



**AGNICO EAGLE**

AMARUQ GOLD PROJECT

Quarrying Management plan

KVCA15Q01

Prepared by:

**Agnico Eagle Mines Limited, Exploration Division**

### Document Control

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## **1. Location**

Agnico Eagle Mines Limited (AEM) signed an exploration agreement with Nunavut Tunngavik Inc. in January 2013 for the Amaruq (IVR) property. This property is located approximately 50 km northwest of the Meadowbank mine and 125 km north of the Baker Lake community. The mineral exploration seeks gold mineral deposits. Drilling on this property began during the summer 2013 with helicopter support. Agnico Eagle started the installation of an exploration camp during the summer 2014 and continued the construction and upgrade of the camp during 2015. A commercial lease with the Kivalliq Inuit Association has been obtained by AEM and includes the camp area.

This management plan describes the use of the borrow pit #7 that is exploited for gravel requirements. The gravel is used to construct gravel pads for the camp area, gravel roads between the camp and the esker, small gravel exploration roads for the drilling and an airstrip. All identified gravel material comes from the borrow pit and not from existing watercourses; no rock and gravel will be gathered from below the high water mark of any watercourse, nor will any borrow pit operate within 31 metres of a water body. The Quarry permit was emitted by the Kivalliq Inuit Association. Fees are paid monthly to the Kivalliq Inuit Association for each cubic metre of material used, and an accurate record of the volume used is kept.

## **2. Contact**

### **Agnico Eagle Mines Ltd.**

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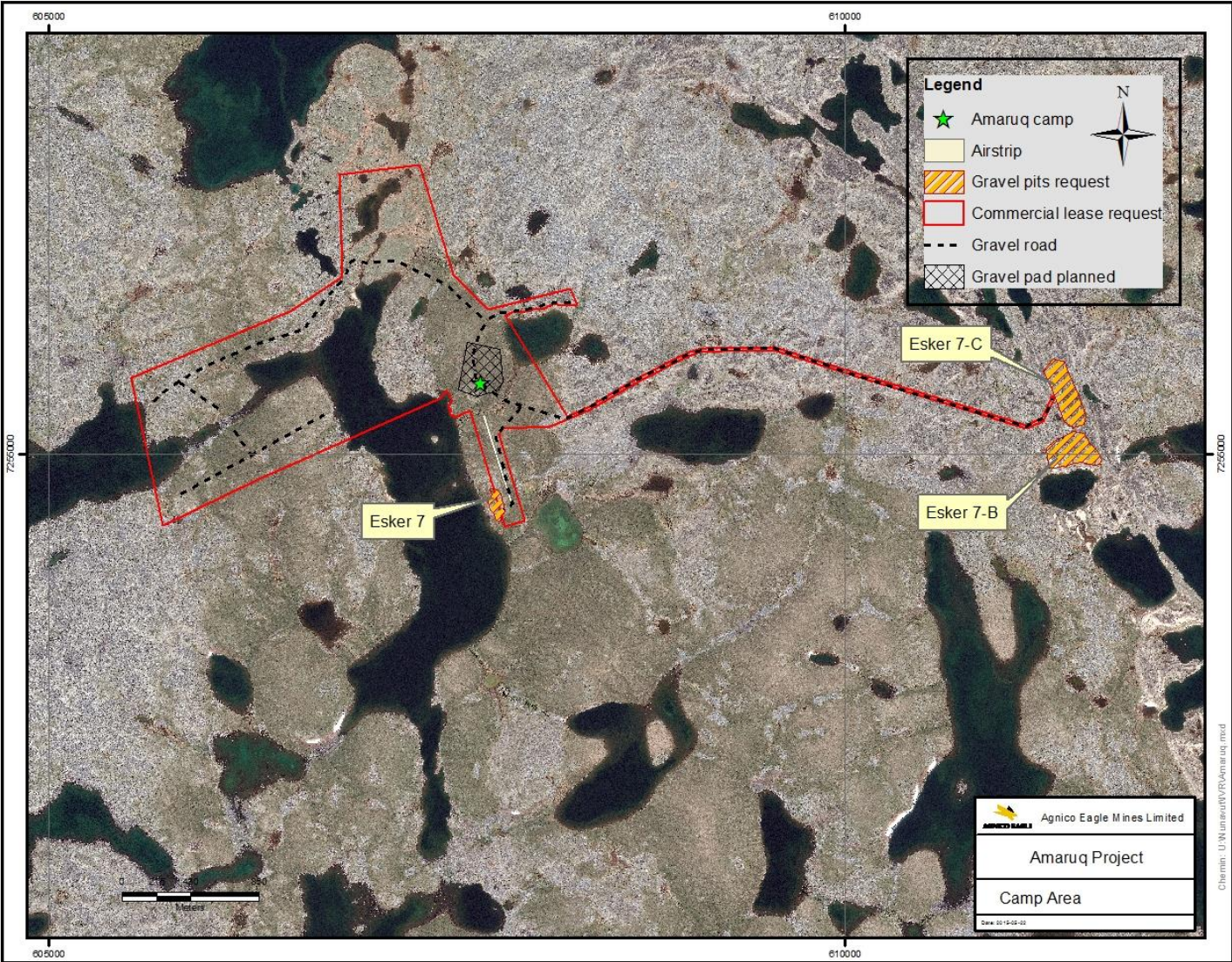
## **3. Land Use Authorization**

This quarry management plan describes the proposed activities for the Amaruq Gold Project under the quarrying permit KVCA15Q01. The activities described in this management plan are authorized by various authorizing agencies. The Nunavut Impact Review Board in the decision 11EN010 and the Nunavut Water Board in the water licence 2BE-MEA1318 have emitted conditions regarding exploitation in the proposed borrow pit. This borrow pit is located on Inuit Owned Land and administered by the Kivalliq Inuit Association.

#### **4. Site description**

Figure 1 shows the gravel deposits located in the esker #7 that is located in the area of the Amaruq exploration project. The area used for the borrow pits will be around 1 hectare for the esker 7. The eskers 7-B and 7-C are not planned to be used in the short term. When the exploitation is completed, the reclaimed borrow pits will have gently sloping walls and positive drainage wherever possible. With prudent initial design, the borrow pits should require little reclamation.

Figure 1, Borrow pit areas



## **Overburden**

There is almost no overburden present in these gravel deposits. At many locations, the gravel is exposed without any overburden. The estimated thickness of the overburden varies between 0 and 2 cm depending on the area. The volume of overburden that will be stockpiled during the exploitation will be very low to absent, since it is very difficult to remove only the overburden without mixing it with the gravel due to its small layer. Please see attachment for the closure and reclamation plan proposed for this borrow pit.

## **Proximity of water bodies**

The lakes located near the proposed borrow area must be protected against any possible sedimentation coming from the borrow pit. The buffer requested by the Nunavut Impact Review Board and by the Nunavut Water Board are the following:

### Water Licence 2BE-MEA1318, amendment 2

#### Item 9

The Licensee shall maintain a minimum of thirty one (31) metres large undisturbed buffer zone between the periphery of quarry sites and the high water mark of any water body. The Licensee shall not excavate and/or remove material from the quarry beyond a depth of one (1) metre above the high water mark or above the groundwater table, to prevent the contamination of groundwater. The quarrying shall be in accordance with all applicable legislation and industry standards including the *Northern Land Use Guidelines, Pits and Quarries* (INAC, 2010).

### Nunavut Impact review Board, new conditions 11EN010

69. The Proponent shall maintain an undisturbed buffer zone between the periphery of quarry sites and the high water mark of any water body that is of an adequate distance to ensure erosion control.



## **Access required**

The road needed to access the borrow pits from the Amaruq camp is located within the perimeter of the commercial lease entitled by the Kivalliq Inuit Association KVCL314C01 and has a length of approximately 1 kilometre from the esker #7.

## **5. Best management practices**

Best management practices will employ the following general mitigation measures for the borrow pits:

- Minimize the surface area of borrow pits;
- Locate borrow pits in well drained areas;
- Maintain the floor of the borrow pits slightly above the elevation of the surrounding area to promote natural drainage patterns, to avoid creating ponds, and to prevent permafrost degradation in borrow pits;
- Prevent erosion and sedimentation through appropriate control measures such as silt fences;
- Carry out ARD/ML testing and water quality monitoring in support of mitigation measures;
- Protect archeological resources;
- Use progressive reclamation for closing borrow pits that are no longer needed.

## **6. Acid Rock Drainage and Metal Leaching**

Geochemical testing will be carried out to assess the chemical composition of the potential building material, its potential to generate acid rock drainage (ARD), and its potential to leach metals into the receiving environment upon exposure to ambient conditions. Sampling and testing prior to use of any borrow pit significantly reduces the risk of ARD/ML. Avoiding the use of undesirable or questionable building materials ranks this mitigation measure as highly desirable. Initial testing of borrow pit materials was completed in 2015.

Additional measures are being used while the quarries and borrow pits are operational. Additional testing for acid rock drainage/metal leaching will be conducted during the gravel exploitation. For the first 10,000 m<sup>3</sup> of material removed from a borrow pit or rock quarry, 3 samples will be collected for static testing (ARD/ML). The total number of samples required drops off once the tonnage exceeds 10,000 tonnes. Table 1 below indicates the number of samples to be collected in each quarry and borrow pit.

The additional testing will confirm that the best available gravel materials are being used.

Table 1, Suggested initial sampling frequency based on tonnage

Tonnage of Unit (metric tonnes)	Minimum number of samples
<10,000	3
<100,000	8
<1,000,000	26
<10,000,000	80

*Analysis datas are available in Appendix A.*

## **7. Management of Water Originating from Borrow Pits**

While ARD/ML testing is a measure to avoid using questionable building materials, water quality monitoring of seeps from borrow pits provides information on possible impacts on the environment, should the water reach any nearby water bodies. A buffer of at least 31 m of undisturbed land is maintained between borrow pits and water bodies, and best management practices will prevent direct drainage. Although erosion is not expected to originate from water flow from the borrow pits, any evidence of erosion will be repaired by placing rip rap over the affected area, and measures will be taken to reduce the velocity of the water with, for example, silt curtains and/or small dikes.

## **8. Management of Archaeological Resources at Borrow Pits**

Agnico Eagle has carried out an archaeological assessment of the area around Amaruq camp and no concerns were raised following the assessment on the Commercial lease area and the esker #7. It is Agnico Eagle's intent to avoid archaeological resources in constructing the infrastructures wherever possible; this is the preferred mitigation

measure. The goal is to protect archaeological sites identified at any borrow pit or on the access road. However, if any identified site cannot realistically be avoided, Agnico Eagle will apply for a Culture and Heritage permit to mitigate the site(s). If any potential archaeological site is identified during the operation of any borrow pit, work will stop, a professional archaeologist will be consulted, and Culture and Heritage will be informed of the discovery.

#### **10. Ground Ice and Permafrost Protection**

The selected borrow pit sites are on well drained esker deposits. All eskers have positive topography rising above the local setting. These types of granular deposits were selected because they are largely free of ground ice, thereby minimizing possible thaw settlement, which can result in erosion, slumping of side slopes, and an altered landscape that extends beyond the borrow pit. Should permafrost degradation become evident, the area will be monitored and, if necessary, stabilized by covering the affected land with 1.0 to 1.5 m of granular material. This reclamation effort would allow the permafrost to move up into the material covering the area and stop any further permafrost degradation or prevent further melting of any ground ice. Inspections of borrow pits will continue after their closure at the end of construction. Any significant seeps originating from the borrow pits as a result of ground ice, permafrost melting, or from precipitation events will be monitored if the water is likely to reach receiving waters.

## **APPENDIX A**

Metal leaching and acid generation potential

Gravel Analysis data 2015

Esker #7

		Certificates #	V-46773	V-46774	V-46775	V-48568	V-48569
		Sample names	1	2	3	Esk1	Esk2
		Sample dates	2015-07-19	2015-07-19	2015-07-19	2015-10-04	2015-10-04
Parameter		Limit CMME	Results				
Leaching (SFE)							
Aluminium (Al)	mg/L		0.15	0.31	0.35	<0.006	<0.006
Antimony (Sb)	mg/L		<0.0001	<0.0001	<0.0001	0.0002	0.0117
Silver (Ag)	mg/L	0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Arsenic (As)	mg/L	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Barium (Ba)	mg/L		0.0009	0.0017	0.0016	<0.0005	0.0043
Beryllium (Be)	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Bismuth (Bi)	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Boron (leaching)	mg/L	1.5	0.07	0.14	0.17	<0.01	<0.01
Cadmium (Cd)	mg/L	0.00009	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Calcium (Ca)	mg/L		0.03	<0.03	<0.03	<0.03	1.54
Chrome (Cr)	mg/L		<0.0006	<0.0006	<0.0006	0.0266	<0.0006
Cobalt (Co)	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Copper (Cu)	mg/L	0.002	0.0016	0.0010	0.0007	0.0040	0.0010
Tin (Sn)	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Iron (Fe)	mg/L	0.3	0.26	0.46	0.47	0.16	0.13
Lithium (Li)	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Magnesium (Mg)	mg/L		0.17	0.12	0.10	0.20	0.47
Manganese (Mn)	mg/L		0.0062	0.01	0.01	0.0051	0.0347
Mercury (Hg)	mg/L	0.000026	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Molybdenum (Mo)	mg/L		<0.0005	0.0046	<0.0005	0.0006	<0.0005
Nickel (Ni)	mg/L	0.025	0.0011	0.0027	0.0008	0.0141	0.0019
Lead (Pb)	mg/L	0.001	<0.0005	0.0021	<0.0005	<0.0005	<0.0005
Potassium (K)	mg/L		0.44	0.43	0.41	1.13	0.99
Selenium (Se)	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sodium (Na)	mg/L		0.50	0.57	0.54	0.71	8.55
Tellurium (Te)	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Thallium (Tl)	mg/L	0.0008	<0.005	<0.005	<0.005	<0.005	<0.005
Titanium (Ti)	mg/L		<0.01	0.01	0.01	<0.01	<0.01
Uranium (leaching)	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium (V)	mg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Zinc (Zn)	mg/L	MMER (0,5)	0.01	0.04	<0.001	0.004	0.001
Acid generating potentiel - MABA							
ANC/PAS Ratio			22.11	12.98	28.16	2.63	7.43
- Acide neutralizing capacity (ANC)	Kg CaCO3/Tonne		8.84	0.81	2.46	2.74	0.97
- Acidity potentiel (AP)	Kg CaCO3/Tonne		0.40	0.06	0.09	1.04	0.13
- Net neutralization potential (NNP)	Kg CaCO3/Tonne		8.44	0.75	2.38	1.70	0.84
- Sulfate %	%S		0.01	0.01	<0.01	<0.01	<0.01
- Total Sulfur	%S		0.02	0.01	0.01	<0.03	<0.01
- pH			6.68	5.48	5.58	7.14	6.70