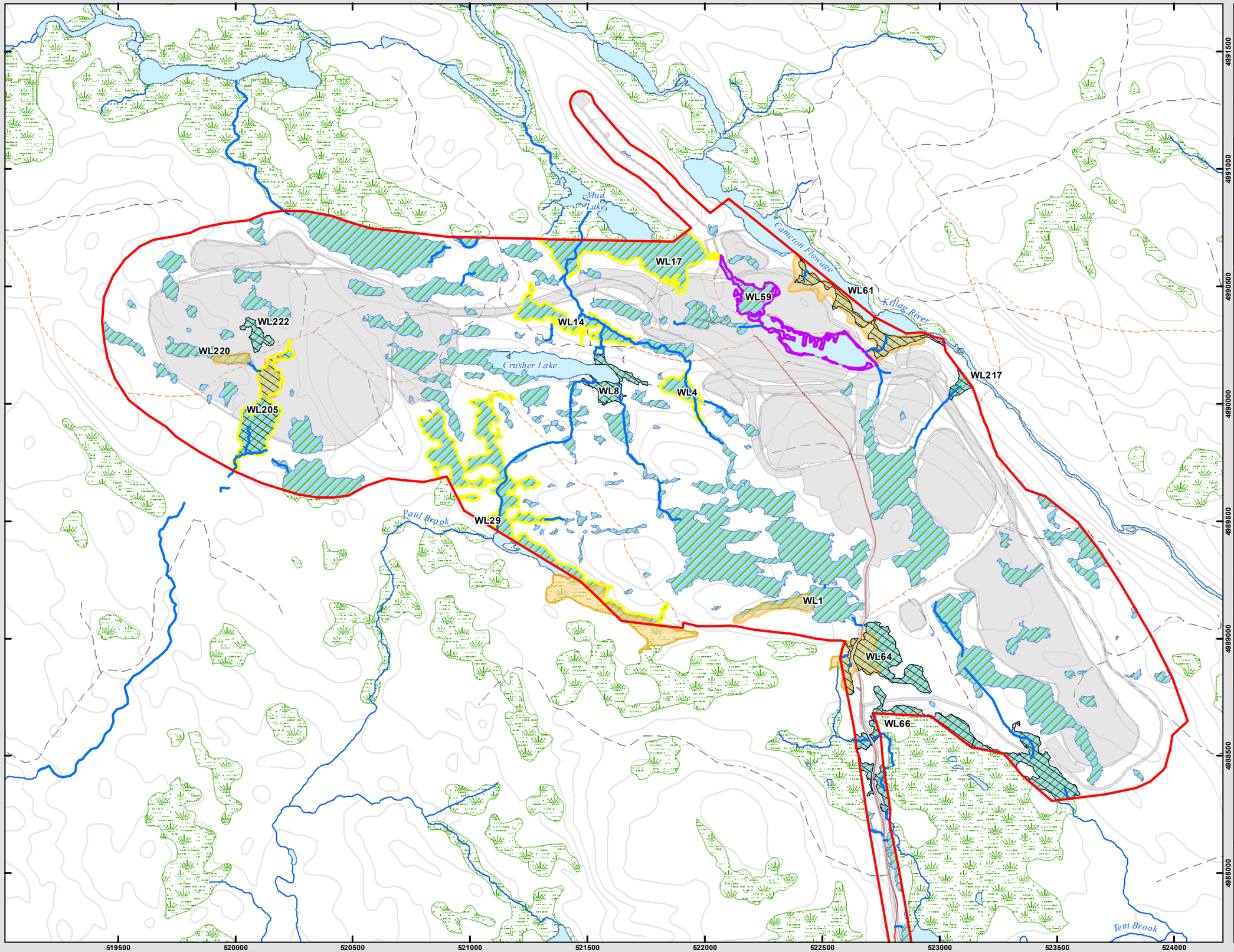


Prepared For:

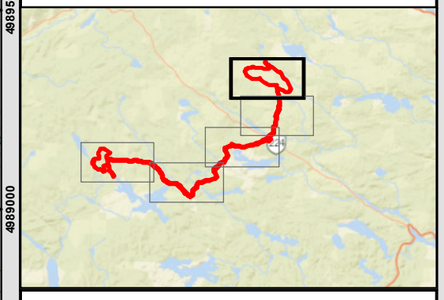
Atlantic Gold

FIGURE NSE-2-178-1a

Beaver Dam Mine Project

Potential Wetlands of Special Significance

- Local Road
- Dry Weather / Seasonal Road
- Track
- Field Delineated Watercourses
- NSTDB Mapped Watercourses
- Field Identified Wetlands of Special Significance
- Potential Wetlands of Special Significance
- Other Wetlands with Multiple SFs
- NSE Predicted Wetlands of Special Significance
- Field Delineated Wetlands
- Open Water
- NSE Wetlands
- Proposed Infrastructure
- Project Area



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Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

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1:15,000 Scale when printed @ 11" x 17"

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Date: 2021-03-01

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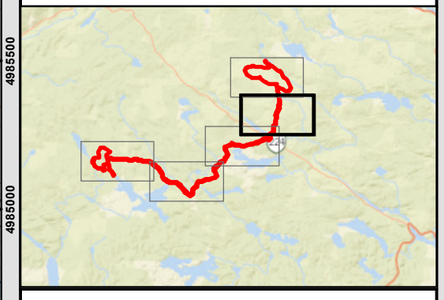
FIGURE NSE-2-178-1b

Beaver Dam Mine Project

Potential Wetlands of Special Significance

- Collector Road
- Local Road
- Dry Weather / Seasonal Road
- Diveways (>300 m)
- Track
- Field Delineated Watercourses
- NSTDB Mapped Watercourses
- Other Wetlands with Multiple SFs
- Field Delineated Wetlands
- Open Water
- NSE Wetlands
- Proposed Infrastructure
- Project Area



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Projection: Transverse Mercator
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Units: Meter

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Drawn By: AS
Reviewed By: XX

Date: 2021-03-01

McCallum Environmental Ltd.

Document Name: BD_EIS_Figure6-8-XWSS

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FIGURE NSE-2-178-1c

Beaver Dam Mine Project

Potential Wetlands of Special Significance

- Collector Road
- Local Road
- Dry Weather / Seasonal Road
- Diveways (>300 m)
- Track
- Field Delineated Watercourses
- NSTDB Mapped Watercourses
- Other Wetlands with Multiple SFs
- Field Delineated Wetlands
- Open Water
- NSE Wetlands
- Proposed Infrastructure
- Project Area

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

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1:20,000 Scale when printed @ 11" x 17"

Drawn By: AS
Reviewed By: XX

Date: 2021-03-01

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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Document Name: BD_EIS_Figure6-8-XWSS

Lower Beaver Lake
River Lake
West River Sheet Harbour
Middle Beaver Lake
Trout Lake
Upper Beaver Lake
WL129
WL8
Curry Lake
Omar Lake Brook
Blackie Lake
Lake Alma
Grassy Lake
WL157
Upper Kidney Lake
Lower Kidney Lake

4985000 4984500 4984000 4983500 4983000 4982500 4982000 4981500 4981000 4980500

516000 516500 517000 517500 518000 518500 519000 519500 520000 520500 521000 521500 522000 522500

Prepared For:

Atlantic Gold

FIGURE NSE-2-178-1d

Beaver Dam Mine Project

Potential Wetlands of Special Significance

- Local Road
- Dry Weather / Seasonal Road
- Diveways (>300 m)
- Track
- Field Delineated Watercourses
- NSTDB Mapped Watercourses
- Other Wetlands with Multiple SFs
- NSE Predicted Wetlands of Special Significance
- Field Delineated Wetlands
- Open Water
- NSE Wetlands
- Proposed Infrastructure
- Wilderness Area
- Project Area

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 250 500 1,000 m

1:20,000 Scale when printed @ 11" x 17"

Drawn By: AS Date: 2021-03-01
Reviewed By: XX

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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Document Name: BD_EIS_Figure6-8-XWSS

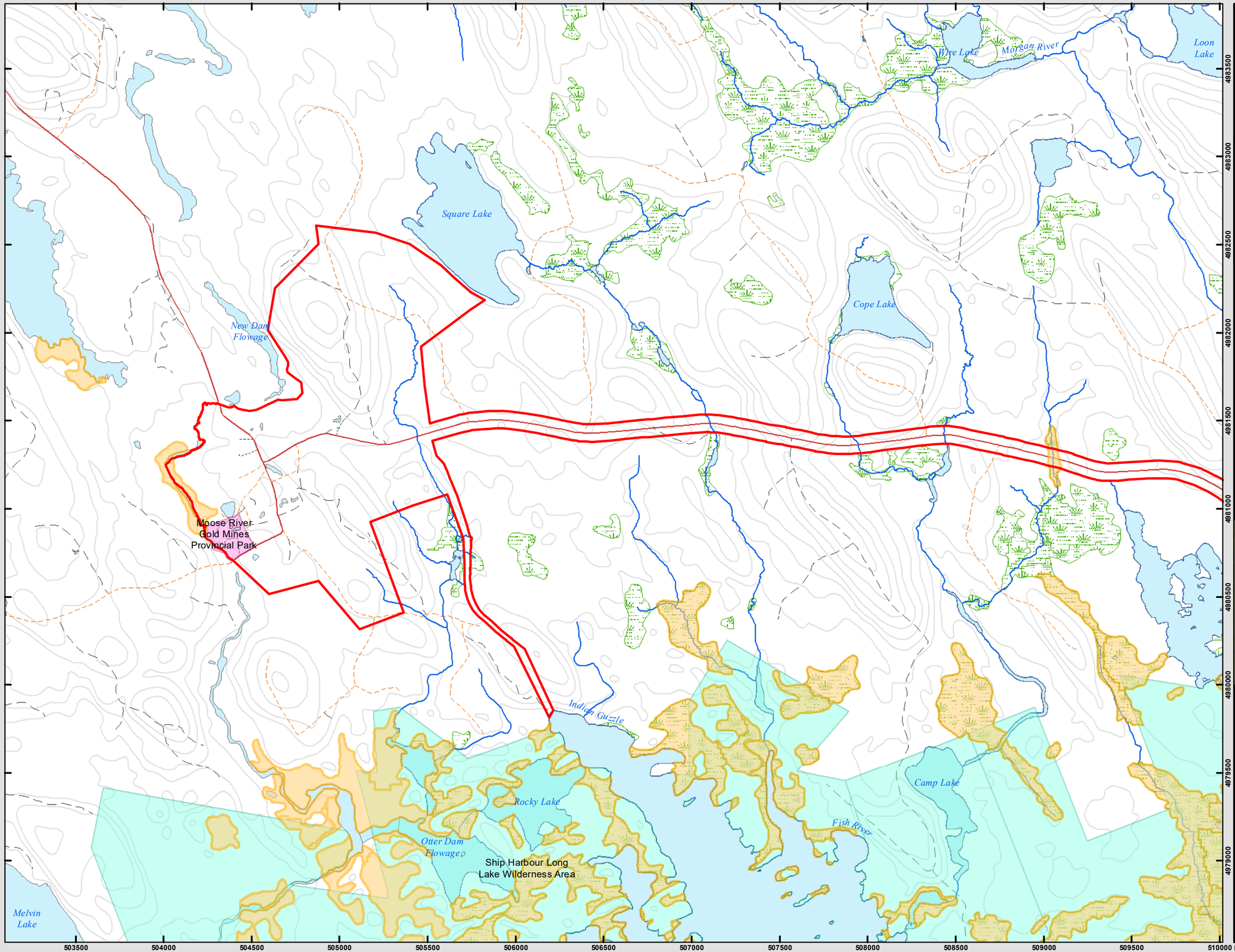
Prepared For:

Atlantic Gold

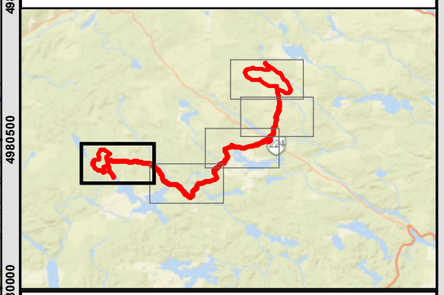
FIGURE NSE-2-178-1e

Beaver Dam Mine Project

Potential Wetlands of Special Significance



- Local Road
- Dry Weather / Seasonal Road
- Diveways (>300 m)
- Track
- NSTDB Mapped Watercourses
- NSE Predicted Wetlands of Special Significance
- NSE Wetlands
- Proposed Infrastructure
- Wilderness Area
- Provincial Park
- Project Area



Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 250 500 1,000 m

1:20,000 Scale when printed @ 11" x 17"

Drawn By: AS
Reviewed By: XX

Date: 2021-03-01

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

McCallum Environmental Ltd.

Document Name: BD_EIS_Figure6-8-XWSS

Round 2 Information Request Number:	NSE-2-179
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Wetlands
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	Section 6.8.3.1 Functional Assessment Results Pg. 379

Context and Rationale

"A review of the NSE predictive WSS layer identified two WSS within portions of the PA…… "

The Proponent is Required to …

Confirm the most recent version of the predictive mapping has been used.

Confirm that baseline field surveys have been conducted for all species that may be present in wetlands.

Response

The NSE WSS predictive layer was consulted during the desktop evaluation for all wetlands prior to initial wetland delineation and assessment in 2016, and reconfirmed with the latest WSS layer, provided by Ian Bryson (Wetland Specialist, NSE) in September 2020. This has been clarified within Section 6.8.4.1.3, page 6-362 of the Updated 2021 EIS (AMNS 2021).

Updated discussion of potential WSS, in consideration of the 2020 NSE predictive layer, is provided in Section 6.8.4.1.3, page 362 – Identification of Exceptional Features of the Updated 2021 EIS (AMNS 2021).

Baseline field surveys were conducted throughout the PA to assess the suitability of wetland habitat for wetland specific species, especially Species at Risk (SAR) and/or Species of Conservation Interest (SOCI). All surveys conducted for SAR and SOCI were completed in suitable habitat throughout the PA according to species-specific methodologies, with a focus on wetland habitat acknowledging SAR/SOCI preference. This included, for instance, both early and late season botany surveys, dedicated lichen surveys, dedicated moose surveys, and avian migration, breeding and overwintering surveys. Priority species were noted by the Project Team during all field programs and therefore, these species were assessed during all surveys conducted on the landscape across all seasons from 2014 to 2020. A summary of all dedicated flora and fauna surveys is provided in Table NSE-2-179-1 below. Survey locations, seasons, dates and, where applicable, times have been described in each respective Valued Component (VC) chapter within the Updated 2021 EIS (AMNS 2021).

Table NSE-2-179-1: Summary of Dedicated Flora and Fauna Surveys, Locations and Times

Survey Type	Locations	Year(s)	Season/Date	Time of Day[a]
Avifauna (survey details in Section 6.12, page 6-638 of the Updated 2021 EIS)				
Fall Migration	Beaver Dam Mine Site: 32 point count stations	2014	Fall (Sept. 17 to Oct. 19)	Began at, or within 30 mins of, sunrise and ended by 10:00 am
Spring Migration	Beaver Dam Mine Site: 12 point count stations Haul Road: 45 point count stations	2015, 2016	Spring (Apr. 21 to Jun. 4)	Began at, or within 30 mins of, sunrise and ended by 10:00 am.
Breeding Surveys	Beaver Dam Mine Site: 24 point count stations Haul Road: 50 point count stations	2015, 2016, 2019	Summer (Jun. 8 to Jul. 13)	Began at, or within 30 mins of, sunrise and ended by 10:00 am
Common Nighthawk	Beaver Dam Mine Site: five stations Haul Road: 12 stations	2015, 2016, 2019	Summer (Jun. to Jul.)	Dawn or dusk
Diurnal Raptor Migration	Beaver Dam Mine Site	2015	Spring (April 15)	12:30 to 4:30 pm
Nocturnal Owl	Beaver Dam Mine Site: four stations Haul Road: seven stations	2015, 2016	Spring (Apr. 11 and 15)	Between 30 mins after sunset and midnight
Winter Wildlife Surveys	Beaver Dam Mine Site and Haul Road	2015, 2016	Winter (Feb. 18 to Mar. 31)	n/a
Fish (survey details in Section 6.9, page 6-431 of the Updated 2021 EIS)				
Fish Habitat Surveys	All watercourses, wetlands and waterbodies within the Beaver Dam Mine Site and Haul Road	2015, 2016, 2019, 2020	All Seasons	Daylight hours
Fish Collection (electrofishing, trapping, eDNA)	Reaches of watercourses and waterbodies with fish habitat	2015, 2016, 2019	All Seasons (Apr. 8 to Dec. 17)	n/a
Terrestrial Fauna (survey details in Section 6.11, page 6-609 of the Updated 2021 EIS)				
Moose Tracking Surveys	Beaver Dam Mine Site: six transects Haul Road: eight transects	2015, 2016	Winter (Jan.to Apr.)	n/a
Moose Pellet Group Inventory Survey	Beaver Dam Mine Site: one transect Haul Road: 18 transects	2015, 2016	Spring (Apr. to May)	n/a
Herpetofauna Surveys (and opportunistic)	Beaver Dam Mine Site and Haul Road	2015 (all study years)	Spring (May 17 to Jun. 4)	n/a
Bat Surveys (Hibernacula Evaluation)	Beaver Dam Mine Site: eighteen AMOs	2014	Fall (Sept. 18)	n/a
Priority Invertebrates (survey details in Section 6.13, page 6-683 of the Updated 2021 EIS)				
Incidental Observations	Beaver Dam Mine Site and Haul Road	2015, 2016, 2018, 2019 (all study years)	Growing Season	n/a

Table NSE-2-179-1: Summary of Dedicated Flora and Fauna Surveys, Locations and Times (continued)

Survey Type	Locations	Year(s)	Season/Date	Time of Day[a]
Flora (survey details in Section 6.10, page 6-560 of the Updated 2021 EIS)				
Priority Lichen Surveys (and opportunistic)	Beaver Dam Mine Site, Haul Road, LSA	2015, 2016, 2018, 2019 (all study years)	Growing Season	n/a
Priority Vascular Flora Surveys (and opportunistic)	Habitats within the PA with elevated potential for priority species	2015, 2016, 2018, 2019 (all study years)	Spring (June) Fall (Sept. 8 to Oct. 9)	n/a
Wetlands (survey details in Section 6.8, page 6-317 of the Updated 2021 EIS)				
Delineation and Functional Assessment	Beaver Dam Mine Site and Haul Road	2015, 2016, 2018, 2019 (all study years)	Growing Season[b] (Jun. to Oct.)	n/a
Watercourses (survey details in Section 6.9, page 6-431 of the Updated 2021 EIS)				
Delineation and Assessment	Beaver Dam Mine Site and Haul Road[c]	2015, 2016, 2018, 2019 (all study years)	Year round[d]	n/a

Notes: [a] Survey times are included where applicable (i.e., where time of day influences species observation).

[b] December/January 2020/2021 exception noted in Appendix J.2 of the Updated 2021 EIS (AMNS 2021).

[c] Assessment extended beyond the PA to assess inflows and outflows, where necessary.

[d] Assessment type is dependant on time of year.

EIS = Environmental Impact Statement; AMOs = provincial abandoned mine openings; LSA = Lichen Study Area; PA = Project Area; n/a = not applicable.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-180
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Wetlands
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	Section 6.8.6.1: Wetland Impacts And Section 6.8.3 Baseline Conditions: Touquoy Mine Site; Table 6.8-14: Potential Wetland Interactions with Project Activities Pg. 398

Context and Rationale

Discussion on project impacts to wetlands at Touquoy site has been removed.

The Proponent is Required to …

Confirm that alterations to reclaim infrastructure and pipelines will not interact with wetlands at Touquoy site during site preparation and construction.

Confirm that operations and maintenance activities at Touquoy site, including discharges, will not interact with wetlands.

Provide rational as why operation and maintenance interactions have all been removed.

Response

Confirmed, there will be no alterations to reclaim infrastructure and pipelines will not interact with wetlands at Touquoy site during site preparation and construction. The Touquoy Mine Site is currently operational. The use of the Touquoy Mine Site for the processing of Beaver Dam ore and tailings management (exhausted pit) will not involve modification to the current footprint or further impacts to wetlands. No discharge events to the wetlands in the receiving environment are planned during construction of operation phases of the Project. The exhausted pit has the capacity to store all mine tailings and process water. Moving the existing tailings pipeline from the permitted TMF to direct water to the exhausted pit will occur within the disturbed footprint of the permitted Touquoy Project and will not result in additional impacts to wetlands.

The only anticipated potential impact during operations and maintenance activities is the potential to spread invasive species resulting from ore being transported via the Haul Road. Invasive species are currently monitored at the Touquoy Mine Site during the existing wetland monitoring program (IR NSE 2-181) and will be monitored at the Beaver Dam Mine Site. There are no other direct or indirect effects to wetlands predicted from the Project at the Touquoy Mine Site during the construction and operations phases. Upset conditions are described and assessed in accidents and malfunctions.

Potential interaction between Project activities and wetland habitat within the Touquoy Mine Site are outlined below (Table NSE-2-180-1) and are updated in the Wetlands effects assessment Section 6.8.7.1.4, Table 6.8-24, page 6-420 in the Updated 2021 EIS (AMNS 2021).

Table NSE-2-180-1: Potential Interactions with Project Activities and Wetlands at the Touquoy Mine Site

Project Phase	Duration	Relevant Project Activity
Construction	1 year	N/A
Operation	5 years	• General waste management • Invasive species introduction or spread • Environmental monitoring
Active Closure	2 years	• Environmental monitoring
Post-closure	10+ years	• Post-closure interaction with discharge from Touquoy Mine Site pit to Moose River riparian wetlands (IR NSE 2-176)

Note: N/A = not applicable.

For further information regarding the Touquoy Mine Site and wetland interactions, refer to the EARD (CRA 2007a) and Focus Report (CRA 2007b).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

CRA (Conestoga-Rovers & Associates Ltd.). 2007a. Environmental Assessment Registration Document for the Touquoy Gold Project.

CRA. 2007b. Focus Report, Touquoy Gold Project, Moose River Gold Mines, Nova Scotia

Round 2 Information Request Number:	NSE-2-181
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Wetlands
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	Section 6.8.6.1: Wetland Impacts Table 6.8-15

Context and Rationale

Vegetative and Habitat Integrity: "Introduction of invasive species can occur indirectly into wetlands when equipment or people enter the wetlands or via runoff or dust from the roads. Introduction of mine and Haul Road traffic during construction and operation can elevate this risk. Invasive species, such as purple loosestrife (Lythrum salicaria), can severely degrade wetland habitat and function. No purple loosestrife was noted during field surveys in the mine footprint Beaver Dam Mine Site or Haul Road PA. "

The Proponent is Required to …

Was purple loosestrife the only invasive plant considered? Have invasive species been evaluated at the Touquoy Site following site construction?

Response

Purple loosestrife was provided as an example of a common invasive species known to impact wetland habitat; however, potential impacts of all invasive flora species have been considered in context of the Project and wetland integrity. Discussion, mitigations and monitoring efforts are provided in Section 6.8.7.1 (page 6-390), 6.8.8 (page 6-424) and 6.8.10 (page 6-430) of the Updated 2021 EIS (AMNS 2021).

Invasive species are currently monitored at the Touquoy Mine Site during the existing wetland monitoring program. All invasive species observed are documented. Invasive plants were determined by referring to the invasive species list provided in the Wetland Ecosystem Services Protocol (WESP) Supplementary Information (Table NSE-2-181-1). This species list, which includes wetland and upland species, was developed by Paul Adamus (the creator of WESP) and includes species list generated by the New Brunswick Invasive Species Council and Maine Natural Areas Program. Nova Scotia, New Brunswick and Maine are all located within the Acadian Forest region.

Additional supporting resources such as CARP (2007), Hill and Blaney (2009) and Belliveau (2012) are also used for invasive species identification and monitoring.

Invasive species monitoring methods are included as part of the preliminary wetland monitoring methods presented in Section 6.8.10 (page 6-430) of the Updated 2021 EIS (AMNS 2021).

Table NSE-2-181-1: Wetland Ecosystem Services Protocol Supporting Information - Invasive Species List

Scientific Name	Common Name	S-Rank	Wetland Indicator Status
[incl. within Arctium lappa]		SNA	fac
Acer negundo	Manitoba Maple	SNA	fac
Acer negundo var. negundo	Manitoba Maple	SNA	fac
Acer platanoides	Norway Maple	SNA	facu
Aegopodium podagraria	Goutweed	SNA	fac
Alliaria petiolata	Garlic Mustard	SNA	fac
Alnus glutinosa	Black Alder	SNA	facw
Angelica sylvestris	Woodland Angelica	SNA	fac
Anthriscus sylvestris	Wild Chervil	SNA	fac
Artemisia stelleriana	Beach Wormwood	SNA	fac
Berberis thunbergii	Japanese Barberry	SNA	facu
Betula pendula	Weeping Birch	SNA	fac
Bromus inermis	Smooth Brome	SNA	facu
Bromus inermis ssp. inermis	Smooth Brome	SNA	facu
Bromus inermis var. inermis	Smooth Brome	SNA	facu
Bromus tectorum	Downy Brome	SNA	upl
Butomus umbellatus	Flowering Rush	SNA	obl
Cardamine pratensis	Cuckoo Flower	S1	fac
Cardamine pratensis var. pratensis	Cuckoo Flower	SNA	fac
Celastrus orbiculatus	Oriental Bittersweet	SNA	facu
Centaurea nigra	Black Knapweed	SNA	fac
Centaurea stoebe	Spotted Knapweed	SNA	upl
Chelidonium majus	Greater Celandine	SNA	facu
Chelidonium majus var. majus	Greater Celandine	SNA	facu
Cirsium arvense	Canada Thistle	SNA	fac
Cirsium vulgare	Bull Thistle	SNA	fac
Convallaria majalis	European Lily-of-the-valley	SNA	facu
Coronilla varia	Purple Crown-vetch	SNA	facu
Cytisus scoparius	Scotch Broom	SNA	upl
Elaeagnus umbellata	Autumn Olive	SNA	upl
Euphorbia esula	Leafy Spurge	SNA	upl
Euphorbia esula var. esula	Leafy Spurge	SNA	upl
Fallopia japonica	Japanese Knotweed	SNA	facu
Fallopia sachalinensis	Giant Knotweed	SNA	facu
Frangula alnus	Glossy Buckthorn	SNA	fac

Table NSE-2-181-1: Wetland Ecosystem Services Protocol Supporting Information - Invasive Species List (continued)

Scientific Name	Common Name	S-Rank	Wetland Indicator Status
Galium mollugo	Smooth Bedstraw	SNA	facu
Geum urbanum	Wood Avens	SNA	fac
Glechoma hederacea	Ground Ivy	SNA	fac
Helianthus tuberosus	Jerusalem Artichoke	SNA	fac
Heracleum mantegazzianum	Giant Cow Parsnip	SNA	fac
Hesperis matronalis	Dame's Rocket	SNA	fac
Hieracium caespitosum	Field Hawkweed	SNA	facu
Hylotelephium telephium	Garden Stonecrop	SNA	fac
Hypericum perforatum	Common St. John's-wort	SNA	fac
Impatiens glandulifera	Purple Jewelweed	SNA	fac
Iris pseudacorus	Yellow Iris	SNA	obl
Lapsana communis	Common Nipplewort	SNA	fac
Ligustrum vulgare	European Privet	SNA	facu
Lonicera periclymenum	European Honeysuckle	SNA	facu
Lonicera tatarica	Tartarian Honeysuckle	SNA	fac
Lupinus polyphyllus	Large-leaved Lupine	SNA	facu
Lupinus polyphyllus ssp. polyphyllus	Large-leaved Lupine	SNA	facu
Lupinus polyphyllus var. polyphyllus	Large-leaved Lupine	SNA	facu
Lysimachia nummularia	Creeping Yellow Loosestrife	SNA	facw
Lysimachia punctata	Spotted Yellow Loosestrife	SNA	fac
Lythrum salicaria	Purple Loosestrife	SNA	facw
Melilotus albus	White Sweet-clover	SNA	facu
Melilotus altissimus	Tall Yellow Sweet-clover	SNA	upl
Melilotus indicus	Annual Sweet-clover	SNA	upl
Melilotus officinalis	Yellow Sweet-clover	SNA	facu
Nymphoides peltata	Yellow Floatingheart	SNA	obl
Origanum vulgare	Wild Marjoram	SNA	upl
Parthenocissus quinquefolia	Virginia Creeper	SNA	fac
Parthenocissus vitacea	Thicket Creeper	SNR	fac
Pastinaca sativa	Wild Parsnip	SNA	facu
Phalaris arundinacea	Reed Canary Grass	S5	facw
Phragmites australis	Common Reed	S4	facw
Phragmites australis ssp. australis	Common Reed	SNA	facw
Picea abies	Norway Spruce	SNA	facu
Pinus sylvestris	Scotch Pine	SNA	fac

Table NSE-2-181-1: Wetland Ecosystem Services Protocol Supporting Information - Invasive Species List (continued)

Scientific Name	Common Name	S-Rank	Wetland Indicator Status
Poa nemoralis	Wood Blue Grass	SNA	fac
Populus alba	White Poplar	SNA	facu
Ranunculus repens	Creeping Buttercup	SNA	fac
Rhamnus cathartica	European Buckthorn	SNA	fac
Robinia pseudoacacia	Black Locust	SNA	upl
Rorippa nasturtium-aquaticum	Watercress	SNA	obl
Rosa multiflora	Multiflora Rose	SNA	facu
Rosa rugosa	Rugosa Rose	SNA	facu
Salix x rubens		SNA	facw
Schedonorus arundinaceus	Tall Fescue	SNA	facu
Scrophularia nodosa	Knotty Figwort	SNA	fac
Senecio jacobaea	Tansy Ragwort	SNA	fac
Sonchus arvensis	Field Sow Thistle	SNA	fac
Sorbaria sorbifolia	False Spiraea	SNA	facu
Tanacetum vulgare	Common Tansy	SNA	facu
Tussilago farfara	Coltsfoot	SNA	fac
Valeriana officinalis	Common Valerian	SNA	fac
Vinca minor	Lesser Periwinkle	SNA	upl

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Belliveau, A. 2012. Invasive Alien Species in Nova Scotia: Identification and Information Guide. Mersey Tobeatic Institute. .pp. 20.

CARP (Clean Annapolis River Project). 2007. Spreading the Word About Weeds – Appendix A and B. pp 49.

Hill, N.M., and Blaney, C.S. 2009. Exotic and invasive vascular plants of the Atlantic Maritime Ecozonee. *In* Assessment of Species Diversity in the Atlantic Maritime Ecozone. *Edited by* D.F. McAlpine and I.M. Smith. NRC Research Press, Ottawa, Canada. Pages 1–18.

Round 2 Information Request Number:	NSE-2-182
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Wetlands
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	Section 6.8.6.3 Wetland Impact Extent Pg. 401 Tables 6.8-16 Expected Direct Wetland Impacts within the Beaver Dam Mine Tables 6.8-17 Expected Direct Wetland Impacts within the Haul Road Table 6.8-19

Context and Rationale

Section provides details on size of wetland feature and estimated Direct Impact area.

The Proponent is Required to …

A) Consider including % of wetland area in Tables 6.8-16/17 that is estimated to be directly impacted and discussion on the impacts to wetland function for wetlands that will be lost as a result high percent of wetland area being lost.

B) Results provided in table 6.8-19 only consider effects of the current project. Are there no potential cumulative effects relating to other impacts or projects in relation to wetlands (i.e. climate change, changes in land use outside of the study area?).

Response

(a)

Percent wetland alteration has been included in Section 6.8.7.1.1, Table 6.8-19, page 6-396 and Section 6.8.7.1.2, Table 6.8-22, page 6-402 of the Updated 2021 EIS (AMNS 2021).

Type of direct impact is categorized as either partial or complete. Where a partial alteration is proposed, in some cases, remaining portions of a wetland may not be maintained in a natural condition or function and is thus considered a complete alteration. Therefore, each wetland proposed for alteration is assessed on a case-by-case basis. When determining alteration extent, the hydrologic regime, wetland type and morphology, alteration type, indirect effects (e.g., edge effects) and particularly the relative size of the wetland compared to alteration area, are considered. Where it is determined that the remaining wetland area will not be self-sufficient, a complete alteration is anticipated and thus proposed at the EIS stage. These predictions will be refined during the permitting stage; Section 6.8.7.1.1, page 6-392 of the Updated 2021 EIS (AMNS 2021).

It was determined that if portions of wetland habitat are not likely to maintain a natural condition (i.e., a portion remains between two drainage ditches), the direct alteration area has been expanded to include wetland fragments which lie outside of proposed infrastructure. These areas were assessed on a case-by-case basis, considering flow regime, wetland type, and alteration type; Section 6.8.7.1.1, page 6-392 of the Updated 2021 EIS (AMNS 2021).

Direct wetland alteration areas are presented in Table 6.8-15, page 6-390 and 6.8-16, page 6-391 in Section 6.8.7, page 6-389 – Wetlands of the Updated 2021 EIS (AMNS 2021). Percent alteration, as assessed through a case-by-case review, has been added

to these tables for clarity. On-going refinement of wetland impact areas will be completed during the permitting process and in consultation with NSE.

(b)

Cumulative effects to wetlands are addressed in Section 8, page 8-1 Cumulative Effects Assessment of the Updated 2021 EIS (AMNS 2021). Section 8 presents an evaluation of potential cumulative effects to all VCs and the assessment scoping approach. The initial screening of the VCs is based on the outcome of the environmental effects assessment (Section 6) and is summarized in Table 8.4-1, page 8-10. The rational for the decision on each VC is documented in Table 8.4-2, page 8-28.

Section 7 – Effects of the Environment on the Project, page 7-1 of the Updated 2021 EIS (AMNS 2021) presents both the possible effects of the environment on the Project and considers how the effects of local conditions, natural hazards, and external events on the Project may in turn affect the environment and VCs.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-183
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Wetlands
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	Section 6.8.5.2 Wetland Cumulative Effects Modelling Pg. 388 Tables 6.9-4 and 6.9.27

Context and Rationale

"As such, the purpose of the wetland cumulative effects assessment is to evaluate the spatial cumulative effects associated with the loss of wetlands as a result of developing the Beaver Dam Mine Site."

The Proponent is Required to …

Given that fish/fish habitat support CRA fisheries were identified, impacts to these fisheries as a result of project impacts to wetlands that provide these functions/benefits.

Response

Impacts to fish and fish habitat through Project impacts to wetlands are assessed in Section 6.9.7, page 6-485 – Fish and Fish Habitat of the Updated 2021 EIS (AMNS 2021). Potential direct and indirect impacts to fish and fish habitat within the PA are discussed in Section 6.7.9. Table 6.9-11, page 6-487 of the Updated 2021 EIS (AMNS 2021). Direct impacts to fish and fish habitat include fish inhabited waters (wetland, watercourse, and open water features) which will either be directly imprinted by Project infrastructure or are expected to experience complete loss of flow due to upstream infrastructure placement. The loss of wetlands and watercourses also has the potential to alter surface flows, downgradient hydrology and water quality, resulting in indirect impacts to fish and fish habitat.

Direct Project impacts to wetlands with fish habitat are provided in Section 6.9.7.2, page 6-488 and 6.9.7.3, page 6-508 of the Updated 2021 EIS (AMNS 2021). Clarification has been added to the Fish and Fish Habitat Baseline report (Appendix J.2 of the Updated 2021 EIS (AMNS 2021)) on the procedures used to calculate impacts to fish habitat (m^2) in wetlands and expanded upon in response to IR CEAA-2-20.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-184
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Wetlands
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	Section 6.13.2 Species of Conservation Interest and Species at Risk Pg. 629

Context and Rationale

"As such, understanding the distribution and diversity of rare species present within a PA is key to proper risk assessment, Project planning, and mitigation of risks posed to rare species by a given project."

"Methods and results from SAR/SOCI surveys at the Touquoy Mine Site are summarized in subheadings within the applicable sections of this EIS, however, the data is not being reevaluated."

The Proponent is Required to …

Given the date of referenced reports, discussion on any changes to conservation rankings to SAR/SOCI species should be provided to ensure priority species have not been overlooked in the assessment. Consideration to new species occurrences, since the time of the report, that could be impacted by the project should be provided.

Response

All observed species status and s-ranks are presented in Section 6.13, page 6-682 – Species of Conservation Interest ad Species at Risk in the Updated 2021 EIS (AMNS 2021) have been reviewed and updated where necessary. Updated ACCDC reports (January 4, 2021) were attained and reviewed for the Beaver Dam Mine Site and Haul Road have been included as Appendices I.1 to I.3 and of the Updated 2021 EIS (AMNS 2021). Additional SAR and SOCI lichen data were received from the Mersey Tobeatic Research Institute (MTRI) in 2019 and incorporated in the desktop evaluation. This data was used to advise field methodology and targeted lichen surveys for additional field programs completed in 2019, as well as inform Project impact assessments and mitigation approaches.

Priority species that are either a) new as of the 2019 EIS submission or b) a result of the review of additional datasets (i.e., lichen dataset from MTRI) have been included as part of the updated desktop evaluation, results and considered with respect to effects assessments and habitat impacts. Historical surveys will not be reassessed.

Information pertaining to the Touquoy Mine Site has been brought forward from the EARD (CRA 2007a), Focus Report (CRA 2007b) and permitting stages (as appropriate). SAR/SOCI interactions with the Touquoy Mine Site are presented in applicable subsections of Section 6.13, page 6-682 – Species of Conservation Interest and Species at Risk of the Updated 2021 EIS (AMNS 2021). However, this data is not being re-evaluated in context of the Beaver Dam Project. The Touquoy Mine Site is currently operational. The use of the Touquoy Mine Site for the processing of Beaver Dam ore and tailings management (exhausted pit) will not involve modification to the current footprint or new impacts to additional habitats or SAR/SOCI during the construction and operations phase.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

CRA (Conestoga-Rovers & Associates Ltd.). 2007a. Environmental Assessment Registration Document for the Touquoy Gold Project.

CRA. 2007b. Focus Report, Touquoy Gold Project, Moose River Gold Mines, Nova Scotia

Round 2 Information Request Number:	NSE-2-185
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Wetlands
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	General Comment

Context and Rationale

Discussion on generation of wetland priority species list (SAR/SOCI) is unclear and seems inconsistent.

The Proponent is Required to …

Provide further discussion on generation of baseline data that is supported by field surveys. Provide a complete list of species that occur or were observed in the study area and confirm that baseline surveys have been collected in appropriate times to identify all species interacting with wetlands. Where the potential for wetland to provide habitat for priority species is noted, the species should be assumed to be present unless biophysical survey confirms their absence (particularly for fish and migratory species).

Response

The following has been included within Section 6.8.3.2, page 6-320 – Field Delineation under Baseline Conditions Methodology (Wetlands) of the Updated 2021 EIS (AMNS 2021) to clarify the assessment process for species use of wetlands, specifically SAR and SOCI.

Further baseline field surveys were conducted throughout the Beaver Dam Mine Site and Haul Road to assess the suitability of wetland habitat for wetland specific species, especially SAR/SOCI. All surveys conducted for SAR and SOCI were completed in suitable habitat according to species-specific methodologies. Survey effort to support wetland identification and functional assessment is extensive and results in significant time on the landscape from early spring (high flow conditions to evaluate fish habitat and connectivity) to late fall across multiple years, in key habitat where presence of SAR and SOCI would be expected. This included, for instance, both early and late season botany surveys, and avian migration, breeding and overwintering surveys. Priority species were noted by the Project Team during all field programs and therefore, were assessed during all surveys conducted on the landscape. Information on these baseline survey methods, including survey locations and timing, and species observed, can be found in Section 6.13.3, page 6-685, and Appendix K.1 (Master Species List) (Updated 2021 EIS [AMNS 2021]). Priority species were assessed across the Beaver Dam Mine Site and Haul Road, and wetland specific species lists will be generated, if necessary, at the permitting phase. It should be noted that, while it was not possible to confirm a species' absence from the landscape, all care was taken to identify the presence of preferred habitat (see Section 6.13, page 6-682 – SAR/SOCI of the Updated 2021 EIS [AMNS 2021] for further information). Where suitable habitat was observed for a SAR (particularly SAR fish and turtles), it was presumed to potentially be present, even if presence was not confirmed via observation of that species (or evidence thereof).

A representative list of all observed species has been included here as Appendix K.1, Master Species List, (Updated 2021 EIS [AMNS 2021]) including the observation date and will be added to the Updated 2021 EIS (AMNS 2021). This list includes species observed during dedicated surveys (e.g., avifauna point counts, lichen surveys, moose surveys, etc.) and incidental observations. Priority species lists for each taxa have been reviewed and updated, as described in IR2 response NSE-2-184. Priority species

with elevated potential to occur within the Beaver Dam Mine Site and Haul Road are included within respective sections within Section 6.13.4, page 6-704 – Baseline Conditions (SAR/SOCI) of the Updated 2021 EIS (AMNS 2021).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-186
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not Listed
EIS Guideline Reference:	*Not Listed*
Revised EIS (February 28, 2019) Reference:	Appendix G.4, pg 8 Pg 321 Pg 495 Pg 496

Context and Rationale

"The Mud Lake and Crusher Lake catchment areas experience the largest reduction in subcatchment area between baseline and EOM due to the construction of the waste rock stockpile, 43% and 52% respectively. The contributing drainage area to Tent Lake encompasses the East Collection Pond subcatchment area that represents the proposed crusher pad and is increased from baseline condition by 28.7%."

"The percent change in total annual runoff from baseline to EOM and from baseline to PC conditions {for Tent Lake} is 53.1%, indicating there is an increase in annual runoff from baseline conditions."

"WC-5, north flowing between Crusher Lake and Mud Lake, will have a reduction of approximately 43% (at EOM) based on the losses to its contributing area. This proposed reduction of flow is predicted to impact the ecological maintenance flow within this portion of WC-5 during low flow periods."

"There is a predicted increase in runoff volume discharged to the Killag River of 0.91% and 0.03% during EOM and PC, respectively. Additionally, a 5 to 7% reduction in baseflow is predicted for the Killag River (Appendix G.5). Together, the impact to fish and fish habitat within the Killag River was deemed negligible."

The Proponent is Required to …

A. Additional information is required to understand the specific impacts associated with the changes in surface water outlined, and the risk for impacts to fish, fish habitat, and channel stability that result from the decreases and increases that are predicted.

B. With the level of information provided, it is difficult to assess the impacts to the water resources in the Beaver Dam Site area, as the information provided is on such a large time step and does not go into details on how the various developments (e.g., pit lake, ditching, settling ponds) alter flows on site at a smaller scale. For example, how does the proposed works affect the Killag River in periods of low flow? How does the need to treat discharges from the two collection ponds affect discharges during these times?

C. The statement that there is a reduction of 5 – 7% of baseflow – I couldn't find this in Appendix G.5. Where is this located?

Response

A. The Fish and Fish Habitat Assessment (Section 6.9), page 6-431 has been revised in the Updated 2021 EIS (AMNS 2021). The assessment provides a comprehensive review of the impacts to fish and fish habitat resulting in changes in base flow and water level.

B. A Mine Water Management Plan (Appendix P.4) is provided in the Updated 2021 EIS (AMNS 2021). The Mine Water Management Plan describes water management including water treatment during each phase of the Project (i.e., construction, operations, active closure and post-closure). This information has been used to inform impact predictions on surface water quantity and quality (Section 6.7, page 6-213 of the Updated 2021 EIS [AMNS 2021]) including mitigations that will be implement throughout the life of the Project. These updates (Section 6.7 and the Mine Water Management Plan) have been used to predict impacts to Fish and Fish Habitat (Section 6.9, page 6-431 of the Updated 2021 EIS [AMNS 2021]).

C. There have been revisions to changes in baseflow in the Project Area, which is provided in Section 6.7.8.2.1, page 6-271 Surface Water Quantity Modelling Results and the summary of the Monthly and Annual Water Balance Results for End of Mine and Post Closure, in the Killag River is provided in Section 6.7, Table 6.7-25, page 6-275, of the Updated 2021 EIS (AMNS 2021).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-187
Regulatory Agency/Indigenous Community:	NSE - Surface Water Quality Specialist
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix G.4, pg 16 Appendix F.1, pg 7 Appendix G.4, pg 17

Context and Rationale

"The percent changes in total annual runoff from baseline to EOM conditions and from baseline to PC conditions are -43.0% and -35.5%, respectively. The negative values indicate that there are decreases in annual runoff from baseline conditions. The percent changes are proportional to the reductions in catchment areas."

"As dewatering progresses and groundwater levels in the vicinity of the open pit are lowered, some surface water bodies which are presently groundwater discharge areas may become areas of groundwater recharge."

Table 4-1

The Proponent is Required to …

Approaches are outlined in Appendix G.4 for the calculation of infiltration and runoff for various stockpile types, but it is stated here that the percent changes are proportional to the reductions in catchment areas. Please clarify.

- It is outlined in other sections of the submission that the creation of the pit may alter inflows to the surrounding waterbodies. How is this and other uncertainties in the approach considered in producing the final values?
- Why does evaporation increase in the End-of-Mine and Post-Closure conditions, as shown in the Tables in Appendix G.4?

Response

Changes in surface runoff will be proportional to the change in catchment area in scenarios where the catchment area has been reduced, and there are no changes in other hydrologic characteristics within the catchment. An example of this would be the change in surface runoff to the WC-26 assessment point from baseline to EOM/PC conditions, as the change in surface runoff is directly related to the reduction in catchment area. There are no changes in land cover, catchment slope, soil conditions in the area that drains toward WC-26 between the development stages.

The groundwater model was used to determine the influence of the pit on groundwater flow patterns in the study area. Groundwater model results were incorporated into the water balance model as percent changes in baseflow from baseline conditions. In addition, groundwater inflow rates to the pit are determined from the groundwater model and input directly to the water balance model. The water balance analysis (Appendix A, PDF page 44 in the Mine Water Management Plan (Appendix P.4 of the Updated 2021 EIS [AMNS 2021]) provides more information on the coordination between the groundwater and surface water models.

The increase in evaporation can be attributed to the change in land cover between EOM and PC conditions. Stockpiles will be removed or vegetated, which will increase the amount of water that is lost due to evapotranspiration.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-188
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix G.4, pg 20 Appendix F.1, pg 9

Context and Rationale

The inputs to the Mine Pit include groundwater inflow, direct precipitation minus evaporation, pit wall runoff and mine site runoff.

"Where the till consists of relatively coarse grained gravels with a small proportion of fines there is the potential for larger groundwater inflows to occur. Whether these inflow rates are sustained will depend on the lateral extent of the gravel deposits, and the degree of interconnection between the gravels and surface water bodies. This may require further investigation if the risk is considered significant."

The Proponent is Required to …

- How was mine site runoff calculated? A description of this piece is not provided in the paragraph that follows, although it is shown in table 5-1 as 'Surface Water Ditch Inflow'
- Is this statement from Appendix F.1 further explored in the water balance or elsewhere in the submission?

Response

A detailed description of how mine site runoff can be found in Appendix A, PDF page 44 - Water Balance Analysis and Appendix B, PDF page 92 - Stormwater Management Assessment Hydrologic Modelling of the Mine Water Management Plan (Appendix P.4) of the Updated 2021 EIS (AMNS 2021).

In general, surface runoff volumes from the waste rock pile and impervious site areas are calculated as the product of rainfall/snowmelt, area, and a runoff coefficient. The runoff coefficient for the waste rock piles is estimated from studies of similar materials at the Touqouy site. Surface runoff volumes from the undisturbed portions of the site are estimated using the hydrologic model in GoldSim.

This statement is not explored further in the submission; however, borehole logs for monitoring well nests installed in the vicinity of the proposed open pit (MW-09, MW-07, MW-11, MW-05) identify that the overburden unit at those location consists primarily of a silty sand. Therefore, available data does not indicate the presence of coarse-grained gravel within the overburden that would create a preferential flow path between the proposed open pit and adjacent surface water bodies. Prior to construction, additional hydrogeologic investigation is planned to confirm the hydrogeologic conditions between Cameron Flowage and the proposed open pit to further confirm the absence of high permeability coarse grained material between Cameron Flowage and the proposed open pit.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-189
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix F.1 pg 8

Context and Rationale

"The results from the water balance analysis can be used to assess the impact of the proposed mine development on the receiving environment in terms of the change in water volume discharged to the Killag River, Mud Lake, Crusher Lake and Tent Lake outfalls."

"Some caution is needed when using the results of packer tests conducted in diamond core holes. Packer tests in core holes may underestimate the actual hydraulic conductivity of the tested interval due to blinding, or blocking, of permeable fractures by fine grained drill cuttings or viscous drilling fluid. It is not possible to quantify the magnitude of these effects, and they may not necessarily be a significant factor. The set of hydraulic conductivity results from the tests at Beaver Dam appears reasonable given the lithology and the type of aquifer (fractured bedrock)."

The Proponent is Required to …

- Described earlier in this Appendix that runoff volumes were not calculated directly for Crusher Lake
- Statements in the submission regarding the level of uncertainty and confidence in the values reported is required.

Response

Runoff volumes have been calculated for Crusher Lake. The drainage area for Crusher Lake remains unchanged from baseline conditions throughout the mine development stages; however, the groundwater modelling results show a small increase in baseflow contributions to the lake in the order of 2-3% annually. The small gain in baseflow is likely attributed to the placement of the NAG waste rock and/or LGO stockpiles overtop of a watercourse in neighbouring watershed. Refer to Appendix A, Section 5.2.2, PDF page 70 of the Mine Water Management Plan (Appendix P.4) of the 2021 Updated EIS (AMNS 2021).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-190
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not listed
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix G.4, pg 20 Appendix F.1 pg 9 Appendix G.4, pg 21

Context and Rationale

"Based on these calculations the pit filling time is equal to 13.8 years."

"The estimated groundwater seepage rate into the 100 m deep pit from both the north and south walls would thus be 622 kL/day (7.2 L/sec)…It is recommended that a range of groundwater seepage rates from bedrock at Beaver Dam of between 100 kL/day (1.2 L/sec) and 1,000 kL/day (12 L/sec) be used for planning purposes."

"The proposed mine development results in a 0.91% and 0.03% increase in runoff volume discharged to the Killag River under EOM and PC conditions, respectively."

The Proponent is Required to …

A. What does the water balance look like during the period of pit lake filling? As mentioned, it will take 13.8 years before the pit lake is full and discharging. During this time, there is no contribution from the pit lake drainage area to the Killag system, which differs from the EOM condition where the pit is pumped to the North Pond and discharged. What are the impacts to water resources during this time?

B. What is the level of uncertainty in the calculations presented, considering the assumptions made and range of potential inputs outlined in other sections of the submission?

C. There are several groundwater seepage rates for both Touquoy and Beaver Dam presented in the various Appendices of the submission. Please present a summary of these in the main report, with a discussion on the range and the values that were chosen in modelling

D. What is the impact of alterations to natural flow patterns (e.g., extensive ditching in Mud Lake watershed, settling ponds, post closure pit lake) on the flows within these watersheds, specifically during low flow periods?

E. How are the local waterbodies and the pit lake estimated to interact? How will the pit lake impact water levels in Cameron Flowage, Mud Lake, and others, and thus flows within the Killag River?

F. What monitoring will be completed to validate and update the model?

Response

A. The water balance model results show an average annual reduction in total streamflow of 2.5% in the Killag River at the downstream limit of impact during pit filling. The water balance results are outlined in Section 5 (PDF page 21) of the Mine Water Management Plan Appendix P4 of the Updated EIS (AMNS 2021). The Water Balance Analysis is outlined in Appendix A, PDF page 44 of Appendix P.4 (AMNS 2021).

B. For the water balance analysis, the most uncertain inputs are the climate data and runoff coefficients from the stockpiles. To address the climate uncertainty, the water balance results are presented in percent change values. A sensitivity analysis was also completed on the climate data and the impact on results by calculating the water balance for the average, wettest and driest years on record and then presenting the results in terms of percent change. The results for all three scenarios are very similar. To address uncertainty with the runoff coefficients from the stockpiles these values were obtained from studies at Touquoy and based on measured data. Monitoring at the Beaver Dam site is proposed and will be used to further refine these values through the development of the mine.

C. The estimated pit inflow rates for Touquoy and Beaver Dam have been updated over time as the Beaver Dam pit shell has been updated and additional hydrogeologic information has been collected and incorporated into predictive models. The estimated pit inflow rates included in the Updated 2021 EIS (AMNS 2021) can be summarized as follows:

- Estimated average annual pit inflow rate of 550 to 1450 m^3/d based on the analytic equations incorporating conservative assumptions (hydraulic gradient of 1) and packer test results conducted in 2014 and in 1986 (Appendix F.1 of the Updated 2021 EIS [AMNS 2021]).
- Based on the updated numerical groundwater flow model, the estimated average annual pit inflow rate is 605 m^3/d ranging from 531 m^3/d to 655 m^3/d for average dry and wet conditions, respectively. The estimated groundwater inflow rates during pit filling ranged from 605 m^3/d at a pit lake stage elevation of -30 m above mean sea level (masl) to 385 m^3/d at a pit lake stage elevation of 127 m^3/d masl. The uncertainty analysis conducted on the pit inflow rate identified a potential pit inflow rate of up to 829 m^3/d (Appendix F.5 of the Updated 2021 EIS [AMNS 2021]).
- An estimated groundwater inflow rate during pit filling ranging from 595 m^3/d at a pit lake stage elevation of 30 m above mean sea level (masl) to 393 m^3/d at a pit lake stage elevation of 127 m^3/d masl is applied in the water balance report for pit infilling calculation. These pit inflow rates are based on an interim result from the numerical groundwater flow model presented in Appendix B, PDF page 92 of Appendix P.4 of the Updated 2021 EIS (AMNS 2021) and the difference between the final estimated pit inflow volumes presented in Appendix B, PDF page 92 of Appendix P.4 of the Updated 2021 EIS (AMNS 2021) and the interim result is negligible with respect to the pit infilling calculation (< 0.5% of the total inflow rate into the proposed pit during pit filling).

In general, the range of preliminary pit inflow rate estimated presented in Appendix F.1 of the Updated 2021 EIS (AMNS 2021) of 550 m^3/d to 1450 m^3/d compare well with the updated average dry to average wet pit inflow rates ranging from 531 m^3/d to 655 m^3/d developed using the hydrogeological model presented in Appendix F.5 of the Updated 2021 EIS (AMNS 2021). The estimated inflow rates presented by Appendix F.1 are based on analytic calculations with conservative assumptions while the pit infilling estimates presented in Appendix F.5 are based on a hydrogeologic model that incorporates additional hydrogeologic investigation data collected since the initial estimates provided by Appendix F.1. The difference between the interim results applied in Appendix P.4 and the final results presented in Appendix F.5 are negligible with respect to the estimation of pit infilling time.

As outlined in Appendix F.6 of the Updated EIS (Executive summary, PDF page 7), at baseline, the Touquoy open pit will be fully dewatered, and is simulated to intercept groundwater seepage at a rate of 768 m^3/d. The extent of the corresponding drawdown cone, as delineated by the 0.5 m drawdown contour, extends approximately 600 m south of the site and about 50 m west of the site toward Moose River. The inflow to the open pit decreases as it is filled with tailings and water during Beaver Dam operations, until the open pit stage reaches the maximum level of 108 m relative to CGVD2013. At this stage,

the groundwater seepage decreases to 373 m^3/d, and the corresponding drawdown cone is about the same as the baseline condition (Appendix F.6, Executive summary, PDF Page 7).

D. The impact of alterations of natural flow patterns during mine development and closure were estimated using the water balance model and the groundwater model. For detailed description of the impacts on natural flow patterns during low flow periods please refer to Appendix A, PDF page 44 Water Balance Analysis and Appendix E, PDF page 227 Hydrogeological Modelling Report within the Mine Water Management Plan Appendix P.4 of the Updated 2021 EIS [AMNS 2021]. In summary, the water balance results presented in Tables 5-6 to 5-23, PDF page 69 to PDF page 88 in Appendix A within the Mine Water Management Plan Appendix P.4 of the Updated 2021 EIS [AMNS 2021], present the results of the monthly water balance assessment for baseline, EOM and PC. These tables present the change in percentage of surface runoff volume, streamflow, and baseflow in both volume and percent change from baseline condition. In general, the months of July, August and September represent the low flow periods.

E. The interaction between the local waterbodies and the pit lake we determined within Appendix A, PDF page 44 Water Balance Analysis and Appendix E, PDF page Hydrogeological Modelling Report within the Mine Water Management Plan Appendix P.4 of the Updated 2021 EIS. The impact the pit lake has on the streamflow volume within the neighbouring waterbodies (i.e., Crusher Lake, Mud Lake and Cameron Flowage) is presented in Table 5-8, PDF page 71 for Crusher Lake, Table 5-10, PDF page 75 for Mud Lake and Table 5-16, PDF page 80 for Cameron Flowage in Section 5 of Appendix A, PDF page 44 Water Balance Analysis within the Mine Water Management Plan Appendix P.4 of the Updated 2021 EIS. The impact the pit lake has on the water levels within Crusher Lake and Mud Lake are presented on Table 5-13 and 5-14, PDF page 78, respectively, in Section 5 of Appendix A, PDF page 44 Water Balance Analysis within the Mine Water Management Plan Appendix P.4 of the Updated 2021 EIS [AMNS 2021].

F. Section 8, PDF page 34 of the Mine Water Management Plan Appendix P.4 of the Updated 2021 EIS outlines the surface water and groundwater monitoring plan during operations and post-closure. In summary, a total of 16 surface water monitoring sites are proposed during construction stage for continued monitoring at the Beaver Dam Mine for either water quality, quantity or both. A total of 19 surface water monitoring sites are proposed during operation and 17 during PC for continued monitoring. The monitoring sites are presented on Figures 8-1, PDF page 36, Figure 8-2, PDF page 37 and Figure 8-3, PDF page 38 respectively. Appendix G, PDF page 646 Groundwater Monitoring Plan within the Mine Water Management Plan Appendix P.4 provides a detailed proposed groundwater monitoring plan during operations and PC. In summary, a combination of existing and proposed monitoring wells adjacent to key infrastructure (which have the potential to affect groundwater) will be used to establish a network of monitoring wells. Measuring the water levels in these wells on a periodic basis will document the impact of mine activities on groundwater elevations at the Mine and groundwater flow directions within the monitoring well network. Data collected from the groundwater monitoring network will be used to calibrate the groundwater model during operations to refine the model predictions and inform further mitigation measures as required.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-191
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Page 30

Context and Rationale

"Runoff from the till stockpiles located to the southeast of the open pit and east of the mine facilities area will be captured with the aid of channels around the stockpile perimeter and diverted north to Cameron Flowage by gravity via separate water discharge structures and engineered channels. At this time, it is not anticipated that a collection pond would be required, however such a pond can be constructed should settling of solids prior to discharge be required."

"The majority of water collected in the north settling pond will be released to Cameron Flowage. Smaller volumes will be released south into Wetland 64 from the collection pond."

The Proponent is Required to …

How will the proponent know if settling of solids from the flows from the till areas 'is required'?

What state will the till area be in? What are the risks to water quality?

Without contours, difficult to have confidence in drainage areas defined in Figure 6.7-2 – please put contours on this map

Response

A settling pond has now been designed to capture and treat runoff water from the till stockpile area, referred to as the east settling pond. Refer to Appendix B, Section 4, PDF page 99 of the Mine Water Management Plan (Appendix P.4 in the Updated 2021 EIS [AMNS 2021[) for a description and predicted performance evaluation of the east settling pond. The till stockpiles will be in place during site operations and removed post-closure. A predictive water quality analysis was completed for the east settling pond inflow and determined that TSS removal was required. The results of this analysis are included in the revised Predictive Water Quality Analysis technical report. More information on this analysis is provided in response to comment NSE 2-110.

The contours will be included on the site maps in the Water Balance and Predictive Water Quality Analysis technical reports, which are provided in Appendices A, PDF page 44 and D, PDF page 184 of the Mine Water Management Plan (Appendix P.4) of the Updated 2021 EIS (AMNS 2021).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-192
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not Listed
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Pg. 29 Pg. 922 Appendix G.3, pg 9 Appendix G.3, pg 17

Context and Rationale

"Raw water at the Beaver Dam Mine Site will be required for fire protection and other processing requirements. Sources of raw water include surface water runoff and raw water pumped from Cameron Flowage. Raw water drawn from Cameron Flowage will be pumped by a single duty submersible water pump to a combination raw water and firewater reserve storage tank."

"The cumulative effect of the combined projects could mean a reduction in the streamflow from Scraggy Lake to the Fish River system; however, assuming that the rate of withdrawal is consistent with current needs of the project, then it has been shown that the withdrawal from Scraggy Lake is sustainable given the current level of inputs to the watershed."

"Freshwater make-up for the process will continue to be sourced from Scraggy Lake. Additional make-up process water required in a dry year or to build a reservoir incase of a dry year will be sourced from effluent from the TMF treatment plant or Scraggy Lake, subject to NSE approval"

"The water balance simulated a water deficit under dry climate conditions that would require takings exceeding the permitted water volume from Scraggy Lake for Touquoy operation. Therefore, under dry climate conditions or based on the operational requirements of pumping infrastructure, start- up water in the open pit may be supplied from Scraggy lake (subject to provincial permitting) and/or effluent from the effluent treatment plant."

The Proponent is Required to …

Further information is required to understand the potential impacts associated with this activity. What are the water needs, does this trigger the need for a water withdrawal approval under the Activities Designation Regulations, and is the Cameron Flowage an appropriate location for water withdrawals to occur?

Clarification is required for the statements in Appendix G.3. From the main submission, it is stated that the existing withdrawal from Scraggy Lake will just require extension, and not modification, which contradicts the information in Appendix G.3, which indicates additional water is likely to be required. Please provide an assessment of what additional water is expected, and analysis into the options presented (e.g., 'build a reservoir', additional water from Scraggy Lake)

Response

A Mine Water Management Plan has been developed for the Beaver Dam Mine Site, which is provided in Appendix P.4 of the 2021 Updated EIS (AMNS 2021). Water withdrawal for domestic water use at the mine site will be from Crusher Lake not the Cameron Flowage/Killag River. An assessment of changes to surface water flow from Crusher Lake is assessed in Section 6.7.8.2.1, page 6-271 of the Updated 2021 EIS (AMNS 2021).

Crusher Lake is part of the Mud Lake catchment. Its drainage area remains unchanged from baseline conditions throughout the mine development stages; however, the groundwater modelling results show a small increase in baseflow contributions to the lake in the order of 2 to 3% annually. The small gain in baseflow is likely attributed to the placement of waste rock and low-grade ore stockpiles overtop of a watercourse in a neighbouring watershed. Under baseline conditions the watercourse would have collected baseflow prior to reaching the Crusher Lake catchment. Under EOM and PC conditions this portion of the baseflow emerges in the Crusher Lake catchment. In addition, during operations, water will be extracted from the lake at a rate of 3 m3/hour to meet the domestic and truck wash water demands. The combined impact is a 4.4% decrease in annual lake discharge. In PC conditions, the Project impact is reversed as water extraction from the lake is discontinued. The WBM simulates a 0.6% increase in annual lake discharge.

The Water Balance Model (WBM) simulates a 18.1% decrease in annual total inflow and 18.3% decrease in annual discharge at Mud Lake between baseline and EOM conditions. These results are attributed to a 4.4% decrease in annual Crusher Lake discharge through WC-5 a 24.5% decrease in annual surface runoff and a 21.9% decrease in annual baseflow. The decrease in surface runoff volume is proportional to the reduction in drainage area due to stockpile and road development within the baseline Mud Lake catchment. The decrease in baseflow is caused by the impact of the open pit on groundwater patterns in the Mud Lake catchment.

The WBM simulates a 13.6% decrease in annual total inflow and 13.7% decrease in annual discharge at Mud Lake between baseline and PC conditions. The impact to surface runoff in the Mud Lake catchment is reduced from EOM to PC conditions, because the low-grade ore stockpile will be removed and the area where the pile once was will be directed to Mud Lake. The impact to baseflow will be reduced between EOM and PC conditions because of the change in drainage area and because the pit will be filled with water, reducing its capacity to draw water from the local aquifer.

The predicted impacts to Mud Lake water levels are highest in wet periods and lowest in dry periods of the year. The results from the WBM indicated that Mud Lake has a surplus of water throughout all periods of the year. Therefore, it is predicted that the discharge channel from Mud Lake to the Killag River will not run dry as a result of the mine development (i.e., extreme long-term drought can lead to dry conditions, which are out of the control of site development).

As noted in the Touquoy Integrated Tailings and Water Management Plan water withdrawal from Scraggy Lake is only expected at start-up (Section 2.9.2.3.2, page 2-69 of the Updated 2021 EIS [AMNS 2021]) that states:

> *"Additional Beaver Dam ore processing start-up water supply is sourced from Scraggy Lake, subject to NSE water withdrawal approval. Freshwater make-up for the process is sourced from Scraggy Lake, as conducted under existing operations associated with processing the Touquoy ore. Additional make-up process water required in a dry year or to build a reservoir in case of a dry year will be sourced from effluent from the TMF treatment plant or Scraggy Lake, subject to NSE approval".*

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-193
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not Listed
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix F.1 pg 1 Pg. 495

Context and Rationale

"Cameron Flowage is a remnant of past logging operations - There is a shallow sediment settling dam located in the eastern part of the proposed open pit (Figure 2). This dam was used to trap sediment generated by the dewatering of the Seabright underground operations in the mid-1980s before discharging to Cameron Flowage."

"WC-5 has been surveyed extensively through multiple seasons. WC-5 exits Crusher Lake as a narrow channel flowing over a historic, man-made dam."

The Proponent is Required to …

Do any dams exist on Cameron Flowage that may be impacted by the proposed activity?

What details are available surrounding the dam on WC-5? Who owns the dam, is it maintained? What impact does this have on flows and fish passage?

Response

No dams on Cameron Flowage observed.

The WC-5 dam is associated with Historic Mine Activities at site. Northern Timber is the private land owner. The Site haul road crosses over top of WC-5, the watercourse leading from Crusher Lake to Mud Lake. In order to prevent disruption of the natural flow path, clean water ditches will collect surface water runoff on the south side of the haul road and drain this runoff back towards WC-5. WC-5 will be channelized in a culvert below the haul road for 50 m. The outlet of the WC-5 culvert will have an energy dissipation basin to reduce channel velocities and promote fish passage through the culvert. The contact water ditches will pass over top of the WC-5 culvert. As with all other sections of the ditch, the contact water ditch in this area will be lined with an HDPE liner to prevent infiltration of contact water into the adjacent watercourse.

Round 2 Information Request Number:	NSE-2-194
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Pg. 40 Pg. 40 Pg 323

Context and Rationale

"Road construction will allow for a clear porous subgrade or cross drainage culverts in order for wetland hydrology to be maintained post-construction."

"Where deviations from the existing course are required, culverts of the same design will be installed beneath the new span and culverts beneath the old span will be removed where appropriate to facilitate the restoration of corresponding watercourses and to improve fish passage."

"Many of the existing culverts are in poor shape (crushed, blocked, and deteriorated) but where construction or drainage changes take place this will facilitate the restoration of the existing drainage conditions and improve fish passage where deemed appropriate."

The Proponent is Required to …

Please provide additional details to support this approach and to support how impacts to local drainage resulting from the road will be mitigated

What is the rationale/justification behind replacing culverts with those of the same design?

Clarification of what is written here is required – is this meant to convey that the 'old span', which is understood to be the previous road, would be completely removed, or just the culverts? If the culverts are to be removed, what will be left in these areas (e.g., riprap)?

How will cases be 'deemed appropriate'?

In general, more information surrounding the approach and design of the haul road is required to sufficiently assess the potential impacts on surface water resources, and whether the mitigations proposed are appropriate

Response

A Sediment and Erosion Control Plan (Appendix C, PDF page 159 of Water Management Plan Appendix P.4) in the Updated 2021 EIS (AMNS 2021). The mitigation to manage drainage will include ditching and culverts, for example.

Table NSE-2-194-1 provides an inventory of drainages and culverts and rationale for replacement. What will remain will be functioning culverts.

Detailed information on the design of the Haul Road is provided in the Section 2.7.3 – Haul Roads, page 2-38 in the Updated 2021 EIS (AMNS 2021).

Table NSE-2-194-1: Potential Direct Fish Habitat Impacts within the Haul Road

Watercourse Location	Current Crossing (Condition)	Plan for Upgraded Haul Road*	Direct Footprint Impact (m^2)	Impact to Fish Passage
WC-1	Culvert (functioning)	Proposed upgraded road alignment perpendicular to WC. Extend existing culvert, following standard mitigation measures.	0	None
WC-A	Culvert (buried)	Proposed upgraded road alignment perpendicular to WC. Replace buried culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through removal of buried culvert.	0	Improvement
WC-B	Culvert (crushed)	Proposed upgraded road alignment perpendicular to WC. Replace crushed culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through removal of crushed culvert.	0	Improvement
WC-C	Culvert (functioning)	Proposed upgraded road alignment perpendicular to WC on eastern side of road. Replace functioning culvert. On western side of road, alignment expected to have direct impact on WC through ditching. Standard mitigation will apply to limit impact to fish habitat.	7.4	None
WC-D	None	Proposed upgraded road alignment perpendicular to WC. Install new culvert at crossing location. Standard mitigation will apply to limit impact to fish habitat.	10.5	None – no mapped aquatic feature upstream of road
WC-E	Culvert (blocked)	Proposed upgraded road alignment perpendicular to WC, east of existing road. Remove blocked culvert on existing road and install new culvert downstream at new crossing location. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through removal of blocked culvert.	0	Removal of old buried culvert: Improvement New culvert: None
WC-F	Culvert (crushed)	Proposed upgraded road alignment perpendicular to WC, west of existing road. Remove blocked culvert on existing road and install new culvert downstream at new crossing location. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through removal of crushed culvert.	0	Removal of old crushed culvert: Improvement New culvert: None

Table NSE-2-194-1: Potential Direct Fish Habitat Impacts within the Haul Road (continued)

Watercourse Location	Current Crossing (Condition)	Plan for Upgraded Haul Road*	Direct Footprint Impact (m^2)	Impact to Fish Passage
WC-G	Culvert (crushed)	Proposed upgraded road alignment perpendicular to WC. Replace crushed culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through replacement of crushed culvert.	0	Improvement
WC-H	Bridge (functioning)	Proposed upgraded road alignment perpendicular to WC. Existing bridge to be expanded to facilitate multi-use bypass road, and parallel new bridge for Haul Road. Standard mitigation will apply to limit impact to fish habitat.	0	None
WC-I	Culvert (buried)	Proposed upgraded road alignment perpendicular to WC. Replace buried culvert. Standard mitigation will apply to limit impact to fish habitat.	0	None – no mapped aquatic feature upstream of road
WC-J	Culvert (buried)	Proposed upgraded road alignment perpendicular to WC on eastern side of road. Replace buried culvert. On western side of existing road, alignment overlaps approximately 19 m of parallel stream that flows into western ditch. Proposed road upgrade will funnel the WC directly across the road to the eastern side and away from the ditch network associated with the road. Standard mitigation will apply to limit impact to fish habitat.	21.6	Improvement
WC-K	Culvert (buried)	Proposed upgraded road alignment perpendicular to WC. Install new culvert. Replace buried culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through installation of culvert.	0	Improvement
WC-L	Culvert (functioning)	WC runs parallel to current road in western roadside ditch. Proposed road upgrade will require the functioning culvert to be replaced to funnel the WC directly across the road to the eastern side and away from ditch network associated with the road. Proposed road alignment overlaps approximately 53 m of parallel ditched stream. Standard mitigation will apply to limit impact to fish habitat.	15.9	None
WC-M	Culvert (functioning, North), None (South)	Proposed upgraded road alignment is perpendicular to WC at two locations (north and south). Northern crossing will require an extension to existing culvert which is functioning. Southern crossing will require installation of a new culvert. Standard mitigation will apply to limit impact to fish habitat.	10.9	None – no aquatic features mapped upstream of southern crossing

Table NSE-2-194-1: Potential Direct Fish Habitat Impacts within the Haul Road (continued)

Watercourse Location	Current Crossing (Condition)	Plan for Upgraded Haul Road*	Direct Footprint Impact (m^2)	Impact to Fish Passage
WC-N- West River	Bridge (functioning)	Proposed upgraded road alignment perpendicular to WC. Existing bridge to be expanded to facilitate multi-use bypass road, and parallel new bridge for Haul Road. Standard mitigation will apply to limit impact to fish habitat.	0	None
WC-O	None	Proposed new road designed perpendicular to WC. Requires culvert installation. Standard mitigation will apply to limit impact to fish habitat.	29.3	None
WC-P	None	Proposed new road designed perpendicular to WC. Requires culvert installation. Standard mitigation will apply to limit impact to fish habitat.	10.2	None
WC-T	Culvert (buried)	Proposed upgraded road alignment perpendicular to WC. Replace buried culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through removal of buried culvert.	0	Improvement
WC-U	Culvert (functioning)	Proposed upgraded road alignment perpendicular to WC. Replace functioning culvert. Standard mitigation will apply to limit impact to fish habitat.	0	None
WC-V	Culvert (buried)	Proposed upgraded road alignment perpendicular to WC. Replace buried culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through removal of buried culvert.	0	Improvement
WC-W	Culvert (hung)	Proposed upgraded road alignment perpendicular to WC. Replace hung culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through replacement of hung culvert.	0	Improvement
WC-X	None	Proposed upgraded road alignment is perpendicular to WC and will require a new culvert installation. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through providing fish access to upstream aquatic resources.	12.1	Improvement
WC-Y	Culvert (buried)	Proposed upgraded road alignment is perpendicular to WC. Replace buried culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through replacement of buried culvert.	0	Improvement
WC-AA	Culvert (hung)	Proposed upgraded road alignment perpendicular to WC. Replace hung culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through removal of hung culvert.	0	Improvement

Table NSE-2-194-1: Potential Direct Fish Habitat Impacts within the Haul Road (continued)

Watercourse Location	Current Crossing (Condition)	Plan for Upgraded Haul Road*	Direct Footprint Impact (m^2)	Impact to Fish Passage
WC-AC	None	Proposed upgraded road alignment overlaps with the top end of this watercourse (3.7 m). This area may be altered to support road upgrades. Standard mitigation will apply to limit impact to fish habitat.	8.3	None
WC-AD-Morgan River	Bridge (functioning)	Proposed upgraded road alignment perpendicular to WC. Existing bridge to be expanded to facilitate multi-use bypass road, and parallel new bridge for Haul Road. Standard mitigation will apply to limit impact to fish habitat.	0	None
WC-AE	Culvert (buried)	Proposed upgraded road alignment perpendicular to WC. Replace buried culvert. Standard mitigation will apply to limit impact to fish habitat and overall improve fish habitat through replacement of buried culvert.	0	Improvement
WC-AF	None	Proposed upgraded road alignment overlaps with the bottom end of this watercourse (40.2 m), at which point the watercourse currently empties into the southern ditch along the existing road. Current ditch drains east towards culvert at WC-AE. Proponent will consider installation of a culvert to funnel the watercourse directly across the road north towards WC-AH, away from the ditch network associated with the road. Standard mitigation will apply to limit impact to fish habitat.	46.3	Improvement
WC-AG	None	Proposed upgraded road alignment overlaps with the bottom end of this watercourse (18.4 m), at which point the watercourse currently empties into the southern ditch along the existing road. Current ditch drains east towards culvert at WC-AE. Proponent will consider installation of a culvert to funnel the watercourse directly across the road north towards WC-AH, away from the ditch network associated with the road. Standard mitigation will apply to limit impact to fish habitat.	12.0	Improvement
WL64	Culvert (buried) – see WC-A	Buried culvert associated with WC-A located at wetland crossing. Proposed upgraded road alignment overlaps surface water features (presumed fish habitat) both sides of road. Replacement of buried culvert likely to improve fish access into wetland.	48.7	Improvement

Table NSE-2-194-1: Potential Direct Fish Habitat Impacts within the Haul Road (continued)

Watercourse Location	Current Crossing (Condition)	Plan for Upgraded Haul Road*	Direct Footprint Impact (m^2)	Impact to Fish Passage
WL66	Culvert (crushed) at northern crossing – see WC-B, None at southern crossing	Proposed upgraded road alignment overlaps wetland complex at two locations – a northern crossing (associated with WC-B) and a southern crossing. At northern crossing, proposed upgraded road alignment overlaps surface water features (presumed fish habitat) on both sides of road. Replacement of crushed culvert on WC-B likely to improve fish access into wetland. No culvert/bridge currently exists at southern crossing. Proposed upgraded road alignment overlaps surface water features (presumed fish habitat) on west side of road. Proponent will consider installation of a culvert to re-establish natural wetland hydrology which may provide fish access into previously inaccessible fish habitat.	487.0	Improvement
WL73	None	No culvert is present at current wetland crossing. Proposed upgraded road alignment overlaps surface water features (presumed fish habitat) currently exist on both sides of road, likely caused by road impoundment. Proponent will consider installation of a culvert to re-establish natural wetland hydrology which may provide fish access into previously inaccessible fish habitat.	185.2	Improvement
WL76	Culvert (crushed) – see WC-G	Crushed culvert associated with WC-G located at wetland crossing. Proposed upgraded road alignment overlaps surface water features (presumed fish habitat) both sides of road. Replacement of crushed culvert likely to improve fish access into wetland.	398.6	Improvement
WL146	None	No culvert is present at wetland crossing. Proposed upgraded road alignment overlaps surface water feature (presumed fish habitat) on both sides of road – extensive flooding on west side likely caused by road impoundment. Proponent will consider installation of a culvert to re-establish natural wetland hydrology which may provide fish access into previously inaccessible fish habitat from WC-Z.	106.4	Improvement

Table NSE-2-194-1: Potential Direct Fish Habitat Impacts within the Haul Road (continued)

Watercourse Location	Current Crossing (Condition)	Plan for Upgraded Haul Road*	Direct Footprint Impact (m^2)	Impact to Fish Passage
WL154	None	Headwater wetland confined to west side of road. Proposed upgraded road alignment overlaps surface water feature (presumed fish habitat). No culvert proposed.	176.9	None
WL159	Culvert (hung) – see WC-AA	Hung culvert associated with WC-AA located at wetland crossing. Proposed upgraded road alignment overlaps surface water feature (confirmed fish habitat). Replacement of hung culvert likely to improve fish access upstream to WL160.	6.5	Improvement
WL160	Culvert (hung) – see WC-AA	Hung culvert associated with WC-AA located at wetland crossing. Proposed upgraded road alignment overlaps surface water feature (confirmed fish habitat). Flooding observed in wetland likely caused by improper culvert sizing. Replacement of crushed culvert likely to improve fish access and re-establish natural wetland hydrology.	836.5	Improvement
Total			**2,430.3**	

* For all reaches requiring fish rescue prior to culvert installation, fish will be released within the same watercourse or waterbody, typically in an area downstream of the proposed impact unless site conditions necessitate otherwise.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-195
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not Listed
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix F.1 pg 1 Pg. 495 Pg. 330 Appendix F.6, pg 5.17

Context and Rationale

"As the predevelopment and post development catchment areas draining to the discharge location at Moose River are similar, Moose River is capable of handling the resultant flows."

"Compared to the existing conditions, the dewatering of the open pit is anticipated to reduce the baseflow in Moose River at SW-2 by 208 m3/d."

The Proponent is Required to …

Please provide further rationale/justification for this sentence, as sufficient information to support the validity of this statement is not provided

For clarity, is this statement correct? Or is this number meant to reflect pit full conditions, as is mentioned in the previous sentence?

Response

The reduction in baseflow in Moose River of 208 m^3/d corresponds to the dewatering of the Touquoy pit at the start of Beaver Dam operations (i.e., the fully dewatered pit) compared to the existing conditions. This represents approximately 0.2% of the mean annual baseflow estimate Moose River (23,348 m^3/d). Appendix F.6 (Groundwater Flow and Solute Transport Modelling to Evaluate Disposal of Beaver Dam Tailings in Touquoy Open Pit) has been updated to reflect this change (Updated 2021 EIS [AMNS 2021]).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-196
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not listed
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix F.1

Context and Rationale

Appendix F1 is in Draft, missing figures

The Proponent is Required to …

Please provide the final report for Appendix F1

Please provide the figures that are referenced in the report

Response

The final Assessment of Potential Open Pit Groundwater Inflows Beaver Dam Mine Gold Project, April 2015 report, including figures, prepared by Peter Clifton & Associates Consulting Hydrogeologists prepared for Atlantic Mining NS Inc., formerly Atlantic Gold Corporation (April 2015) will be included as part of the Updated 2021 EIS as Appendix F.1 (Updated 2021 EIS [AMNS 2021]).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-197
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not Listed
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Pg 330

Context and Rationale

"A spillway is proposed to be installed at elev. 108 m to prevent the pit lake from overtopping. The capacity of the spillway will be sized to accommodate the Canadian Dam Association inflow design flood and associated freeboard requirements for wind run-up and wave set-up and in consideration of DFO requirements."

The Proponent is Required to …

What requirements, if any, are necessary for the on-going maintenance of the spillway? How will this be maintained appropriately after mine closure?

What are the potential impacts downstream as a result of this spillway? Are they acceptable, and are any mitigations proposed? What are the design criteria for the spillway itself?

Response

The Touquoy Integrated Tailings and Water Management Plan (Appendix F.7) of the Updated 2021 EIS (AMNS 2021) describes a closure plan for the spillway. The spillway will be monitored until such time that water quality meets discharge criteria without the need for water treatment. Updates to reclamation and closure plans will include updates to spillway and treatment.

Water from spillway will be treated to meet water quality discharge criteria and therefore the effects to downstream environment will be low. The design of the spillway is provided in Section 2.1, PDF page 8 of Appendix F.7 of the Updated 2021 EIS (AMNS 2021).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-198
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Pg 497

Context and Rationale

"There is an increase, however, of 53.1% in the predicted annual runoff volume discharged to Tent Lake due to mine development… Flooding of WC- B and adjacent wetlands may have a positive impact and increase suitable fish habitat. The expected flow increase will effect Wetland 64 and will have limited effect on WC-B, and associated fish habitat in either system."

The Proponent is Required to …

Additional analysis is required to support these statements. What will be the impact on the watercourse associated with such an increase in flow, as far as channel stability and geometry is concerned, and what is the potential for impacts downstream (e.g., Tent Lake) as a result of these changes?

Response

Based on the revised site layout, there will be a 1 to 2% reduction in annual streamflow at the Tent Brook system assessment point presented in the water balance analysis (Appendix A, Section 7, PDF page 89 in the Mine Water Management Plan (Appendix P.4 of the Updated 2021 EIS [AMNS 2021]). The revised site layout has reduced the change in contributing drainage area to the Tent Lake system. The current plan involves a small decrease in drainage area from baseline (306.2 ha) to EOM/PC (301.6 ha).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-199
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix F.1, pg 7

Context and Rationale

"The estimated average groundwater inflow rate into an open pit at Touquoy from the till is 450 kL/day (5.2 L/sec) (Peter Clifton & Associates, 2006). Given the proposed open pits at Touquoy and Beaver Dam have similar crest perimeter lengths, this estimate of groundwater inflow rate from the till can also be applied to the Beaver Dam site.

The Proponent is Required to …

The submission should include enough information to have confidence with the approach to size the settling pond to meet water quality objectives based on the expected inputs to the pond.

Response

The estimate of pit inflow rates presented in Peter Clifton & Associates, 2006 is outdated. The Hydrogeologic Modelling Report (Appendix E, PDF page 227 in the Mine Water Management Plan, Appendix P.4 of the Updated 2021 EIS [AMNS 2021]) and Section 6.6.7.1, page 6-188 of the Updated 2021 EIS (AMNS 2021) present the updated predicted pit inflow rate estimates, through the application of a numerical groundwater flow model. The updated predicted groundwater inflow rates into the open pit are combined with the surface water runoff values as presented in the Water Balance report Appendix A, PDF page 44 (Mine Water Management Plan, Appendix P.4 of the Updated 2021 EIS [AMNS 2021]). Appendix B, PDF page 92 - Stormwater Management Assessment Hydrological Modelling in the Mine Water Management Plan (Appendix P.4 of the Updated 2021 EIS [AMNS 2021]) outlines the information used to size the settling ponds to increase confidence that water quality objectives are met.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-200
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Pg 30

Context and Rationale

"Based on results from recent surface and groundwater quality modelling, an effluent treatment plant will be utilized as required to ensure that any discharge meets the applicable federal MDMER criteria… The effluent treatment at the Beaver Dam Mine Site will be conceptually similar to the plant currently used at the Touquoy Mine Site."

The Proponent is Required to …

The need for treatment at Beaver Dam is inconsistently reported in the submission – please clarify.

Response

Based on the predictive water quality assessment (Appendix D, PDF page 184 in the Mine Water Management Plan [Appendix P.4 of the Updated 2021 EIS (AMNS 2021) water treatment will likely be required for EOM and PC. In addition, during construction of the mine site additional treatment requirements will be required for the dewatering of site water. Details on the Construction, Operations and Post-closure conditions water treatment assessments are provided in Appendix F.1, PDF page 517, Appendix F.2, PDF page 582 and Appendix F.3, PDF page 624 in the Mine Water Management Plan [Appendix P.4 of the Updated 2021 EIS (AMNS 2021)].

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-201
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Pg. 30

Context and Rationale

"Smaller volumes will be released south into Wetland 64 from the collection pond."

The Proponent is Required to …

What is water quality associated with the crusher pad - does collection pond before Wetland 64 have any design criteria for TSS settling or similar? Or is this just for the purposes of runoff attenuation?

Response

Refer to NSE-2-110

Based on the revised site layout, runoff from the crusher pad will be directed to the north settling pond, which will provide the necessary water quality treatment. All settling ponds have been designed to control runoff generated from the 25 mm 4-hour water quality event to the 100-year 24-hour storm event for a minimum 24-hour detention time and include a rock filter berm to promote settling of large particles in the energy dissipation forebay.

Round 2 Information Request Number:	NSE-2-202
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Not Listed
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Pg. 323 Appendix G.2

Context and Rationale

"Deposition of tailings in the exhausted open pit for Beaver dam ore processing will accelerate the time to naturally fill the pit and create a pit lake during reclamation. However, this does not change the environmental effects predicted for the reclamation and closure plans for the existing Touquoy Mine Site as it simply changes the total time for the pit to fill…There are no further effects to surface water quality or quantity anticipated to be caused by the processing of ore and the management of tailings (exhausted pit) from the Beaver Dam Mine."

"The geochemical model simulated the oxidation and reduction reactions to understand the water quality of the mixed pit lake quality based on the geochemistry of the individual water quality parameters during operation and reclamation."

"Based on results of the groundwater flow model (Stantec 2018b), the open pit acts solely as a sink (i.e., gaining groundwater to the Touquoy open pit) at pit lake stages lower than 104 m in elevation. The interaction between the Touquoy open pit lake and Moose River is limited to groundwater flow from Moose River to the pit during this period."

"When the pit lake level rises into and above the more permeable geological units at elevations above 104 m, the groundwater flow gradients will begin to reverse, and seepage from the open pit will migrate towards the Moose River as baseflow at a rate of approximately 310 m3/d. The flow rate in Moose River in April is 125 times this rate, and therefore represents a dilution ratio of approximately 125."

Table 5.2 – Predicted Water Quality Concentrations to Moose River, not considering water treatment

The Proponent is Required to …

A. What about the impacts to water quality in the pit resulting from contact with the deposited Beaver Dams tailings?

B. What was done to understand mixing processes and their impacts on water quality in the proposed water cap? Has it been assumed to be a fully mixed system, and is this a reasonable assumption?

C. What about potential for stratification of the water cap, and what this could mean for water quality discharges?

D. Does the statement re: sink align with the information provided in the other Appendices and statements in the submission?

E. Does the value of 310 m3/d align with what is provided in other appendices in the submission? What is the level of confidence in this number, and what is the range of values presented from the other studies completed? What is the uncertainty in this value, and how is this considered in the assessment of impacts?

F. Re: Table 5.2 – what is the level of confidence of these values? What are the potential ranges for these values?

Response

A. The impacts to water quality from the deposition of Beaver Dam Tailings is described in Section 6.7.8.4.2, page 6-306 of the Updated 2021 EIS (AMNS 2021).

B. Approximately, 1 m water cover above the deposited Tailings, which will limit resuspension, (Appendix F.7, Section 2.2.2, PDF page 12, Touquoy Integrated Water and Tailings Management Plan (Updated 2021 EIS [AMNS 2021]).

C. Tailings in pit will likely stratify over time in the pit.

D. Deposition of tailing in open pit acting as a sink is consistent.

E. & F. To document uncertainty Model Sensitivity and Limitations is discussed in Section 6.0, PDF Page 36 of the Touquoy Integrated Tails and Water Management Plan Appendix F.7 of the Updated 2021 EIS (AMNS 2021).

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.

Round 2 Information Request Number:	NSE-2-203
Regulatory Agency/Indigenous Community:	NSE
Topic/Discipline:	Surface Water Quality
EIS Guideline Reference:	*Not listed*
Revised EIS (February 28, 2019) Reference:	Appendix G.4, pg 12

Context and Rationale

"Runoff from the North Settling Pond subcatchment area is routed through the North Settling Pond storage element. Inputs to the North Settling Pond storage element include pumped water from the open Mine Pit, and runoff from the North Settling Pond subcatchment area, which includes the waste rock stockpiles, ore stockpile, and a portion of haul road. Output from the North Pond includes overflow from the North Settling Pond storage element. The North Settling Pond storage element has a permanent pool capacity of approximately 7,500 m3 and an active storage capacity of approximately 6,600 m3. Overflow from the North Settling Pond storage element is directed to the Killag River outfall."

The Proponent is Required to …

What about treatment? Additional details surrounding how the provided settling pond design criteria will allow it to treat inflows to meet discharge water quality objectives are required

Response

Based on the predictive water quality assessment (Appendix D, PDF page 184 in the Mine Water Management Plan [Appendix P.4 of the Updated 2021 EIS] AMNS 2021) water treatment will likely be required for EOM and PC. In addition, during construction of the mine site additional treatment requirements will be required for the dewatering of site water. Appendix F, PDF page 516 of the Mine Water Management Plan (Appendix P.4 of the Updated 2021 EIS [AMNS 2021]) provides a detailed description of the water treatment design for construction, operation and closure.

The settling ponds are designed to provide TSS removal for runoff generated from a range of storm events including the 25 mm 4-hour water quality event to the 100-year 24-hour storm event. These settling ponds will have a permanent pool depth of 1-2 m that is of sufficient length to promote the settling of suspended solids prior to discharge and rock filter berms separating the energy dissipation forebays from the main pond area. The active storage volumes and outlet structures will be designed to provide minimum 24-hour retention times for the range of storm events.

The east and south settling pond discharge to the natural environment. During operation phase, the north settling pond will discharge to an aeration lagoon for treatment of nitrite. The aeration lagoon will be designed to accommodate the inflow from the north settling pond. A two-way pump will be installed to transfer water from the north settling pond to the open pit in advance of a storm event to increase the available storage volume of the pond. The pumps will run over the duration of the storm event. The emergency spillway of the north settling pond will also be directed to the pit. Water in the pit will be pumped back into the pond when there is available capacity for treatment.

References

AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. October 2021. Middle Musquodoboit, NS.