurst caribou winter range habitat selection in 2015 and to increase the number of GeoFence collars on the herd in 2016. A Comprehensive Analysis Report was completed for wildlife monitoring results at Diavik following the 2016 monitoring year. At the request of EMAB, the results were used to determine the number of caribou in a given area (density) over the aerial survey route, in order to determine if the ZOI results in an unnatural increase of caribou outside of that zone. The result (1.62 animals/km^2) is within the mine-related and natural levels of change seen in the study area from 1998 to 2012.

  The caribou movement analysis showed that caribou move more slowly when they are in good quality habitat. It found that more than half of the caribou paths were at least 100 km (61 mi) away from the mine and 24 km (15 mi) from the nearest lake. The relationship between difficult terrain and the distance caribou travel supported TK observations that caribou use flatter terrain and prefer to travel along shorelines. Despite there being a low number of movement paths near lakes in this study, caribou would move more slowly and stay in an area longer when they were near a lake. The analysis also showed that caribou move more quickly as they approach and spend time near the Diavik-Ekati mine complex. Lastly, long term scientific monitoring and TK have shown that caribou were usually present around the mine area in July and August. From 2009 to 2013, caribou remained closer to Contwoyto Lake and approached the areas of the mine during the fall rut period.

- *Behavioural Observations*

  The goal of the program is to generate enough observations to test possible impacts to caribou based on how they behave closer to and further from the mines. In past years, Diavik has had community Elders and youth participate in this work and contribute their

input and knowledge to the program results. Few caribou were observed in the study area in 2017, the number of behavioural observations/scans conducted was a total of 32 (0 to 2.7 km from the mine). Caribou collars locations received from the GNWT suggest these animals were most likely from the Beverly/Ahiak and Bathurst herds. The total number of caribou observed increased compared to previous years and was 513, with a group size range from 1 to 64 and an average group size of 16 animals.

The following numbers of behavioural scans were conducted in past years: 2 in 2016 (both more than 20 km away from the mine), 38 in 2015, 9 in 2014, 90 in 2013, 86 in 2012, 104 in 2011, 83 in 2010 and 89 in 2009. A full analysis of caribou behaviour data was done in 2011. Diavik works with EKATI mine to collect and share data that covers distances from less than 2 km to greater than 30 km from mine infrastructure.

During the early years of this monitoring, Diavik had limited opportunities to study caribou behaviour on the ground through scanning observations; in 2003, 2004, 2005, 2006, 2007 and 2008, ground observations of caribou behaviour were successfully completed for 12, 14, 5, 8, 24 and 7 caribou groups, respectively.

- *Migration Patterns*

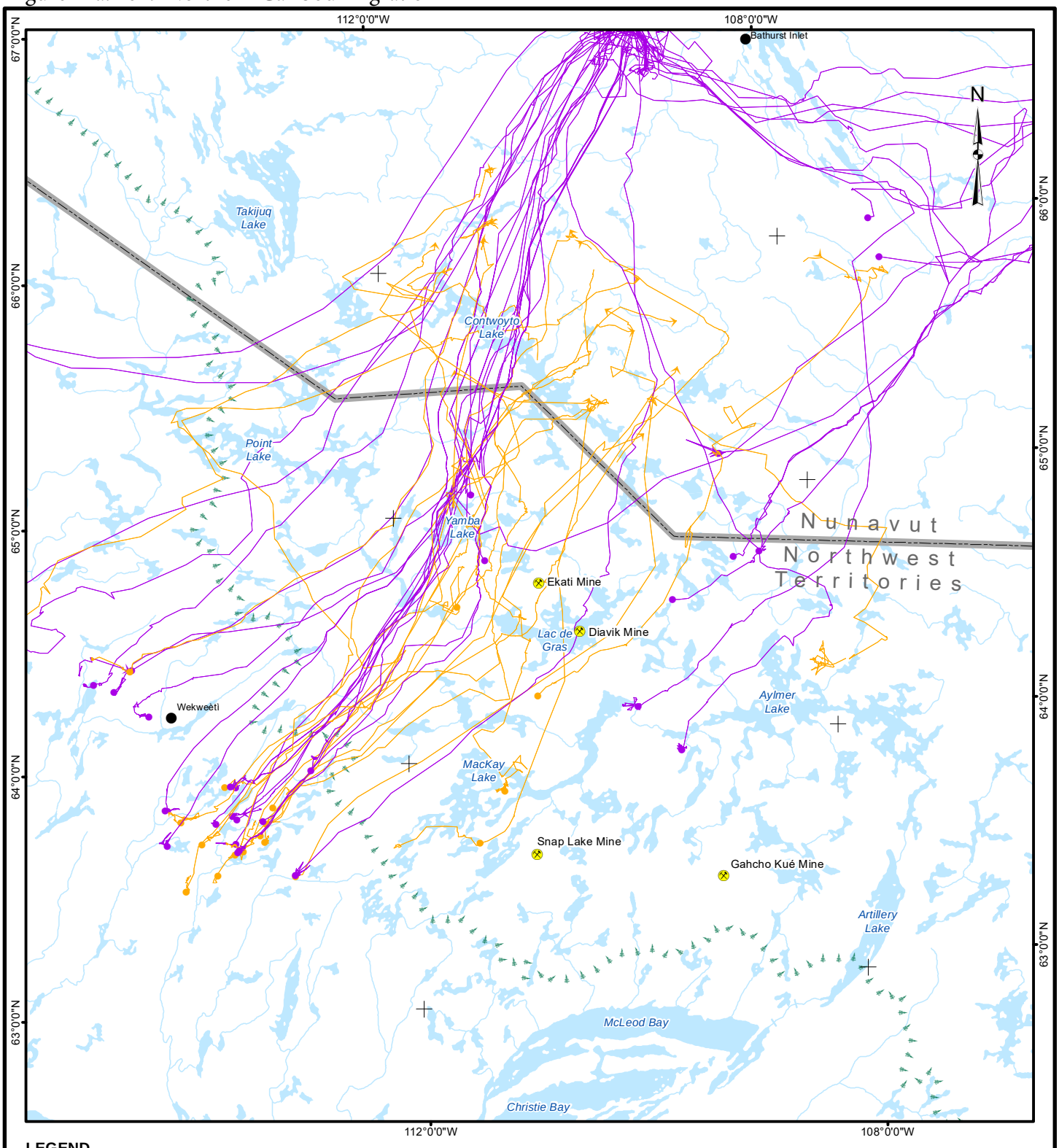
  Data from GNWT satellite-collared caribou show that during the 2017 northern migration the majority of caribou (31 in total; 17 males, 14 females) travelled west of the mine, which supports the prediction in the EER (Figure 12a). Only 6 animals were seen travelling to the east of Lac de Gras (3 males, 3 females). During the 2017 southern migration, 11 caribou went east of the lake (1 male, 10 females), which supports the prediction in the EER (Figure 12b). Five caribou (3 males, 2 females) travelled west of the lake.

  The 2016 northern migration 28 collared caribou (16 females, 12 males) traveled west and none traveled east of Lac de Gras, which supports the prediction in the EER. These results support the long-term patterns observed since 1996, and further support the observation that caribou movement west or east of Lac de Gras during the northern migration is dependent on their winter range location (Golder 2011). During the southern migration, nine collared caribou (3 females, 6 males) traveled west and one female traveled east of Lac de Gras from July to 30 November 2016. The results for 2016 are inconsistent with the EER prediction of animals moving east around Lac de Gras during the southern migration. However, the comprehensive analysis conducted this year (Golder 2017) found that 120 (63%) of the 190 collared caribou moved east past Lac de Gras during past southern migrations from 1996 to 2016. Additionally, the comprehensive analysis found that 169 (73%) of the 231 collared caribou moved west past Lac de Gras during the northern migration. Long-term data best show that caribou movement paths generally correspond to the predictions made in the EER (DDMI 1998).

  Data from satellite-collared animals record cows in the Bathurst herd west of the mine site during the northern migration in 2015. Collar maps for the 2015 southern migration suggest that cows remained further north longer than usual (into November) and then the majority

travelled east of Diavik during the southern migration as well. Two (2) collared cows were recorded moving west of Lac de Gras, as originally predicted. Analysis has shown that northern caribou movement patterns agreed with the EER prediction that the majority of collared caribou would travel west of the mine during the northern migration (78% of collared caribou). A total of 45% of collared caribou have travelled through the southeast corner of the study area over time during the southern migration. A TK study conducted through the Tłı̨chǫ Training Institute in 2013 developed a map (Figure 13) based on Elder observations that shows how caribou migrations have changed due to an increase in mining activity in the Slave Geologic Province. TK observations at that time suggested that caribou continue to move west and east of Lac de Gras during their migrations, while noting that they travel further from the mine and ultimately return to the same general areas for calving and overwintering.

Figure 12a: 2017 Northern Caribou Migration



LEGEND

- EXISTING MINE
- POPULATED PLACE
- NORTHERN MIGRATION OF FEMALES (APRIL 15 - JUNE 1)
- NORTHERN MIGRATION OF MALES (APRIL 15 - JUNE 1)
- TERRITORIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY

100 0 100

SCALE 1:2,500,000 KILOMETRES

REFERENCE

1. CARIBOU DATA SUPPLIED BY ENVIRONMENT AND NATURAL RESOURCES. 2018. BATHURST CARIBOU SATELLITE COLLAR LOCATIONS, 1996 – NOVEMBER 30, 2017. NWT WILDLIFE MANAGEMENT INFORMATION SYSTEM. GOVERNMENT OF THE NORTHWEST TERRITORIES, YELLOWKNIFE, NT.
2. 1:2 MILLION SCALE BASE DATA FROM THE ATLAS OF CANADA; CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE – CANADA. DATUM: NAD83 PROJECTION: NWT LAMBERT CONFORMAL CONIC

PROJECT

Rio Tinto

DIAVIK DIAMOND MINES INC.

TITLE

NORTHERN MIGRATION OF BATHURST CARIBOU HERD, 2017

PROJECT		1771843	FILE No.	
DESIGN	KB	12 Feb. 2018	SCALE AS SHOWN	REV. 0
GIS	VV	13 Mar. 2018		
CHECK	DC	13 Mar. 2018		
REVIEW	DC	13 Mar. 2018		

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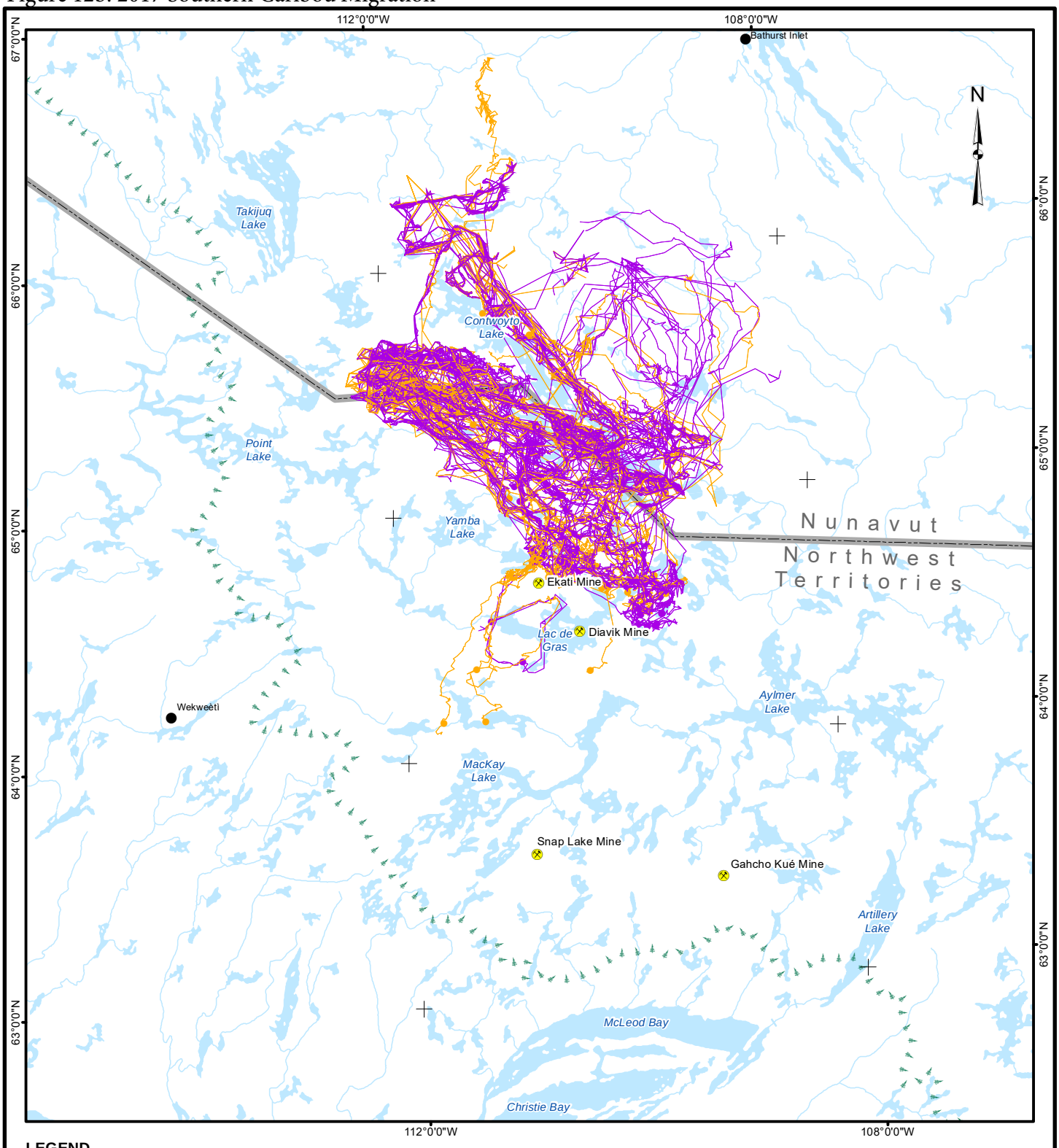
Figure 12b: 2017 Southern Caribou Migration



LEGEND

- EXISTING MINE
- POPULATED PLACE
- SOUTHERN MIGRATION OF FEMALES (JULY 1 - NOVEMBER 30)
- SOUTHERN MIGRATION OF MALES (JULY 1 - NOVEMBER 30)
- TERRITORIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY

100 0 100

SCALE 1:2,500,000 KILOMETRES

REFERENCE

1. CARIBOU DATA SUPPLIED BY ENVIRONMENT AND NATURAL RESOURCES. 2018. BATHURST CARIBOU SATELLITE COLLAR LOCATIONS, 1996 – NOVEMBER 30, 2017. NWT WILDLIFE MANAGEMENT INFORMATION SYSTEM. GOVERNMENT OF THE NORTHWEST TERRITORIES, YELLOWKNIFE, NT.
2. 1:2 MILLION SCALE BASE DATA FROM THE ATLAS OF CANADA; CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE – CANADA. DATUM: NAD83 PROJECTION: NWT LAMBERT CONFORMAL CONIC

PROJECT

Rio Tinto

DIAVIK DIAMOND MINES INC.

TITLE

SOUTHERN MIGRATION OF BATHURST CARIBOU HERD, 2017

PROJECT		1771843	FILE No.	
DESIGN	KB	12 Feb. 2018	SCALE AS SHOWN	REV. 0
GIS	VV	13 Mar. 2018		
CHECK	DC	13 Mar. 2018		
REVIEW	DC	13 Mar. 2018		

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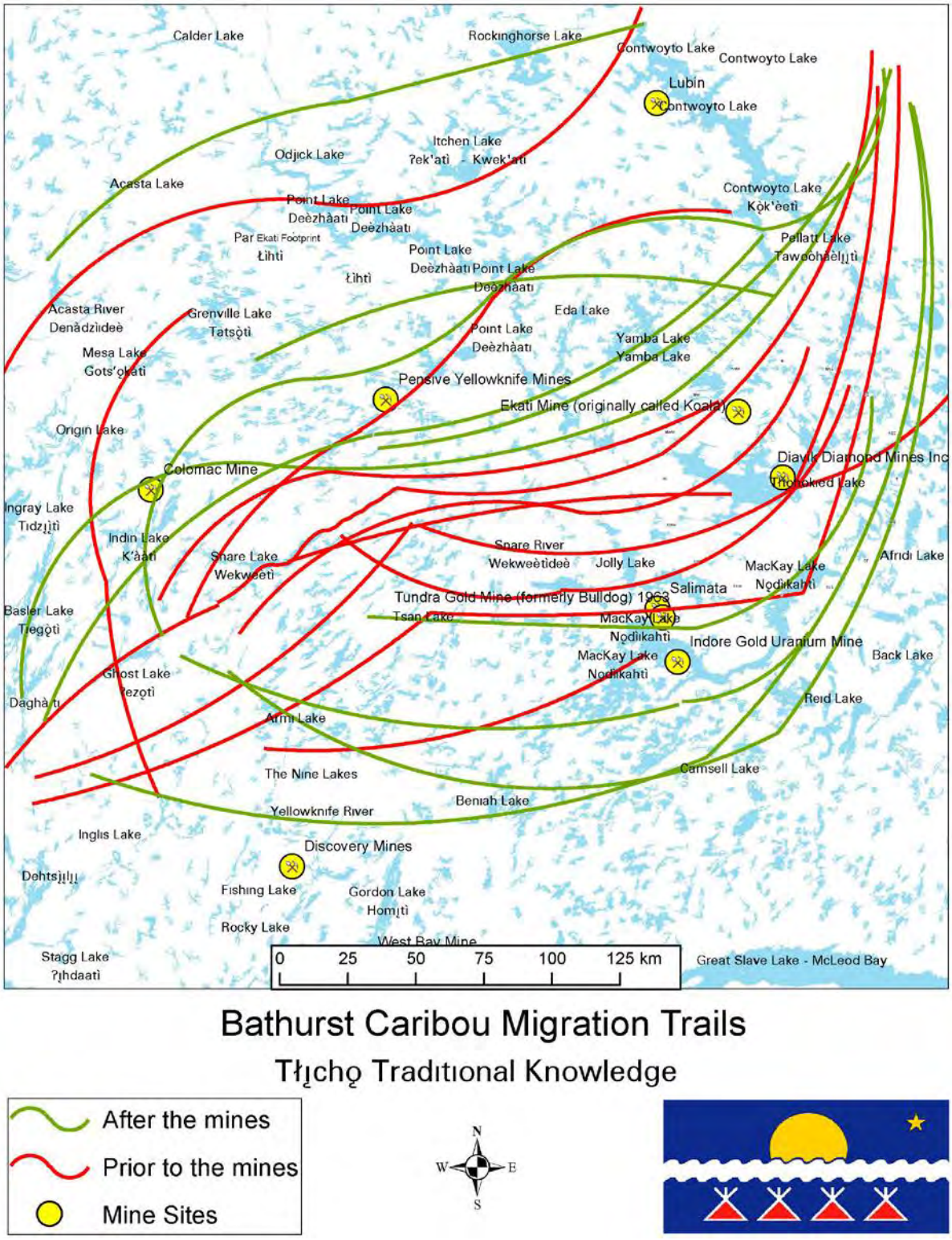
Figure 13 Caribou Migration Trails Prior to and After the Mines (Tłı̨chǫ Training Institute)



- *Herding & Mortality*

  There were no herding events for caribou at the Mine site in 2017. In 2016, there were 2 incidents. On 18 July, a caribou was observed on the airport runway. The caribou was deterred from the runway by two staff members on foot. A second caribou was observed on the airport runway on 28 July, which staff members were able to deter by truck. No herding events took place in 2015. One caribou herding event took place in 2014, and no events occurred in 2012 or 2013. In 2011, caribou were herded away from mine infrastructure three times. There were also two herding events in 2009 – one for 27 animals near the airstrip with an incoming flight and one for a single caribou walking on the Type I rock pile. Very few herding events have been required since the mine began operating.

  There were no caribou mortalities or injuries caused by mining activities in 2017. There was one natural caribou mortality from a wolf kill that Environment staff found near the mine. There has been only one caribou mortality caused by mining activities (2004) since baseline data began being collected in 1995.

Grizzly Bear

Will the distribution or abundance of grizzly bears be affected by the mine development?

EA Predictions and Overall Status:

- Approximately 8.7 km^2 of grizzly bear habitat will be lost and there will be some avoidance of the area, but the abundance and distribution of grizzly bears in the regional area will not be affected measurably;
  - *Bear habitat loss has remained below the value predicted; effects on the abundance and distribution of grizzly bears have been minimal*
- The maximum zone of influence from mining activities is predicted to be 10 km; and,
  - *Efforts to determine a ZOI for bears were not successful*
- Bear mortalities due to mine related activities are expected to average 0.12 to 0.24 bears per year over the mine life.
  - *Mine-related bear deaths have remained low and below the predicted rate*

Observations:

- *Habitat*

  The table below shows the grizzly bear habitat that has been lost to date (in square kilometers), which falls within what was predicted.

Table 7: Grizzly Bear Habitat Loss by Year

Predicted Grizzly Habitat Loss (km^2)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009 to 2014	2015	2016	2017	Loss to Date
8.67	1.25	1.62	0.94	0.42	0.93	0.69	0.43	0.50	0.26	0.64	**0.35**	**0.17**	**0.07**	**8.2**

- *Mortality*
  The calculated mine mortality rate for grizzlies over the past eighteen years (since 2000) is 0.06, which is below the range predicted. One mortality occurred at the mine in 2004.

- *ZOI and Abundance/Distribution*
  Grizzly bear habitat surveys were conducted from 2001 to 2008, but they were not successful at determining a ZOI for bears within the study area. Diavik submitted a request to remove the Zone of Influence monitoring requirement and this was supported by GNWT-ENR and EMAB.

  There was a change in the way grizzly bears in the Diavik and EKATI mine areas are studied in 2012, as well as for De Beers Canada Inc. properties. TK/IQ was used to identify the preferred habitat of grizzly bear and then determine the location in which to set the 113 posts to collect hair samples. Community assistants were also involved with post construction and deployment. The study was conducted in the summers of 2017, 2012 and 2013, for the Diavik and EKATI mines, and De Beers completed it in 2017, 2013 and 2014. The summary report on the 2017 hair snagging program is expected by mid-2018. The results from previous years showed that the number of posts with grizzly bear hair varied throughout the 6 sampling sessions each year. In 2012, it ranged from 20% to 44% of posts, while in 2013 it was between 46% to 57%. Methods and timing of future monitoring for this program are yet to be determined.

  There were a total of 89 grizzly bear visits to the mine site during 2017. This number is not considered to be the number of bears in the Diavik area, as it is likely that these sightings include multiple observations of the same bear due to repeat visits to East Island. The number of grizzly bear sightings in any given year does not appear to be influenced by the number of people on site (Table 8).

Table 8: Average Camp Population and Number of Incidental Grizzly Bear Observations, 2002-2017

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Ave # ppl in camp	1100	470	397	646	716	747	979	562	579	630	629	537	484	524	625	641
# Bear on island	5	19	24	43	21	41	5	22	44	56	97	67	69	77	94	89

Wolverine

Will the distribution or abundance of wolverine be affected by the mine development?

EA Predictions and Overall Status:

- The mine is not predicted to cause a measurable shift in the presence of wolverines in the study area; and
    - *Wolverine presence has been variable within the study area across the years*
- Mining related mortalities, if they occur, are not expected to alter wolverine population parameters in the Lac de Gras area.
    - *Mine-related wolverine deaths have not altered the population in the area; a decrease has been observed but is likely related to the caribou population*

Observations:

- Wolverines were observed on East Island 44 times during 2017. These observations are not recorded systematically and contain repeat sightings of the same animal. There were four times where wolverine had to be deterred from site using a truck in 2017.

  There were no wolverine deaths or relocations in 2017. Since 2000, five wolverines have been relocated and five mortalities have occurred at the Mine. There were two relocations and one wolverine found dead at the Mine in 2016 (Table 9). See Table 10 for historic visitations, relocations and mortalities.

Table 9: Wolverine Observations, Relocations and Mortalities, Baseline to 2017

	Baseline[(a)]	2000-2004	2001	2002-2007	2008	2009-2011	2012	2013	2014	2015	2016	2017
Days with Visits	27/year Total = 82	25	36	149	46	53	11	3	6	118	105	44
Relocations	1	0	2	0	0	0	0	0	0	1	2	0
Mortalities	1	0	1	0	1	0	2	0	0	0	1	0

(a) Includes wolverine occurrences recorded at three different camps (i.e. Diavik, Kennecott, and/or Echo Bay Road camps) annual numbers are not available for baseline investigations.

A large portion of the 2015 sightings were of the same individual that was relocated on 23 March 2015. The number of occurrences of wolverine on East Island in 2008 was higher compared to other years (46); however it is important to realize that many of the sightings were of a male animal that was denning under South Camp and another wolverine that had a snow den on the west side of East Island.

- Snow track surveys began in 2003, and have been conducted with the assistance of community members, as available. In 2008, Diavik revised the wolverine track survey in favour of an increased number of transects of standard length compared to the surveys completed in previous years. They are 4 km straight lines that are randomly distributed

throughout the study area, but some bias is placed on tundra areas identified as preferred habitat for wolverine based on TK.

A total of 52 tracks were found over two transect surveys from 22 March to 19 April 2017, with an average track density of 0.26 (per kilometer) for all transects. Community assistants from Kugluktuk and the North Slave Metis Alliance helped carry out the survey in 2017. Over the years the number of tracks identified remained relatively consistent from 2003 to 2009, and detection rates have increased since 2011. Future programs that include successful survey of all transects twice will help identify whether snow track detection rates vary through time.

Table 10: Wolverine Track Index, 2003-2017

Year	Survey Period	Number of Tracks	Distance Surveyed (km)	Track Index (Tracks/km)
2003	April 10 – 12	13	148	0.09
2004	April 16 – 24	22	148	0.15
2004	December 2 - 8	10	148	0.07
2005	March 30 – 31	7	148	0.05
2005	December 7 – 12	18	148	0.12
2006	March 30 – 1	5	148	0.03
2008	April 30 – May 2	15	160	0.09
2009	April 2 – 4	11	156	0.07
2010	No community assistant available			
2011	March 30 – April 3	23	156	0.15
2012	March 28 – April 3	22	160	0.14
2013	April 2 – 6	26	156	0.17
2014	March 23 – 26	25	160	0.13
2015	March 24 – April 17	38	160	0.13
2016	March 22 – April 13	100	160	1.25
2017	March 22 – April 19	52	160	0.26

Diavik participates in a joint wolverine DNA research program with the GNWT and EKATI mine in certain years. This program was conducted at Diavik in 2005, 2006, 2010, 2011 and 2014. A total of 66 individuals (34 males, 32 females) were identified in the Diavik area in 5 years of the program. Seven of the wolverine identified in 2014 had been previously detected in the Diavik area. Interestingly, two individuals identified in the Diavik area in this year were also seen in the Snap Lake study area. A declining trend in the number of wolverine in the Diavik study area has been seen with the DNA hair-snagging study, and is likely influenced by the number of caribou in the Bathurst herd. The long-term duration and frequency of this program has not been determined collaboratively at wildlife monitoring workshops hosted by ENR. The schedule for future monitoring programs will

be determined after the 2014 data summary analysis report from ENR is complete and reviewed.

Raptors

Will the distribution or abundance of raptors be affected by the mine development?

EA Predictions and Overall Status:

- Disturbance from the mine and the associated zone of influence is not predicted to result in measurable impacts to the distribution of raptors in the study area; and
    - *Negligible impacts to the distribution of raptors in the mine area have been observed*
- The mine is not predicted to cause a measurable change in raptor presence in the study area.
    - *Raptor presence within the study area has remained similar over the years*

Observations:

- Diavik, Ekati and the GNWT conducted falcon productivity and occupancy surveys annually in the Daring Lake, Diavik and Ekati study areas from 2000-2010. The falcon monitoring results from Daring Lake have been used as control data for productivity from an undisturbed area. Previously identified potential nesting sites were visited by helicopter in May each year to determine if nesting sites were occupied, and again in July to count any young in the nest.

  Nest occupancy remained relatively high in the Lac de Gras region throughout those 10 years (raptors were preferentially using the area within 14 km of the mine), supporting the prediction that mine activity levels would have a negligible impact on the presence and distribution of raptors in the study area. Annual changes in nest success were also not related to the level of activity at the mine site.

  As a result of these findings, discussions during the wildlife monitoring program review process from 2009-2011 supported a change in falcon monitoring methods to align with the Canadian Peregrine Falcon Survey (which in turn is aligned with the North American Peregrine Falcon Survey). This survey is conducted across Canada (and North American) every five years. The survey was conducted in 2015.

- Chick production in past years has ranged from zero to seven in the DDMI study area. Observations made over the years were consistently similar to those of the control site at Daring Lake, where productivity and occupancy rates have changed little since baseline.

Table 11: Falcon Nest Occupancy and Production at Diavik and Daring Lake, 2000 to 2010

Year	Survey Area	Total Sites	Occupied	Productive	Total Young
2000	Diavik	6	2	2	5
	Daring	-	-	-	-
2001	Diavik	6	2	0	0

Year	Survey Area	Total Sites	Occupied	Productive	Total Young
	Daring	13	3	1	3
2002	Diavik	6	4	1	3
	Daring	18	10	9	15
2003	Diavik	6	1	0	0
	Daring	10	5	3	4
2004*	Diavik	6	5	4	7
	Daring	12	6	1	2
2005*	Diavik	6	3	1	2
	Daring	10	5	1	1
2006*	Diavik	6	3	0	0
	Daring	10	4	1	3
2007*	Diavik	6	3**	2	7
	Daring	10	1	2	8
2008*	Diavik	6	5***	2	3
	Daring	12	6	3	4
2009*	Diavik	6	4	2	5
	Daring	12	5	3	6
2010*	Diavik	8	6	3	7
	Daring	12	5	3	7

Daring Lake data originates from the Daring Lake research station (S. Matthews, personal communication, ENR).
*Diavik data includes spring (occupancy only) and summer (productivity only) monitoring data. Previous occupancy values based on productivity survey only.
**Occupancy data for May provided by BHPB and GNWT – site DVK 11 not checked
***Does not include additional site (DVK 19-1) found occupied during the June survey

- Since May 2005, peregrine falcons have been seen nesting on Diavik buildings and pit walls. A total of 36 pit wall/mine building inspections were carried out in 2017. Two peregrine falcon nests were found, one at the Site Services Building and one on an A154 open pit bench. Both of these nests had young raptors in them. Ravens nested at the South Tank Farm, but they may have left the nest by the end of May as no birds were seen after this time (Table 13). A possible nest site for rough-legged hawk was seen on an A418 open pit bench but it was not confirmed. Two active nest sites were found in each of 2016 and 2015; 1 with peregrine falcons and 1 with common ravens. Two rough-legged hawk and 1 peregrine falcon nest were found in 2014, 4 peregrine falcon nests were seen in 2013 and one in 2012, but no raptors were found nesting at the mine site in 2010 or 2011.

Table 12: Nests Observed on Mine Infrastructure and Open Pits in 2017

Area	Species	Date	Active Nest	Observations
A154 Open Pit Bench	Peregrine Falcon	23 Aug	Yes	One adult and 3 young
Site Services Line Up Area	Peregrine Falcon	22 May	Yes	Peregrine falcon sitting in nest. Three eggs seen on 6 July. 3 fledglings being fed by an adult on 9 July.

Area	Species	Date	Active Nest	Observations
South Tank Farm	Common Raven	16-22 May	Yes	Pair observed at nest. Unable to confirm if eggs or young.

- There were no peregrine falcons found dead in 2017. In 2016, one peregrine falcon was found dead at the Mine. A peregrine falcon carcass was found near the main intersection for entry to the A21 area. The carcass had been picked clean by ravens and the cause of death could not be determined.

  There were no falcon deaths at the mine in 2014 or 2015. Two falcon mortalities occurred at the Diavik Mine site in 2013. On 20 July 2013, a peregrine falcon carcass with 3 wounds was found by the A154 dike; it is suspected to have hit a power line. On 17 November 2013, a juvenile carcass that had been heavily scavenged was found below the ore storage area in the A154 pit. There was no nearby infrastructure that would indicate that the mortality resulted from the Mine. No falcons died because of mine operations from 2009 to 2011, but one peregrine falcon was found dead in 2012.

Waterfowl

Will the distribution or abundance of waterfowl be affected by the mine development?

EA Predictions and Overall Status:

- At full development, 3.94 km^2 of aquatic habitat will be lost; and
  - *The amount of aquatic habitat lost to date remains below the value predicted*
- The mine is not predicted to cause a measurable change in waterfowl presence in the study area.
  - *Construction and operation of the mine has little effect on waterfowl*
- Early open water or early vegetation growth might attract waterfowl during spring migration.
  - *Mine water bodies were used by birds in spring but they typically did not use them any earlier than shallow areas of Lac de Gras (e.g. east and west shallow bays)*

Observations:

- By the end of 2007, a total of 2.56 km^2 of shallow and deep water habitat had been lost due to mine development, and there had been no additional shallow or deep water areas developed since that time. With the start of development of the A21 dike in spring 2015, a total of 0.23 km^2 of additional water habitat was lost; 0.06 km^2 of shallow water and 0.17 km^2 of deep water. With continued A21 construction in 2016, a further 0.03 km^2 of shallow

water and 0.47 km^2 of deep water habitat were lost. The total area of water habitat loss still remains below predictions (3.94 km^2) at 3.03 km^2.

- East Island shallow bays (natural bays in Lac de Gras) and mine-altered water bodies (ponds that have been changed or created for the mine site) were surveyed annually, on a daily basis, over a 5-week period during the peak spring migration (late May to late June) for waterfowl presence from 2003 to 2013. The results of surveys indicated that mine-altered water bodies are used by water birds, including ducks, geese, gulls, loons and shorebirds, during spring. However, the range of dates when water birds are first detected do not support the predictions that waterfowl or shorebirds are using mine-altered water bodies earlier than the East and West bays. As there is no similar control site that can be used for the shallow bays (they are a unique feature of the region), detailed statistical analysis on waterfowl presence is not conducted. Over the years, almost 20 different species of shorebirds have been observed, in addition to 5 species of dabbling ducks, 14 types of diving ducks and 4 kinds of geese. Each year, the shallow bays have the highest abundance of birds, followed by the north inlet. Overall, data collected suggest that construction and operation of the mine has had little effect on the presence of birds in the area.

  Diavik consulted with Environment Canada, EMAB and other stakeholders about removing the requirement to monitor bird species abundance and diversity at East and West bays, given the results to date. This monitoring program was discontinued in 2014.

- Diavik has been operating 4 wind turbines since September 2012. During consultations with Environment Canada (EC) prior to installation, it was noted that no post-construction follow up monitoring for bird fatalities is required. However, Diavik voluntarily implemented a post-construction monitoring program in 2013 to assess the potential direct impacts the wind farm may have on birds. Surveys for bird carcasses below the turbines were undertaken to estimate bird strikes. Monitoring was completed by Diavik personnel twice per week, within a 50 meter radius of each turbine using the Baerwald Spiral method. In 2013, a total of 23 inspections were completed at the wind farm during post-construction mortality monitoring between 11 June and 23 August and no bird carcasses were observed. Instead of continuing with the more formal Baerwald surveys, Diavik now includes monitoring for bird mortalities at the wind turbines as part of the overall site compliance monitoring program.

- Excluding raptors, no birds have been killed at the mine site from 2011 to 2017. Four other project-related bird mortalities have occurred, one each in 2010, 2009, 2005 and 2002.

5. Community Engagement and Traditional Knowledge

Meetings with community leadership and members, as well as school and site visits are some of the methods used to engage with communities over the years. Diavik has an approved Engagement Plan with the Wek'èezhìi Land and Water Board that was developed with review and input from the PA organizations. The following table summarizes completed engagements relating to the environment that Diavik conducted in partnership with the Participation Agreement (PA) organizations during 2017 (Table 13).

Where possible, Diavik tries to include community members in environmental monitoring programs and Jorgan Bolt (Kugluktuk) and Wayne Langenhan (NSMA) assisted with the wolverine track surveys during 2017.

Table 13: Community Engagement during 2017

Date	Method	Topic(s)	Comments
2017-09-14 to 2017-09-18	All 5 PA's – TK Panel Session 10	Closure monitoring/ watching and the South Country Rock Pile	Refer to Appendix III
NSMA			
2017-12-20	Email	Water license updates	Meeting confirmed to discuss PK to UG, Water license updates on Jan 12, 2018
2017-12-15	Email	Business Update	Email with Diavik stats (employment, business spend, training, HSE, etc.)
2017-06-27	Email	A21 dewatering & fish out	Requested if NSMA is interested in any expired fish from fish out. NSMA indicated they would be interested in cleaned fish only.
2017-05-26	Email	2016 SD Report	Emailed link to annual report.
2017-01-30	Meeting	Land Use Permit renewal	Teleconference to review 2 expiring Land Use Permits for the CBM Camp and Exploration & renewal application. NSMA noted that Bathurst Caribou Range Plan may impact Land Use Permits; DDMI noted that current Land Use Permits has conditions outlined regarding caribou in the permits
2017-01-17	Email	Land Use Permit renewal	Meeting request to review upcoming LUP renewal process
Tlicho			

Date	Method	Topic(s)	Comments
2017-12-20	Email	Request to meet	Request to meet and review the PK to A418 amendment & WLWB Engagement Plan
2017-12-15	Email	Diavik Update	Update on HSE, employment, business spend, training, etc
2017-08-15-17	Event	Water Sampling and Prospecting	Facilitated learning event for Imbe - water sampling and prospecting 101
2017-08-08-10	Event	Water Sampling and Prospecting	Facilitated learning event for Imbe - water sampling and prospecting 101
2017-07-11-12	Event	Water Sampling and Prospecting	Facilitated learning event for Imbe - water sampling and prospecting 101
2017-07-31	Event	Trails of our Ancestors	Participated in canoe trip with TG employees
2017-07-25	Meeting	Trails/ update	Set up plans for Trails of Our Ancestors trip
2017-07-21	email	Fish Distribution	Whether the Tlicho want any fish from the A21 fish out.
2017-07-17-20	Event	Water Sampling and Prospecting	Facilitated learning event for Imbe - water sampling and prospecting 101
2017-07-11-12	Event	Water Sampling and Prospecting	Facilitated learning event for Imbe - water sampling and prospecting 101
2017-06-27	email	Fish Distribution	Whether the Tlicho want any fish from the A21 fish out.
2017-05-291	email	2016 SD Report	Sent 2016 SD Report
2017_05-17	Meeting	IMBE Preparation Meeting	Planning for water sampling and prospecting training

Date	Method	Topic(s)	Comments
2017-02-21	Liaison and contractor workshop	Diavik HR, Environment and contractor recruitment	Meeting with all liaisons to inform on recruitment, community resources (CDETNO, Tree of Peace), Diavik orientation and meeting with contractor HR personnel.
2017-01-19	Meeting	LUP Renewal	Presented on our request to renew our 2 land use permits (CBM camp & Exploration permit). Following the presentation, the working group asked for monthly employment stats
YKDFN			
2017-12-20	Email	Request to meet	Request to meet to review the PK to A418 amendment & WLWB Engagement plan
2017-12-15	Email	Diavik update	Employment stats, HSE update, business spend, training, etc.
2017-12-12	Email	Closure plan	Requested a copy of DDMI closure plan. Sent link to closure plan on WLWB site.
2017-06-27	Email	A21 dewatering & fish out	Requested if YKDFN is interested in any expired fish from fish out.
2017-06-27	Email	CSP Community Feedback poster	Sent poster for community posting
2017-05-26	Email	2016 SD report	Emailed link to 2016 SD report
2017-05-08	Tour/Meeting	Site visit, meeting w/Carol & Denton	Site tour, meeting with President and provided Business update
2017-04-27	community meeting	Diavik closure plan	2 participants attended meeting. Minutes and record kept with DDMI.
2017-04-26	Community meeting	Diavik closure plan	5 participants attended meeting. Minutes and record kept with DDMI.

Date	Method	Topic(s)	Comments
2017-02-28	Meeting	Meeting with Chief	DDMI requested a meeting with the Chief if any concerns with Diavik. Chief asked to set-up community closure meetings (Apr 26-27).
2017-02-21	Liaison and contractor workshop	Diavik HR, Environment, Contractor recruitment	Meetings with all liaisons to inform on recruitment, community resources (CDETNO, Tree of Peace), Diavik orientation and meeting with contractor HR personnel.
2017-01-17	Email	Land Use Permit renewal	Request for meeting to present LUP renewals
2017-01-16	Community Engagement	Ice fishing camp	Environmental cultural activity with students
LKDFN			
2017-12-20	Email	Water license update	Meeting request for PK to UG, Water license updates on January 17, 2018
2017-12-15	Email	Business Update	Update on employment stats, HSE, training, and Business spend
2017-11-15	Meeting	WLWB Community Engagement	Reviewed our revised community engagement plan. Discussed next steps: present to Chief & Council. We will work to find a date.
2017-06-27	Email	A21 dewatering & fish out	Requested if LKDFN is interested in any expired fish from fish out.
2017-05-26	Email	2016 SD Report	Emailed link to annual report
2017-02-21	Liaison and contractor workshop	Diavik HR, Environment, Contractor recruitment	Meetings with all liaisons to inform on recruitment, Community resources (CDETNO, Tree of Peace) Diavik orientation. And meeting with contractor HR personnel.
2017-02-15	Telephone call	2017 workplan, Lands contact	2017 workplan in draft; Lands contact for LUP Environment update to be scheduled
2017-01-17	Requesting LUP Update meeting	Land Use Permit presentation & renewal	Requested meeting/conf call date of Jan. 30th. LKDFN replied with not being available.

Date	Method	Topic(s)	Comments
2017-01-17	Email	LUPermits renewal	Request for teleconference to review upcoming LUP renewals w/environment.
KIA			
2017-12-20	Email	Water license update	Meeting request for PK to UG, Water license updates on January 17, 2018
2017-09-25	Site tour	Site tour	Surface tour with a focus on closure.
2017-07-10	Meeting	Business Update	Diavik business update on employment stats, HSE, training, and Business spend.
2017-06-27	Email	Fish distribution	Whether the KIA would like fish from the A21 fish out. KIA suggested that we email Kug HTO. DDMI emailed them (June 27) - on vacation until July 11.
2017-05-29	Email	2016 SD Report	Sent link to 2016 SD Report
April 10-12	Meeting	Business Update	Cancelled due to weather by KIA - rescheduled TBD
2017-02-21	Liaison/contractor workshop	Diavik HR, Environment, Contractor recruitment	Meetings with all liaisons to inform on recruitment, Community resources (CDETNO, Tree of Peace) Diavik orientation. And meeting with contractor HR personnel.
2017-01-30	Conference call	Land Use Permit renewal presentation	Teleconference to review 2 expiring Land Use Permits for the CBM Camp and Exploration & renewal application. No issues from KIA.
2017-01-22	Email	Request to teleconference	Request to set-up a teleconference to discuss the renewal of 2 of our land use permits

Traditional Knowledge Panel

Monitoring/watching at and after closure is very important to northern communities. Aboriginal peoples have long practiced "watching" as guardians of their lands, water, wildlife and more,

routinely noting changes or significant events as signals of overall environmental health and wellness. These skills continue to be practiced today: informally within communities and out on the land, as well as formally through community-based monitoring programs.

The TK Panel Session #10 from 14 to 18 September 2017 was intended to vision watching programs at Diavik for closure and post-closure. A presentation highlighting northern community-based monitoring programs as well as some examples from elsewhere in Canada (e.g. including *Eyes and Ears on the Land and Sea*, a documentary of the Haida Watchman Program in Haida Gwaii) provided background for discussion. Examples of programs led by other northerners were particularly relevant. The presentation was meant to encourage initial discussions and inspire thinking for future planning.

However, while some time was spent on this topic, participants wanted more time to discuss details and make recommendations related to the Waste Rock Storage Area - South Country Rock Pile (WRSA-SCRP) that will result from A21 open pit mining. The TK Panel drew upon previous sessions related to the Waste Rock Storage Area - North Country Rock Pile (WRSA-NCRP), observations made during previous site visits, and presentations on revisions to the site-wide Closure and Reclamation Plan (CRP V4) and plans for development of the WRSA-SCRP to enable discussion about the proposed structure (e.g. location, shape, content, slope) and plans for the WRSA-SCRP.

The goals for Session #10 were to:

- Provide an opportunity for input on progressive reclamation opportunities and progress for the WRSA-NCRP;
- Provide input to the design and plan for the proposed WRSA-SCRP;
- Review examples of other monitoring/watching programs in order to put forth ideas around future watching programs at Diavik;
- Provide guidance on ways to encourage safe movement of caribou and other wildlife on/around site and how best to monitor animals throughout closure; and
- Review and suggest future session topics for the TK Panel.

Throughout discussions key questions were considered and discussed in relation to the session goals, and resulted in the following key themes:

i. Re-sloping and progressive reclamation of the WRSA-NCRP is supported;
ii. The WRSA-SCRP should generally follow those recommendations put forth by the TK Panel for the WRSA-NCRP, with efforts to make it as small and smooth as possible; and
iii. A future session is required to further develop ideas around monitoring / watching.

The resulting recommendations are summarized below and the Session 10 report is provided as Appendix III.

- SCRP—Eight recommendations to avoid disturbing new area, minimize the pile size, ensure caribou routes, make sides smooth and drain the underlying pond.

- A21 Pit—One recommendation detailing five alternative uses for waste rock in an effort to reduce the size of the WRSA-SCRP.
- Help caribou—A recommendation specific to returning East Island to a caribou-friendly state and designed with migration corridors, regardless of whether caribou will return.
- Watching Programs (Framework)—Eight recommendations citing the importance of youth engagement, training, year-round monitoring, long-term planning, funding, need for collaboration and foundations in both traditional knowledge and western science.
- Watching Programs (General)—Four recommendations detailing how planning and implementing a collaborative monitoring program should occur including details on the importance of carrying out background research, drawing from other examples, celebrating 'best practices' of the TK Panel and ensuring infrastructure (i.e. trailers / buildings) remains on-site.
- Cultural—One recommendation reminded the group of the importance of designing watching programs that are culturally appropriate, respectful and relevant as determined from the elders.

6. Operational Activities & Compliance

The information below provides a summary of the operational activities that occurred during 2017. More detailed information can be found in the Type 'A' Water License annual report. Most of these activities will be repeated or continue to advance in 2018.

- Required SNP stations were sampled during each month. Where samples were unable to be obtained (e.g. safety concerns, weather, equipment issues), samples were re-scheduled or postponed. In 2017, parameters with Effluent Quality Criteria (EQC's) remained well below the maximum amounts allowed for in the Water License (Part H Item 26), including ammonia. Monthly SNP reports are submitted to the WLWB.
- The Tibbitt to Contwoyto Winter Road operations were successful and Diavik trucked loads of supplies to the mine site, and backhauled stored hazardous wastes for off-site recycling or disposal.
- Quarterly toxicity samples from stations 1645-18 and 1645-18B were collected in March, June, September and December.
- The average camp population for the year was 641.
- The open pit bottom elevations are 8565 (A154) and 9030 (A418) level; the surface of the water on Lac de Gras is 9415.5 m asl.
- A total of 6,414 m was developed underground, including 4,169 m of waste rock and 2,245 m of ore development.
- Collection pond dewatering activities were conducted on a regular basis.

Environmental Compliance

- DDMI requested that the SNP section of the Water License document be updated to clarify requirements for A21 dewatering. It was submitted to the WLWB on 2 August and approved on 22 September 2017.
- There were a total of 10 reportable spills that occurred on the mine site during 2017, both on surface and underground. Spill report forms are submitted to the GNWT and the Inspector follows up on spill clean up.
- During 2017, Diavik found that a mis-communication between departments resulted in a mistake in the way they were handling waste rock from the mine. Type III rock, which can lead to runoff water with high metals in it, was accidentally placed in the wrong areas. A total of 0.06% of all the waste rock on site was either used in surface construction or placed in the wrong area of the North Country Rock Pile between December 2014 and October 2016. The mistake was found and Diavik is working with the Inspector to sample different areas and figure out how to fix any problem areas, e.g. remove or cover rock. Additionally, Diavik has changed their rock management methods for underground and treats this waste rock as Type III only.

- In April and May of 2017, Diavik notified the Inspector that melt water from snow and ice within the PKC was found ponded against the dam in various locations. The Water License says that water shouldn't collect against the dam, unless approved by the Board. Diavik submitted a request to clear up the License condition related to this, as Diavik understands this requirement to be limited to the PKC Pond being against the dam, and that it wouldn't apply to things like snow melt. The Wek'èezhìı Land and Water Board have since approved that melt, rain and ice water can be against the dam for up to 14 days.

- EMAB and other organizations submit comments and recommendations to help Diavik improve their environmental monitoring programs, how results are presented or how Diavik responds to compliance concerns through letters to DDMI and the WLWB review process. Those submitted through the WLWB review process are recorded in the on-line registry, including DDMI's response to all recommendations. The EMAB online library also contains technical reviews, workshop summaries and Board meeting minutes that capture reviews and recommendations that EMAB may provide to Diavik outside of the WLWB process. Please refer to Appendix IV for copies of EMAB's recommendations and Diavik's response on the Air Quality and Wildlife monitoring programs.

  Surface Projects

  - PKC: The Degrit Trial continued to try and reduce the amount of fine PK (processed kimberlite) in the PKC area; this includes construction of coarse PK berms
  - A21 Project: Dike construction continued and included: jet grouting, relief wells, monitoring instrumentation, pit access ramps and dewatering.

  Underground Projects (numbers below are associated with levels (masl) in the mine)

  - Completed the second de-watering casing hole between the D8875 Pump Station and the D8825 Pump Station.
  - Constructed numerous vents for air flow.
  - Constructed additional sumps for water management.
  - Installed more pipelines for water management.
  - Constructed numerous safety improvements: catwalks, escapeways, ladder tubes, Zacon doors, bulkheads, mandoors, and bumper blocks.
  - Completed new electrical room on A8895.

The key operational activities planned for 2018 include finishing A21 dike construction and dewatering, beginning open pit mining at A21 (including rock placement in the South Country Rock Pile), starting a PKC dam raise, placing closure cover materials on the North Country Rock Pile and the continued development of the underground mine.

References for Further Information

Water Quality & Waste Rock

- Monthly Surveillance Network Program (SNP) Reports
- 2017 Reports: Type A Water License, Seepage Survey Report
- AEMP Study Design Plan, Version 4.1
- Three Year AEMP Results Summary for 2014 to 2016
- AEMP Reference Conditions Report, Version 3
- 2017 AEMP Annual Reports
- Waste Rock Management Plan V8 and GNWT Inspection Reports

All reports are available on the WLWB online registry.

Wildlife

- 2017 Wildlife Monitoring Report
- 2012 Wildlife Monitoring & Management Plan
- 2013-2016 Comprehensive Wildlife Analysis Report

All reports are available on the EMAB online library.

Closure/Re-vegetation/Traditional Knowledge/Community Engagement

- CRP V4 (WLWB online registry)
- Final Closure Plan – Waste Rock Storage Area/North Country Rock Pile, Version 1.2 (WLWB online registry)
- Diavik Community Engagement Plan V1 (WLWB online registry)
- TK Study for the Diavik Soil and Lichen Sampling Program, Tlicho Research and Training Institute (2013, http://www.research.tlicho.ca/research/partnerships-other-govt/traditional-knowledge-study-diavik-soil-and-lichen-sampling-study)

Air Quality

- Air Quality Monitoring Program (EMAB online library)
- 2017 Air Quality Monitoring Report (Pending, 30 June 2018 – EMAB online library)
- National Pollutant Release Inventory (http://www.ec.gc.ca/inrpnpri/default.asp?lang=En&n=B85A1846-1)

Socio-economics /Sustainable Development

- 2017 Sustainable Development Report (Pending)

Management & Operating Plans (as per Table 2)

http://www.mvlwb.ca/Registry.aspx?c=Diavik%20Diamond%20Mines%20(2012)%20Inc.#