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Subject:
Review of the Cullaton Lake Mine Security Estimate
Water Licence 1BR-CUL1118

ENVIRONMENT

Date:

14 June 2018

Dear Mr. Parsons:

Further to the request of Indigenous and Northern Affairs Canada (INAC), ARCADIS Canada Inc. (Arcadis) was retained to complete an independent quantum of security estimate for the post-closure program to be implemented at the Cullaton Lake Mine as part of the Water Licence 1BR-CUL1118 Closure and Reclamation Plan.

This quantum of security estimate has been prepared based on information provided in our review of the 21st May 2018 letter from Barrick Gold Inc. (the mine owner – Barrick) to INAC in response to an INAC/Arcadis presentation on the Closure and Reclamation Plan which included an 18th May 2018 letter from Palmer Environmental Consulting Group Inc. to Barrick.

Further to recent discussions between Barrick, INAC and Arcadis, it is understood that there is general agreement with the approach being proposed by Barrick for the Closure and Reclamation of the mine site even though the current site conditions do not exactly match those outlined in the original Abandonment and Restoration (A&R) Plan for the site.

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1. Overview of Proposed Closure and Reclamation Plan

Pursuant to the information provided in the Barrick letter of 21st May 2018, the following Closure and Post-Closure activities will be completed between 2017 and 2117.

Year 0 to Year Ten (2017 to 2027)

- In 2017 the following work has been completed:
  - Geotechnical inspection per the water licence requirements
  - Surface water sampling per the water licence requirements
- In 2018 the following work will be completed:
  - Inspection and repairs to security fences and site signage

  - Inspection and repairs to emergency housing
  - Clearing and grubbing of site access roads
  - Grading and levelling of site access roads
  - Maintenance along site access roads (eg remove debris from culverts)
  - Clear/Grub, grade/level, and maintain Airstrip
  - Complete an aquatic fish survey
  - Install thermistors within the tailings

- Between 2018 and 2025 the following work will be completed:
  - Geotechnical Inspections every second year (2018, 2020, 2022, 2024)
  - Surface water sampling every second year (2018, 2020, 2022, 2024)
  - Sediment sampling every fourth year (2018 and 2022)

- In 2026 the following work will be completed:
  - Inspection and repairs to security fences and site signage
  - Inspection and repairs to emergency housing
  - Clearing and grubbing of site access roads
  - Grading and levelling of site access roads
  - Maintenance along site access roads (eg remove debris from culverts)
  - Clear/Grub, grade/level, and maintain Airstrip
  - Complete inspection and repairs of Rip-Rap and Spillway at Tailings Containment Structure (Dam 1)
  - Complete Dam Safety Review and geotechnical inspection
  - Surface water sampling and assessment
  - Sediment sampling and assessment

<u>Year 11 to Year 100 (2028 to 2117)</u>

- Every two years complete the following work:
  - Geotechnical Inspections
  - Surface water sampling and assessment

- Every four years complete the following work:
  - Sediment sampling and assessment

- Every ten years complete the following work:
  - Inspection and repairs to security fences and site signage
  - Inspection and repairs to emergency housing
  - Clearing and grubbing of site access roads
  - Grading and levelling of site access roads
  - Maintenance along site access roads (eg remove debris from culverts)
  - Clear/Grub, grade/level, and maintain Airstrip
  - Complete Dam Safety Review and geotechnical inspection
  - Surface water sampling and assessment
  - Sediment sampling and assessment

- Every twenty years complete the following work:
    - Complete inspection and repairs of Rip-Rap and Spillway at Tailings Containment Structure (Dam 1)
    - Lower the freeboard on the Dam by 0.1 m as part of dam decommissioning (optional task).

2. Basis of Estimate

The following assumptions were made, in conjunction with the frequency of scheduled tasks presented in the previous section, to prepare the Arcadis security estimate:

Site Maintenance Activities

- **Fencing & Signage** will require two labourers half a work day with some supervisor oversight to complete repairs and general maintenance. The rate for this work also includes for a second ATV on site and an allowance for material costs associated with signage and fencing.

- **Emergency Housing** will require two labourers half a work day with some supervisor oversight to complete repairs and general maintenance. The rate for this work also includes for a second ATV on site and an allowance for material costs associated with repairing the emergency shelter.

- **Site Road Works** Clearing and brushing of local roads and trails will require two labourers, a wildlife monitor and some supervision to complete. An allowance for small tools and use of an ATV has also been included. Assumed that the ATV with a grading blade will be mobilized to site as [art pf the Rip-Rap and Spillway Repairs and as such the cost for additional charters has been cover in the security amount noted herein.

- **Rip-Rap and Spillway Repairs** will require three labourers, a wildlife monitor, and a supervisor to complete repairs and general maintenance. Furthermore, additional daily charters may be required to mobilize staff on the assumption two days will be required to complete any repairs and up to another day would be required to lower the freeboard of the dam by 0.1 m as prescribed in the Barrick letter of 21st May 2018 (optional task). In addition to the construction crew it has been assumed that an engineer will need to be on site to supervise the lowering of the dam and to confirm the nature of any repairs required on the up or downstream sides of the dam and associated spillway.

- **Airstrip** will require up to three labourers for a full work day using an ATV with a push-blade to complete clearing and grubbing as well as grading work on the airstrip.

Site Monitoring Activities

- **Geotechnical Monitoring** will require a professional engineer to complete biennial inspections of the site. A wildlife monitor will need to be onsite during this inspection work.

- **Dam Safety Inspection** will require a professional engineer to complete dam inspections once every ten years. A wildlife monitor will need to be onsite during this inspection work.
- **Surface Water Monitoring** will require field staff to complete the field work as prescribed in Section 2. Given that this work will be done by a two-person team it has been assumed an additional wildlife monitor is not required.
- **Sediment Monitoring** will require field staff to complete the field work as prescribed in Section 2. Given that this work will be done by a two-person team it has been assumed an additional wildlife monitor is not required.
- **Planning and Mobilization** rates are based on the fee rates provided in the attached costing matrix.
- **Air Charter** rates are based on the rates used by Barrick in their estimate.
- **Airfare, Accommodations and Per Diems** rates are based on those used by Barrick in their estimate.
- **Sample Analysis** rates are based on the rates used by Barrick in their estimate.
- **Reporting** rates are based on the rates used by Barrick in their estimate.

Contingency

The contingency amount included in the Barrick security estimate was set at 30% against the aggregate of the total costs. Arcadis considers this to be appropriate given the level of risk and uncertainty associated with the current condition of the site reclamations completed to date. If, however, future monitoring and inspections determine that conditions are worse than currently predicted and/or costs are higher than anticipated, the overall contingency may need to be increased at a later date or, as a minimum, not decreased as would normally be the case for progressive reclamation projects.

Escalation and Rate Discounting

For the purposes of this quantum of security estimate, Arcadis has not applied escalation or rate discount factors. It is our understanding that INAC will determine the appropriateness of applying such factors at a later date.

3. Variances in Cost Estimate

The table below summarizes the difference in rates used by Arcadis in completing the quantum of security estimate provided herein.

Table 1 Summary of Cost Variance

Activity	Barrick Rate	Arcadis Rate	Reason for Difference
Fencing & Signage	$1,000	$2,000	Variance includes for use on an additional ATV, supervisory time and an allowance for small tools, and supply of fencing materials
Emergency Housing	$1,000	$2,000	Variance includes for use on an additional ATV, supervisory time and an allowance for small tools, and supply of building materials
Site Road Work	$3,000	$4,000	Variance includes for use on an additional ATV, supervisory time and an allowance for small tools.
Rip-Rap/Spillway Repairs and Decommissioning	$50,000	$64,740	Variance due to the addition of another day to complete dam repairs and an additional day assigned for the lowering of the dam to facilitate it future decommissioning. Also includes costs associated with having engineering staff on site to oversee any dam repairs.
Airstrip	$15,000	$15,000	No variance
Geotechnical Inspections	$11,350	$11,710	Change in costing related to Planning and Mobilization Costs where daily fee rates were used by Arcadis
Dam Safety Inspection	$43,840	$45,940	Change in costing related to Planning and Mobilization Costs where daily fee rates were used by Arcadis
Surface Water Monitoring	$14,320	$16,090	Variance due to addition of wildlife monitor to assist with work and costs associated with travel for this individual.
Air Charters	$10,750	$10,750	No variance
Sediment Monitoring	$19,120	$19,960	Daily Fee Rates used to calculate Planning and Mobilization costs
Contingency	30%	30%	Difference is based on the aggregate costs used to derive the contingency amount.
Rate Discounting			See Section 2

4. Summary of Costs

On the basis of the information provided in Sections 2 and 3 of this letter, the aggregate costs for the implementation of the Closure and Post-Closure Plan as outlined by Barrick in their letter of 21st May 2018 are as summarized in Table 2 for the Year 0 to 10 timeline and Table 3 for the 100 Year timeline.

Table 2 Summary of Closure Cost Estimate Year 0 to Year 10 Timeframe[1]

Monitoring & Maintenance Activities	Barrick Cost Year 0 to10	Arcadis Cost Year 0 to10
Site Maintenance		
Fencing & Signage	$2,000	$4,000
Emergency Housing	$2,000	$4,000
Site Road Work	$6,000	$8,000
Rip-Rap/Spillway Repairs and Decommissioning	$50,000	$64,740
Airstrip	$30,000	$30,000
Site Monitoring		
Geotechnical Inspections	$56,750	$58,550
Dam Safety Inspection	$43,840	$45,940
Surface Water Monitoring	$100,240	$112,630
Air Charters	$75,250	$75,250
Sediment Monitoring	$57,360	$59,880
Contingency		
Contingency Allowance for Unscheduled Maintenance	$100,000	$112,380
Grand Total	**$523,440[2]**	**$575,370**

Note 1 – excludes costs associated with thermistor installation and completion of fish survey which are to be completed in 2018.
Note 2 – includes the costs for work completed in 2017 and Year 1 Site Maintenance.

Table 3 Summary of Closure Cost Estimate over a 100-Year Timeframe[1]

Monitoring & Maintenance Activities	Barrick Cost Estimate for 100	Arcadis Cost Estimate for 100 Years
Site Maintenance		
Fencing & Signage	$11,000	$22,000
Emergency Housing	$11,000	$22,000
Site Road Work	$33,000	$44,000
Rip-Rap/Spillway Repairs and Decommissioning	$250,000	$323,700
Airstrip	$165,000	$165,000
Site Monitoring		
Geotechnical Inspections	$454,000	$468,400
Dam Safety Inspection	$438,400	$459,400
Surface Water Monitoring	$716,000	$804,500
Air Charters	$537,500	$537,500
Sediment Monitoring	$497,120	$518,960
Contingency		
Contingency Allowance for Unscheduled Maintenance	$349,900	$378,900
Grand Total	**$1,516,000[2]**	**$3,744,360**

Note 1 – excludes costs associated with thermistor installation and completion of fish survey which are to be completed in 2018.
Note 2 – The Grand Total includes a 3% discounted rate after Year 10 as presented in Barrick's letter of 21st May 2018. The total less the discount is $3,462,920.

A breakdown of the costs, using the spreadsheet provided by Barrick as a basis for the preparation of the Arcadis quantum of security, is provided in Attachment A.

5. Closure

We trust the information provided herein meets your current needs. Should you require any additional information please do not hesitate to contact us.

Charles F. Gravelle, M.Sc.E., P.Eng.

Principal

ATTACHMENT A
Summary of Security Costs