

## **Appendix 10**

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### **Meadowbank 2021 Annual Open Pit Geomechanical Inspection**

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March 2, 2022

Christian Tremblay  
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Dear Christian,

**RE: Meadowbank Complex - Meadowbank Site - 2021 Annual Open Pit Geomechanical Inspection**

## 1.0 INTRODUCTION

Agnico Eagle Mines Limited (AEM) operates the Meadowbank Complex, in Nunavut, Canada. The complex consists of the Meadowbank and Amaruq Sites. The Meadowbank Site consists of the Portage, Goose, Vault, and Phaser deposits. The deposits were mined using a series of open pits and mining is now complete. An annual inspection of the open pits by a third-party is required under the Type-A, Part 1, Item 2 Water License for the mine.

Tetra Tech Canada Inc. (Tetra Tech) has been the geotechnical engineer for the open pits at the Meadowbank Site since 2014 and has historically completed the annual inspections of the open pits. In 2019, mining transitioned to the Amaruq Site, where Knight Piésold Ltd. (KP) is the geotechnical engineer for the open pits. In 2021 AEM requested that the annual inspection of the open pits at the Meadowbank Site be transitioned from Tetra Tech to KP so that a single annual inspection could be completed for both sites. To facilitate this transfer, the inspection of the open pits was carried out jointly by Mr. Cameron Clayton, M.Eng., P.Eng., P.Geo., of Tetra Tech and Mr. Ben Peacock, P.Eng., of KP from September 13 to 15, 2021.

## 2.0 OPEN PITS INSPECTED

Open pit mining at the Meadowbank Site ended in 2019 and the site has entered a new stage in its life where there is decreased activity around the open pits. The open pits are partially flooded and several have been partially or completely backfilled with waste rock or tailings. In general, this has both reduced the likelihood of a failure occurring and the consequences if a failure occurs. Consequently, there has been a reduction in monitoring and inspections at the Meadowbank Site. However, it is important to note that hazards continue to be present and, in some cases, new hazards have developed as a result of these changes. The open pits included in the inspection and their current status is summarized in Table 1.

The results of the inspection are summarized in this letter and detailed in Appendix A.

**Table 1**      **Open Pits Inspected and their Status**

Open Pit	Current Status
Portage Pit A	Inactive, inactive in-pit waste rock dump, partially flooded and actively used for water management
Portage Pit B	Inactive, backfilled with waste rock (B Dump)
Portage Pit C	Inactive, backfilled with waste rock (C Dump)
Portage Pit D	Inactive, backfilled with waste rock (D Dump)
Portage Pit E	Inactive, inactive in-pit waste rock dump, partially flooded and actively used for tailings deposition
Goose Pit	Inactive, inactive in-pit waste rock dump, partially flooded, previously used for tailings deposition with the potential for future deposition
Vault Pit	Inactive, inactive in-pit waste rock dump, partially flooded
Phaser Pit	Inactive, partially flooded
BB Phaser Pit	Inactive, partially flooded

## 3.0 2021 INSPECTION RESULTS

### 3.1 GENERAL

The Meadowbank site was inspected by Ben Peacock of KP, Cameron Clayton of Tetra Tech, and Christian Tremblay (Geotechnical Engineer) of AEM from September 13 to 15, 2021. Observations made during the site visit were grouped according to the following four headings at AEM's request:

- **Priority 1 (P1):** A high priority or structural safety issue considered immediately dangerous to life, health or the environment. Also includes issues with a significant risk of regulatory enforcement.
- **Priority 2 (P2):** An issue that, if not corrected, could plausibly result in a structural safety issue leading to injury, environmental impact or significant regulatory enforcement. Also includes repeated deficiencies that demonstrate a systematic breakdown of procedures.
- **Priority 3 (P3):** Single occurrences of deficiencies or non-conformances that in isolation are unlikely to result in structural safety issues. Also includes recommendations for pro-active measures important to the validation of the open pit slope design.
- **Priority 4 (P4):** Opportunity for improvement, for example to meet industry best practices.

As part of the transition of the annual inspections from Tetra Tech to KP, the findings from the 2020 annual inspection (Tetra Tech, 2021) were reviewed in the context of the current site activities. The findings and their current status are summarized in Table 2. Key observations made during the 2021 inspection are summarized in the following sections.

### 3.2 PRIORITY 1 OBSERVATIONS

No P1 observations were made during the inspection.

### 3.3 PRIORITY 2 OBSERVATIONS

The following P2 observations were made:

1. The B Dump extends into the flooded portion of Pit A. The lower platform of the dump has settled over time and previous inspections have identified the potential for failures of the dump slope as the water level rises in Pit A and the potential for thaw of the waste rock increases. The possibility of a failure of the dump extending back to the adjacent Amaruq All Weather Road (AWR) was discussed during this inspection. It is not clear if the topography and bedrock profile below the B Dump and the Amaruq AWR would result in a scenario where a failure of the dump could impact the road. The topography and bedrock profile should be reviewed. If the road could be plausibly impacted, stability analyses should be completed.
2. Berms should be construct or re-established to prevent entrance to the following areas where access is no longer required:
  - a. The Pit A East Ramp
  - b. The upper platform of the B Dump
  - c. The upper platform of the Vault Pit North Waste Rock Dump
  - d. The Vault Waste Rock Dump (both access ramps). The existing berms only partially restrict access.
  - e. The southern entrance to the Phaser / BB Phaser Pit Ring Road
3. The need for continued access to the Vault Pit Ring Road should be reviewed and berms constructed to restrict entrance to areas where access is no longer required. In particular, review the need for berms to prevent access to the areas of subsidence adjacent Pond D and Vault Lake.
4. The Vault Pit Ring Road has subsided adjacent Pond C and represents a hazard to vehicle traffic and access is still required. The area should be filled and graded or the area should be clearly marked with pylons.
5. The ABF Garage has been constructed on top of the C Dump. Settlement of the dump, and potential structural damage to the garage, is likely once the water level in Pit A and Pit E reaches the base of the dump and the potential for thaw of the waste rock increases. The garage and its associated infrastructure should be relocated away from the waste rock dumps and the tailings management areas. Once the garage has been relocated, construct berms to prevent access to the C Dump platform.
6. The Ground Control Management Plan (GCMP) for the Meadowbank Site was last updated in 2018 and does not reflect the current state of operations or ground control activities. The GCMP should be reviewed and updated. The GCMP could be consolidated with the one for the Amaruq Site. In particular, the following should be completed:
  - a. Specify the inspection and monitoring commitments.
  - b. List/reference key sources of information for the Meadowbank open pits, including design reports and previous annual inspections so that the information is not lost.

### 3.4 PRIORITY 3 OBSERVATIONS

The following P3 observations were made:

1. Continue the monthly visual inspections of the Goose Pit, Portage Pit A, Portage Pit E, Vault Pit, B Dump, C Dump and D Dump.

2. The Amaruq AWR crosses a rockfill embankment between the Vault and Phaser pits. The stability of the embankment could be adversely impacted if the water level in the Phaser pit increases and water ponds behind the embankment. The monthly visual inspections should consider the presence of seepage below the Amaruq AWR Embankment at the Vault Pit as well as the water level in the Phaser Pit.
3. The ramps used to access the pit lakes at the Goose Pit, Portage Pit A, Vault Pit and Phaser Pit are currently not included in the monthly visual inspections. Visual inspections of the ramps should be completed prior to access or as part of the monthly inspections. In addition to the ramp, the inspections should continue to consider the open pit slopes and in-pit waste dumps. The Ring Road adjacent Vault Lake should be inspected prior to accessing the Vault Pit due to the potential for inrush from Vault Lake to the Vault Pit. If the hazard was mitigated (e.g., by breaching the Ring Road) the inspections of the Ring Road could be stopped.
4. The visual inspections are currently completed on a monthly basis, regardless of the identified hazards. A formal mechanism should be developed to increase the frequency of visual inspections in response to defined criteria.
5. The visual inspections are completed by the Geotechnical Group. While several members of the group have experience monitoring open pit slopes, the group's focus is on the management of the dykes and tailings facilities. Recommend implementing an annual visual inspection of the open pits and in-pit waste rock dumps by the Rock Mechanics Group.
6. Continue to monitor the wireline extensometers at the D Dump.
7. The hazard assessment map captures many, but not all, of the hazards identified during the annual inspection. Comments have also been provided on several of the risk ratings. The hazard map should be reviewed and updated to reflect the outcome of the annual inspection.

### 3.5 PRIORITY 4 OBSERVATIONS

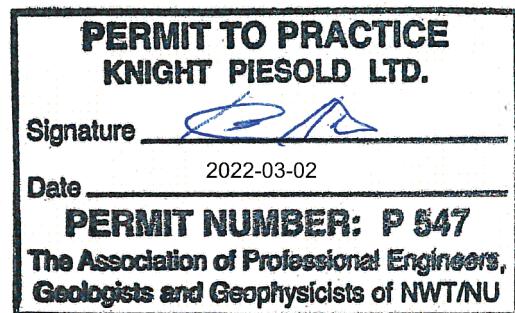
The following P4 observations were made:

1. There is an opportunity to use imagery from the site drone surveys to evaluate the subsidence of the Goose Pit Waste Rock Dump, B Dump, C Dump, D Dump and Vault Pit Waste Rock Dump using photogrammetry. Recommend completing an assessment on an annual basis to supplement the existing visual inspections.
2. The infiltration of surface water is likely contributing to the settlement observed at the B Dump. Grade the upper and lower platforms of the B Dump and fill the sinkholes/depressions in order to prevent water ponding and to limit further infiltration.
3. Include the Vault Pit North Waste Rock Dump in the monthly visual inspections, focussing on the area of settlement.
4. The Phaser and BB Phaser Pits are inactive, and flooding of the open pits has reduced the exposed rock slopes to a single bench or less. As a result, the geomechanical hazards associated with these open pits are limited. Recommend approaching the Nunavut Worker's Safety and Compensation Commission (WSCC) about ending the third-party annual inspections for these open pits.

## 4.0 CLOSING

We trust this letter meets your present needs. Please do not hesitate to contact us should you require anything further.

Yours truly,



Prepared:



Ben Peacock, P.Eng.  
Specialist Engineer | Associate  
Knight Piésold Ltd.

Reviewed:



Cameron Clayton, M.Eng., P.Eng., P.Geo.  
Principal Rock Mechanics Engineer  
Tetra Tech Canada Inc.

Approval that this document adheres to the Knight Piésold Quality System:



### Attachments:

- Table 2 Rev 0 Status of Recommendations from 2020 Annual Inspection
- Appendix A Meadowbank Complex - Meadowbank Site - 2021 Annual Open Pit Geomechanical Inspection

### References:

Tetra Tech Canada Inc. (Tetra Tech), 2021. *2020 Annual Pit Slope Performance Review – Meadowbank Mine, Nunavut*. January 7. British Columbia. Ref No. 704-ENG.ROCK03163-01.

/mjr

TABLE 2

 AGNICO EAGLE MINES LTD. - MEADOWBANK COMPLEX  
 MEADOWBANK SITE

 2021 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION  
 STATUS OF RECOMMENDATIONS FROM 2020 ANNUAL INSPECTION

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Component	Summary of Key Observations	Recommendations	Status in 2021	Priority
Geotechnical Inspections and Reporting, and Rockfall Log	As the pits transition into various states of closure or use for water management and tailings, the need for bi-weekly instrumentation monitoring and quarterly inspection summaries can be reduced or in some cases eliminated. In some other cases, the instrumentation has been re-purposed.	Complete transition to formal monthly geotechnical inspections supported by regular informal day-to-day observations.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
	Rockfalls in restricted pit areas where there is no worker access no longer recorded but may be recorded to maintain an updated reference database.	Continue to record and report (as appropriate) rockfall events that are within the pits used for tailing and water management and where there is the potential for worker access.	Rockfalls are documented in the monthly inspection reports.	P3
Review of Instrumentation	Instruments relating the open pits and hence tailings management facilities are located at Goose Pit, Pit E (south crest), and Vault Pit. There are additional in-field instrumentation between Goose Pit and Pit E, and additional instrumentation along the dikes.	Some monitoring of instrumentation, such as TDR cables and inclinometers, can be suspended.	Complete. The TDS cables and inclinometers are no longer monitored.	N/A
	A review of the instrumentation showed no significant changes from the previous inspection.	Monitoring of piezometers and thermistors installed behind the South Wall of Pit E and the East Wall of Goose Pit should continue to build a record of ground thermal and piezometric response to the addition of tailings.	The piezometers and thermistors in the South Wall of Pit E continue to be monitored by the Geotechnical Group.	P4
		The Vault instrumentation can be decommissioned.	The piezometers and thermistors in the East Wall of the Goose Pit are no longer monitored as tailings deposition has stopped. Recommend reviewing the need to monitor these instruments periodically given the potential for future tailings deposition.	N/A
Portage Pit A and Water Management Facility	There are no significant geotechnical concerns for the Pit A walls.	Specific bi-weekly pit wall inspections and quarterly inspection summaries can be suspended. Informal observations as part of regular monthly inspections should continue to be made when the opportunity presents.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
	Most of the geotechnical hazards associated with the pit walls are submerged by the current pit lake level and no longer present a risk.			
Portage Pit B and B Dump	There are no significant geotechnical concerns for the Pit B walls.	Specific bi-weekly pit wall inspections and quarterly inspection summaries can be suspended. Informal observations as part of regular monthly inspections should continue to be made when the opportunity presents.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
	Most of the geotechnical hazards associated with the pit walls are submerged by the current pit lake level and no longer present a risk.			
	The pit is being used for water management facility and requires access to the pit lake for maintenance and moving of water lines. This requires working near the toe of B Dump. No deformation of the dump face was noted.	Maintain the B Dump crests as closed and inactive and ensure barrier berms are installed to prevent vehicles from accessing the crest area.	A berm prevents access to the lower dump platform but access to the upper dump platform is unrestricted. Recommend constructing a berm to prevent access to the upper dump platform.	P2
		Visual inspections of the dump platforms and dump faces should be included in the monthly inspections.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
	The B Dump platform has experienced settlement and the formation of sinkholes and tension cracks. The sinkholes are on the main platform at approximately 5126 mRL; a depression was noted on the platform directly above. It is thought that ice and snow accumulate in the depression and contribute to sinkhole formation on the lower bench during freshet.	If practical the depression at the north end of the upper dump should be backfilled and graded to prevent the release of water to the lower dump platform and the ongoing development of sinkholes.	The depression at the north end of the upper dump platform and the sinkholes on the lower dump platform have not been filled or graded. Recommend completing this work to prevent water ponding and limit infiltration.	P4
C Dump	No deformation of the dump face was noted. No settlement of the dump platform was noted at the time of the site visit. No tension cracks noted.	Visual inspections of the dump platforms and dump faces should be included in the monthly inspections as water levels rise.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
		Once the ABF structure has been relocated maintain the C Dump crest as closed and inactive with appropriate barrier berms.	The ABF Garage has not been relocated. Recommend relocating the garage and associated infrastructure away from the C Dump and tailings management areas. Once the garage has been relocated, construct berms to prevent access to the dump platform.	
	The ABF garage structure has been constructed within 35 to 47 m from the dump crest. As the water in Pit A/B rises it will infiltrate the dump material. Settlement could occur that will affect the garage foundation and building structural integrity.	An alternate location should be identified for the garage structure that is outside the tailings management areas.		P2
		No permanent facilities to be constructed on dump platform.		

TABLE 2

 AGNICO EAGLE MINES LTD. - MEADOWBANK COMPLEX  
 MEADOWBANK SITE

 2021 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION  
 STATUS OF RECOMMENDATIONS FROM 2020 ANNUAL INSPECTION

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Component	Summary of Key Observations	Recommendations	Status in 2021	Priority
D Dump	No deformation of the dump face was noted. No new settlement of the dump platforms. Extensometers that were set at the crest during final mining of the pit show negligible movement. Tension cracks observed previously on 5088 mRL are dormant.	Maintain the D Dump crests as closed and inactive and ensure barrier berms are installed to prevent vehicles from accessing the crest area.	Complete. Access to the top of the dump is prevented by a berm.	N/A
	As the lake level in Pit E rises, additional platform settlement should be expected, and shallow sliver failures may occur on the dump face.	No permanent facilities to be constructed on dump platform.	Complete. No facilities have been constructed on the dump.	N/A
	Deformation of the platform may extend further behind the face. The lower dump (5088 mRL platform) will be inundated first. The lower dump supports the upper dump (5126 mRL platform). Instability in the lower dump will affect upper dump stability.	Maintain and monitor the existing wireline extensometer to monitor dump stability in the area above the access ramp which will be used to access pump controls and the pump station during filling of the Pit E tailings area.	The wireline extensometers are maintained and monitored by the Geotechnical Group. The instruments should continue to be maintained and monitored.	P3
		Continue visual monitoring as part of monthly inspections of the D Dump platforms, crests, and dump faces, waste rock dumps and recording of observations such as tension cracks, crest settlement, or dump profile changes as part of regular monthly site geotechnical inspections	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
Portage Pit E and Tailings Management Facility	The pit is currently being used for tailings deposition. Radar is no longer in use. East Wall continues to perform well and there are no geotechnical concerns.	Continue regular monthly inspections and informal day-to-day inspections.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
	South Wall experienced three rockfall events above the South Ramp, and the ramp was closed.	Maintain the South Wall Ramp as closed.	The South Wall Ramp is not used and pylons were in place to restrict access at the time of the visit. Recommend constructing a berm at the top of the ramp to prevent access.	P2
	A review of the instrumentation installed in the South Wall showed no variability from the 2019 inspection.	Incorporate monitoring of the thermistor and piezometer instrumentation installed behind the South Wall of the pit into the dike instrumentation monitoring program. The monitoring can be scaled back to exclude TDR and inclinometer readings.	The piezometers and thermistors in the South Wall of Pit E continue to be monitored by the Geotechnical Group. The TDR cables and inclinometer are no longer monitored.	N/A
	The West Wall continues to perform well, and while known hazards have been identified, no change in these areas was noted since the previous inspection.	The rockfall protection berm on the west edge of the west wall ramp should continue to be maintained as long as personnel access the pit for pump maintenance or moving of water reclaim line.	The rockfall berm has been maintained and a second, larger berm constructed. The berm has capacity to retain future rockfall.	N/A
		Continue visual monitoring and recording of observations of rock falls and other potential instability as part of regular monthly site geotechnical inspections in areas where personnel, equipment, or infrastructure could be affected.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
	A tailings water reclaim line is planned along the west ramp adjacent to a rockfall protection berm, and beneath known rockfall hazards.	Consider relocating the reclaim water line on the West Wall Ramp to the outside edge of the ramp, away from potential rockfall risk areas, if practical to do so. If not practical, ensure rockfall containment berm along inside of ramp is well maintained and sufficient to control rockfall hazards.	Complete. The reclaim water line and associated control systems have been relocated to the outside edge of the ramp.	N/A
	A pump station is planned to be located at a bullnose corner on the ramp adjacent to known rockfall hazards.	Consider relocating the planned pump station location on the West Wall Ramp to an area further up the ramp, clear of potential rockfall risk areas, if practical to do so. If not practical, ensure appropriate rockfall containment berms in place to protect pump station and personnel.	Complete. The pump station was relocated up the ramp from the rockfall hazards. Rockfall berms are in place on both sides of the ramp and have capacity to retain future rockfall.	N/A
	Subsidence and sinkholes were noted in the ring road access to the south wall instrumentation. Access to the road has since been closed.	Maintain closure of the ring road near the South Wall sump.	Complete. The road is closed.	N/A
	Tailings are being discharged from the south end of the West Wall of the pit. Tailings are discharged over weak ultramafic rock which are susceptible to erosion and degradation of rock mass quality.	Implement bi-weekly inspections (once every two weeks) of the ultramafic wall performance at the tailings discharge point to identify indicators of potential instability such as formation of tension cracks, erosion and degradation of the rock mass, bench scale instability. Continue visual monitoring and recording of observations as part of regular site geotechnical inspections as the Pit E tailings and water management facility is filled.	Monthly inspections are completed by the Geotechnical Group. This frequency is considered appropriate as no evidence of erosion or instability has been observed to date at the tailings discharge point. The inspections should continue to be completed.	P3
Pit E Tailings Discharge Point				

TABLE 2

 AGNICO EAGLE MINES LTD. - MEADOWBANK COMPLEX  
 MEADOWBANK SITE

 2021 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION  
 STATUS OF RECOMMENDATIONS FROM 2020 ANNUAL INSPECTION

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Component	Summary of Key Observations	Recommendations	Status in 2021	Priority
Goose Pit, Pit Dumps, and Tailings Management Facility	The Goose Pit walls continue to perform satisfactorily and there are no geotechnical concerns. Only the upper single bench remains visible above the current pit lake.	Continue visual monitoring and recording of observations as part of monthly site geotechnical inspections.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	P3
	The pit is currently being used for tailings and water management.	Incorporate monitoring of the instrumentation with the dike instrumentation monitoring program.  The monitoring can be scaled back to exclude the TDR readings.	The piezometers and thermistors in the East Wall of the Goose Pit are no longer monitored as tailings deposition has stopped. Recommend reviewing the need to monitor these instruments periodically given the potential for future tailings deposition.  The TDR cables are no longer monitored.	P4
	There are two in-pit waste dumps, the North Dump and the South Dump.	Maintain closure of the dump platforms to all vehicle and pedestrian traffic.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed.	
	The South Dump platform is below the pit lake surface.	Continue visual monitoring and recording of observations as part of monthly site geotechnical inspections.	Access to the dump is prevented by a berm.	P3
	The North Dump platform continues to display significant subsidence characterized by differential settlement and the development to of tension cracks. This is most likely in response to increasing water levels. The dump platform is inaccessible to vehicle traffic.			
Vault Pit	The east wall of the pit is instrumented with piezometers, ground temperature cables, and time domain reflectometry cables.	Incorporate monitoring of the instrumentation with the dike instrumentation monitoring program.  The instrumentation to be monitored can be scaled back to exclude the TDR readings.	The piezometers and thermistors in the East Wall of the Goose Pit are no longer monitored as tailings deposition has stopped. Recommend reviewing the need to monitor these instruments periodically given the potential for future tailings deposition.  The TDR cables are no longer monitored.	P4
	The pit walls of the Vault Pit continue to perform well and there are no significant geotechnical concerns.	Maintain restricted access to the pit and dumps. Since there are no longer any regular in-pit activities, regular inspections can be suspended, except for requirements prior to entering the pit for water sampling.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed. At a minimum, the open pit slopes, in-pit dumps and Ring Road adjacent Vault Lake should be inspected prior to accessing the open pit.	P3
	Access to the pit is restricted by berms across the ramp.	General (informal) visual inspections can be undertaken when the opportunity presents.		
	A review of available instrumentation showed no significant changes from previous years.	The pit is inactive and bermed to prohibit access; consequently, monitoring of the instrumentation can be suspended and the instruments can be decommissioned as necessary.	The instrumentation has been decommissioned.	N/A
	An area of significant subsidence was observed on the ring road, at the north end on the east side of the pit. The area is approximately 75 m long by 20 m wide and is in an area that was previously underlain by the Vault Lake. Water ponds against the east side of the road.	Berm off access to the ring road from the north end of the pit; the south end of the ring road is currently bermed to prevent access.	The northern end of the Ring Road continues to be bermed off. A berm is no longer present at the southern end of the road. Access requirements to the Ring Road should be reviewed and berms constructed to prevent entrance to areas where access is no longer required. In particular, consider berms to prevent access to the areas of subsidence adjacent Pond D and Vault Lake.	P2
	The Vault Pit lake is being allowed to fill naturally. Prior to entering the pit for sampling of the pit lake, Agnico have a procedure in place for a geotechnical team member to inspect the pit slopes and waste dumps.	In addition to having a member of the geotechnical team inspect the pit walls and waste dumps, the ring road settlement area should also be inspected before entry to the pit.	Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed. At a minimum, the open pit slopes, in-pit dumps and Ring Road adjacent Vault Lake should be inspected prior to accessing the open pit.	P3
	There are two in-pit dumps. These were inspected and are performing well. Minor tension cracks were noted previously in the highest dump platform and these have not increased.	Since there are no longer any regular in-pit activities, regular inspections of pit walls and dumps can be suspended, except for requirements prior to entering the pit for water sampling.	General (informal) visual inspections can be undertaken when the opportunity presents.	P3
			Monthly inspections are completed by the Geotechnical Group. The inspections should continue to be completed. At a minimum, the dumps should be inspected prior to accessing the open pit.	

**TABLE 2**
**AGNICO EAGLE MINES LTD. - MEADOWBANK COMPLEX  
MEADOWBANK SITE**
**2021 ANNUAL OPEN PIT GEOMECHANICAL INSPECTION  
STATUS OF RECOMMENDATIONS FROM 2020 ANNUAL INSPECTION**

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Component	Summary of Key Observations	Recommendations	Status in 2021	Priority
Phaser Pit	The pit walls of Phaser Pit continue to perform well and there are no significant geotechnical concerns.	Maintain restricted access to the pit and ring road. Since there are no longer any regular in-pit activities, regular inspections can be suspended, with the exception of requirements prior to entering the pit for water sampling. General (informal) visual inspections can be undertaken when the opportunity presents.	A visual inspection of the open pit slopes and ramp should be completed prior to accessing the open pit.	P3
BB Phaser Pit	The pit walls of BB Phaser Pit continue to perform well and there are no significant geotechnical concerns. Only the top 3 to 5 m of the upper rock bench remains visible above the pit lake surface.	Maintain restricted access to the pit and ring road. Since there are no longer any regular in-pit activities, regular inspections can be suspended, with the exception of requirements prior to entering the pit for water sampling. General (informal) visual inspections can be undertaken when the opportunity presents.	The open pit is flooded and no rock slopes are exposed. General (informal) visual inspections can be undertaken when the opportunity presents.	N/A
	The access road separating BB Phaser Pit from Phaser Pit is still accessible. Sinkholes noted in 2019 are absent in 2020.	Deactivate road and berm off to prevent use.	The road remains accessible at its southern entrance. A berm should be constructed to prevent access to the road.	P2

\NB4\project\\$110100622\38\A\Correspondence\NB22-00210 - Meadowbank Annual Inspection\Table 2 Status of 2020 Recommendations.xlsm]Table

**NOTES:**

1. TABLE AFTER TABLE 8.1 FROM TETRA TECH (2021).
2. PRIORITY HAS BEEN UPDATED TO REFLECT THE RESULTS OF THE 2021 ANNUAL INSPECTION.

0	02MAR22	ISSUED WITH LETTER NB22-00210	MJR	BDP
REV	DATE	DESCRIPTION	PREP'D	RWWD

## APPENDIX A

### **Meadowbank Complex - Meadowbank Site - 2021 Annual Open Pit Geomechanical**

(Pages A-1 to A-51)



# Meadowbank Complex - Meadowbank Site

## 2021 Annual Open Pit Geomechanical Inspection

September 13 to 15, 2021

# Outline

- Introduction
- Observed Slope Performance
- Monitoring and Inspections
- Recommendations



# Introduction



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# Introduction

## General

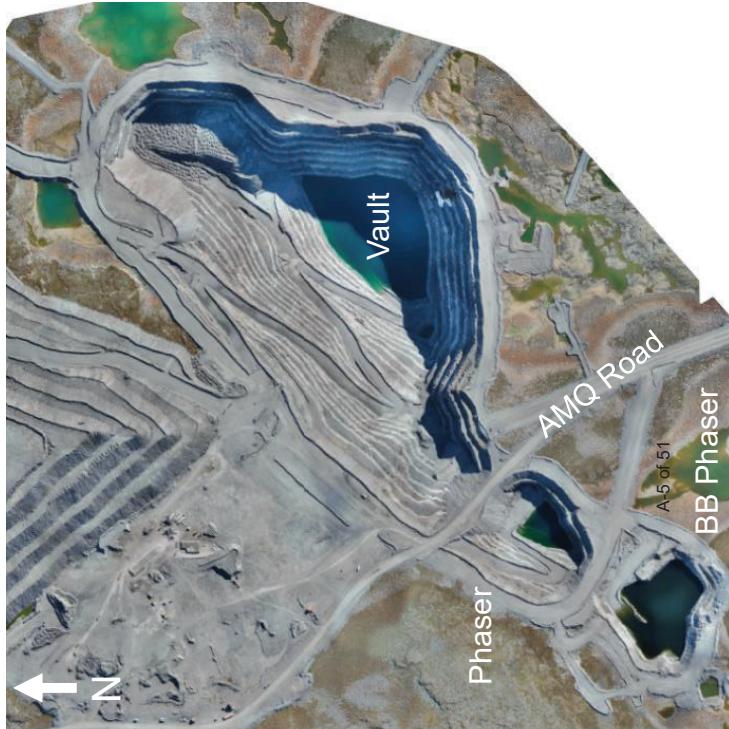
- Agnico Eagle Mines (AEM) operates the Meadowbank Complex in Nunavut. The complex consists of the Meadowbank and Amaruq Sites.
- The Meadowbank Site consists of the Portage, Goose, Vault and Phaser deposits. The deposits were mined using a series of open pits and mining is now complete. The Portage and Goose open pits are currently being used for tailings, waste rock and water management.
- An annual inspection of the open pits by a third-party is required under the Type-A, Part 1, Item 12 Water License for the mine.
- Tetra Tech Canada Inc. (Tetra Tech) has been the Open Pit Slope Geotechnical Engineer (PSGE) for the Meadowbank Site since 2014. In 2019, mining began to transition to the Whale Tail and IVR deposits at the Amaruq Site, approximately 50 km from the Meadowbank Site and production at the Meadowbank site has now ceased.
- Knight Piésold Ltd. (KP) is the PSGE for the Amaruq Site. AEM requested that the role of PSGE for the Meadowbank Site be transferred from Tetra Tech to KP in 2021 so that a single annual inspection could be completed for the open pits at both sites. KP have now assumed the role of PSGE for the Meadowbank Site in addition to the Amaruq Site.
- To facilitate this transfer, the inspection of the open pits was carried out jointly by Cameron Clayton, P.Eng. (Tetra Tech) and Ben Peacock, P.Eng. (KP). Mr. Clayton has been providing geomechanical design input and support for the open pits since 1995.
- The inspection was completed between September 13 and 15, 2021 and is summarized in this presentation.

# Introduction

## Meadowbank Site Open Pits

- The open pits at the Meadowbank Site that were reviewed and their current status are summarized below.
- Note that all elevations presented are in meters Relative Level (mRL), which uses a datum 5000 m below sea level.

Open Pit	Current Status
Portage Pit A	Mining complete, actively used for water management, inactive in-pit dump
Portage Pit B	Backfilled with waster rock
Portage Pit C	Backfilled with waster rock
Portage Pit D	Backfilled with waster rock
Portage Pit E	Mining complete, active tailings deposition, inactive in-pit dump
Goose Pit	Mining complete, partially flooded, inactive tailings deposition with the potential for future deposition
Vault Pit	Mining complete, partially flooded, inactive in-pit dump
Phaser Pit	Mining complete, partially flooded
BB Phaser Pit	Mining complete, partially flooded



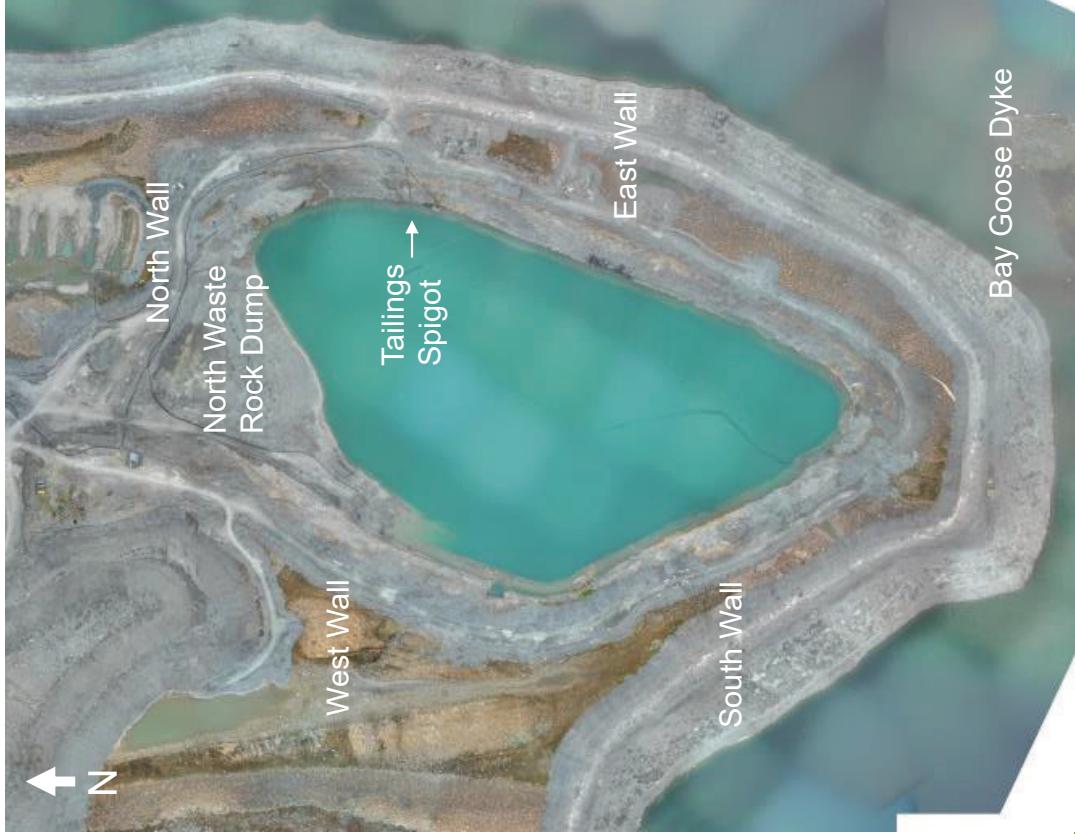
# Observed Slope Performance



# Observed Slope Performance

## Goose Open Pit - General

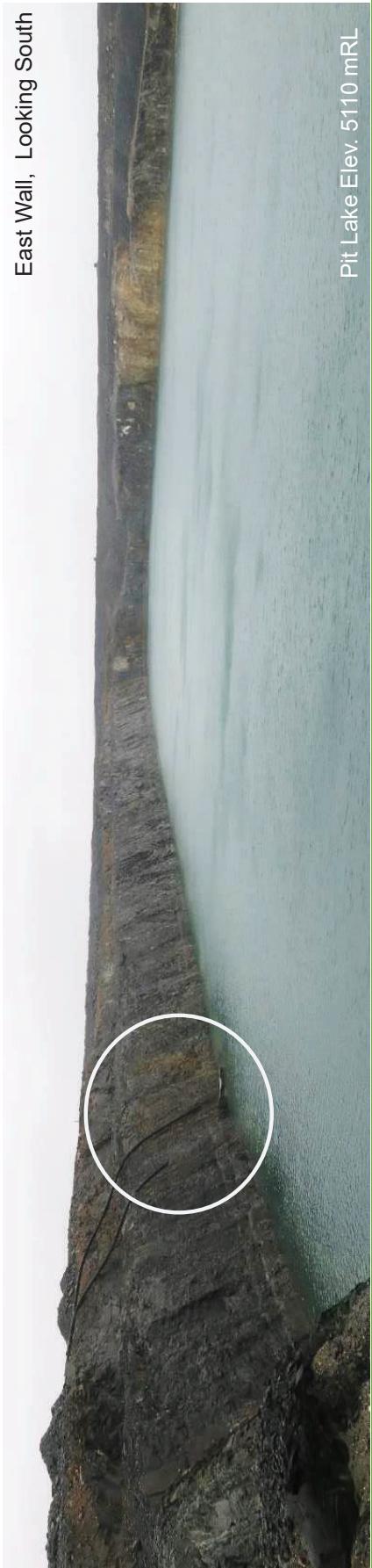
- The Goose open pit was inspected on September 13, 2021.
- Observations made during the inspection are summarized on the following slides.
- The approximate current pit geometry is shown at right.
- Mining of the open pit is complete. An inactive in-pit dump is present along the North Wall of the open pit (the North Waste Rock Dump).
- The open pit reached a final floor elevation of 4997 mRL, with a crest elevation of approximately 5130 mRL.
- Tailings was previously deposited in the open pit from a spigot point on the East Wall to an elevation of 5086 mRL. It is understood that future deposition of tailings is likely to be limited. The water elevation at the time of the inspection was approximately 5110 mRL.
- Access to the open pit is infrequent, typically limited to monthly water quality sampling when the pit lake is not frozen.
- The East Wall of the open pit was instrumented with Time Domain Reflectometry (TDR) cables, Vibrating Wire Piezometers (WPs) and thermistors. These instruments are no longer monitored from a geomechanical perspective. The instrumentation is discussed in the Monitoring and Inspections section of this presentation.



# Observed Slope Performance

## Goose Open Pit - East Wall

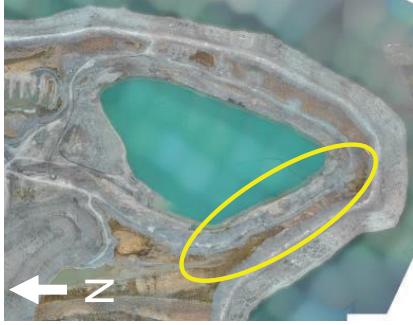
- A portion of a single bench is exposed above the current pit lake.
- The wall was established in the Intermediate Volcanics and is performing well.
- The former tailings discharge point is circled below. No erosion of the slope was noted.
- No particular geomechanical concerns were noted.



# Observed Slope Performance

## Goose Open Pit - South Wall

- A portion of a single bench is exposed above the current pit lake.
- The wall is performing well.
- No particular geomechanical concerns were noted.



South Wall, Looking Southwest



Pit Lake Elev. 5110 mRL

# Observed Slope Performance

## Goose Open Pit - West Wall and Ramp

- At the time of the inspection, pylons were in place at the top of the ramp to restrict access to authorized personnel.
- The exposed bench faces along the ramp are relatively low and there is ample room to transit and work away from the wall. As a result, the rockfall risk is considered to be low. It is understood that a pump had been located adjacent the wall but was moved to the other side of the ramp to reduce exposure. The pump was not present at the time of the inspection.
- No particular geomechanical concerns were noted.



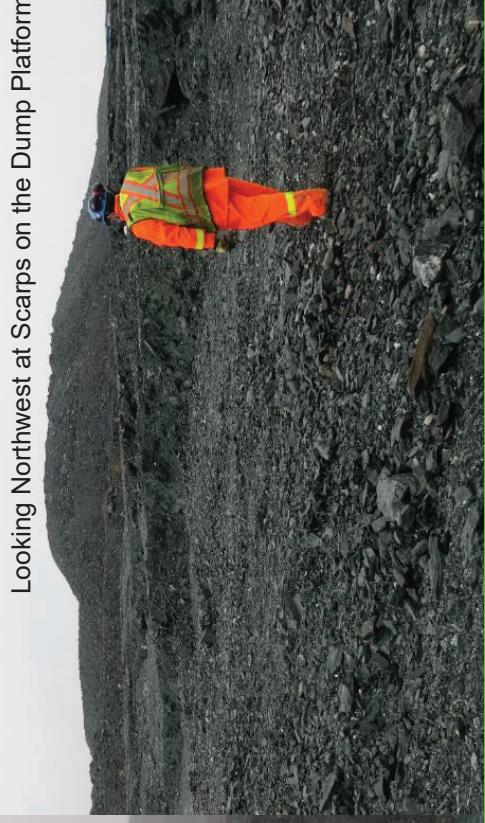
# Observed Slope Performance

## Goose Open Pit - North Wall (North Waste Rock Dump)

- The dump has been subsiding since 2015. The settlement is attributed to the deposition of water in the open pit, through a combination of thawing snow/ice lenses within the dump, thawing frozen contacts between rock blocks, and increasing porewater pressure. An example of one of the scarps formed by the settlement is shown at lower right.
- The settlement is monitored visually as part of monthly inspections by the Geotechnical team.
- The dump is inactive and access is prevented by both a rockfill berm and the presence of water pipes across the access point.
- Recommend continuing the monthly visual monitoring as long as access is still required to the open pit. There is an opportunity to use the drone imagery already collected by the mine to do a photogrammetry assessment of the subsidence on an annual basis.



Looking North at the Dump, with Settlement and Scarps Visible



Looking Northwest at Scarps on the Dump Platform



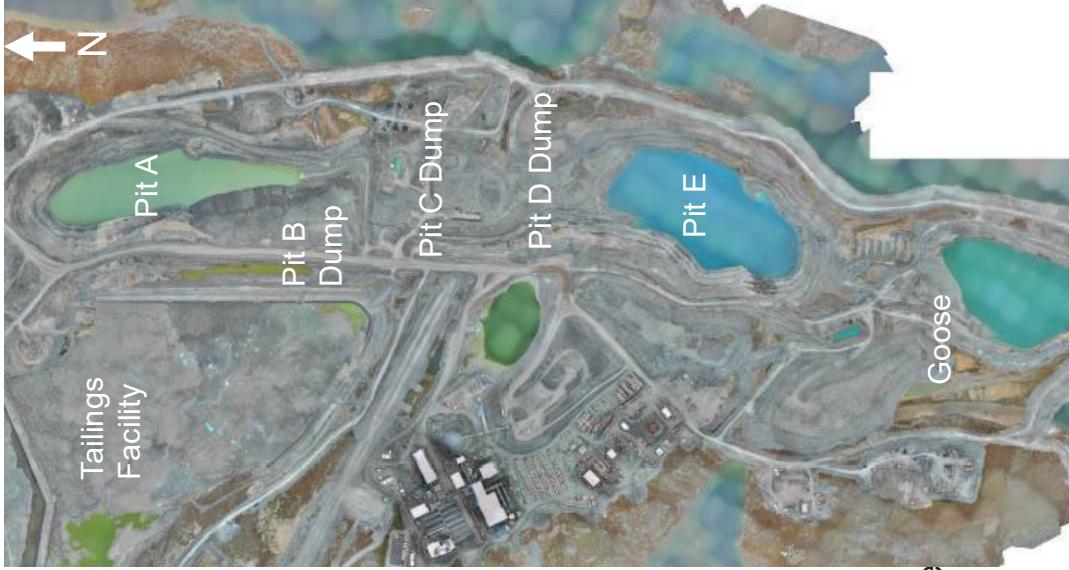
Dump Elev. 5125 mRL

Pit Lake Elev. 5110 mRL

# Observed Slope Performance

## Portage Open Pits - General

- Pit A, Pit E, B Dump, C Dump and D Dump were inspected on September 13 and 14, 2021. Observations made during the inspection are summarized on the following slides.
- The approximate current pit geometry is shown at right.
- Mining of the open pits is complete.
- Pits B, C and D have been backfilled with waste rock. The waste rock dumps extend along the southwest wall of Pit A and the north wall of Pit E. The dumps are no longer active.
- Pit A is being used for water management. The water elevation was approximately 5080.8 mRL at the time of the inspection. Pit A has a final floor elevation of 4997 mRL and a crest elevation of approximately 5151 mRL.
- Tailings are being deposited in Pit E from a spigot point at the crest of the West Wall. The tailings were at an elevation of 5038.4 mRL and the water at an elevation of approximately 50668.9 mRL at the time of the inspection. Pit E has a final floor elevation of 4976 mRL and a crest elevation of approximately 5130 mRL.
- Access to the open pits is infrequent, typically limited to monthly water quality sampling when the pit lakes are not frozen.
- The South Wall of Pit E was instrumented with TDR cables, an inclinometer, VWP's and thermistors. These instruments are no longer monitored from a geomechanical perspective. The instrumentation is discussed in the Monitoring and Inspections section of this presentation.



# Observed Slope Performance

## Pit A - West Wall

- Approximately three benches are exposed above the pit lake in this area.
- Local bench scale failures have previously occurred within the Ultramafics on this wall. No significant change was observed in the failures remaining above the pit lake since the 2020 inspection.
- Several large voids are present within the Quartzite and were previously identified as a rockfall hazard. No significant change was observed since the 2020 inspection.
- No particular geomechanical concerns were noted.



# Observed Slope Performance

## Pit A - East Wall

- Approximately three benches are exposed above the pit lake in this area.
- Access to the East Ramp was limited by pylons and partial berm was present halfway down the ramp and at the base of the ramp at the time of the inspection. It is understood that the ramp is no longer used. Recommend constructing a berm at the top of the ramp to prevent access.
- The wall is performing well.
- No particular geomechanical concerns were noted.



Composite of Pit A East Wall, Looking East



# Observed Slope Performance

## Pit A - South Wall Ramp

- The south ramp is used to access the pit lake and water management infrastructure is present along the ramp.
- A rockfall berm is present along both sides of the ramp. The berm is in good condition and has capacity to retain any future rockfall.
- The PTO / Pump controls are located well up the ramp, away from the areas of greatest rockfall hazard associated with the dump and the highwall. The controls are also well away from the pit lake, mitigating the risk associated with a wave caused by a failure of the open pit slope or the dump. This is a good practice.
- Specific geotechnical considerations relating to Dump B are discussed on the next slide. Bulging of the toe of the dump slope was not observed.
- No particular geomechanical concerns were noted.



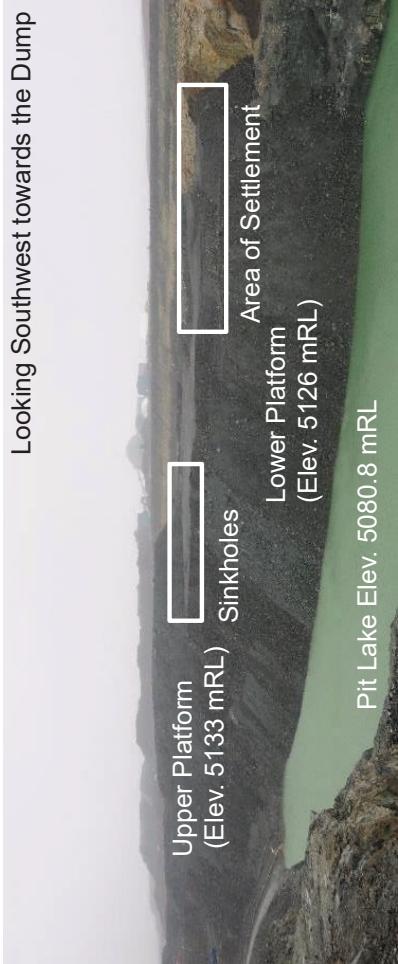
South Ramp, Looking North with PTO/Pump Controls at Left



# Observed Slope Performance

## B Dump

- The Pit B Dump consists of an Upper and Lower Platform, both of which are inactive. Access to the Lower Platform was prevented by a berm while access to the Upper Platform was unrestricted at the time of the inspection.
- The northern end of the Lower Platform above the pit lake has settled and tension cracks are present. Sinkholes have also formed at the southern end of the Lower Platform. These are discussed on the following slide.
- Failures of the dump slope are possible as the pit lake elevation rises, but have not been observed to date. Such a failure could cause a large wave in the pit lake, as discussed on the previous slide. The potential for a failure of the dump back towards the Amaruq Road (see photo at lower right) was discussed as it is not clear if the road is partially constructed on the dump. The topography and bedrock profile below the road and the dump should be reviewed to assess whether this is a plausible failure mode.
- A geotechnical inspection of the dump is completed on a monthly basis. The dump is not instrumented. Recommend continuing the inspections, particularly while access continues on the Pit A South Ramp below the dump.



# Observed Slope Performance

## B Dump - Lower Dump Platform

- Based on discussions with C. Clayton and C. Tremblay, there has been little change in the sinkholes and settlement since the 2020 inspection. No obvious bulging of the toe of the dump slope was observed. It was noted that the deposition of Ultramafics within the dump had previously contributed to settlement of the dump.
- Continue to monitor the settlement and tension cracks at the north end of the dump. Recommend surveying the cracks so that their development over time can be monitored.
- Recommend grading the Lower Platform prior to the winter in order to limit water infiltration during freshet.

Sinkholes at South End of Lower Platform  
(Looking South)



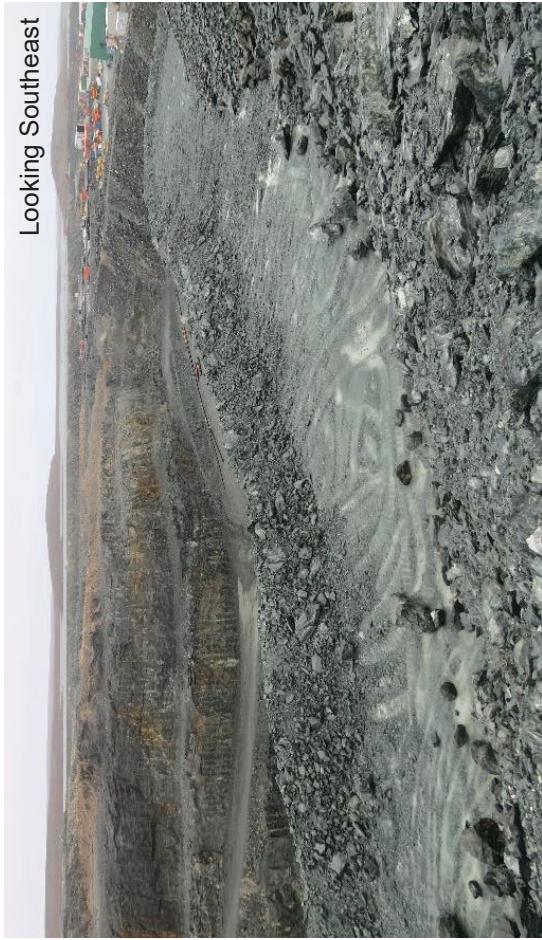
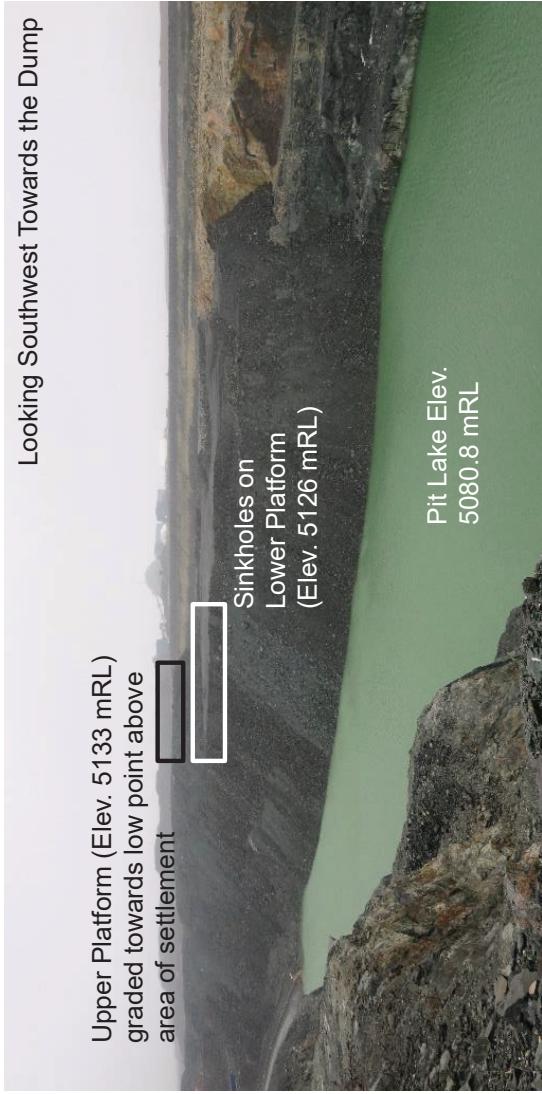
Settlement and Tension Cracks at North End of Lower Platform  
(Looking South)



# Observed Slope Performance

## B Dump - Upper Dump Platform

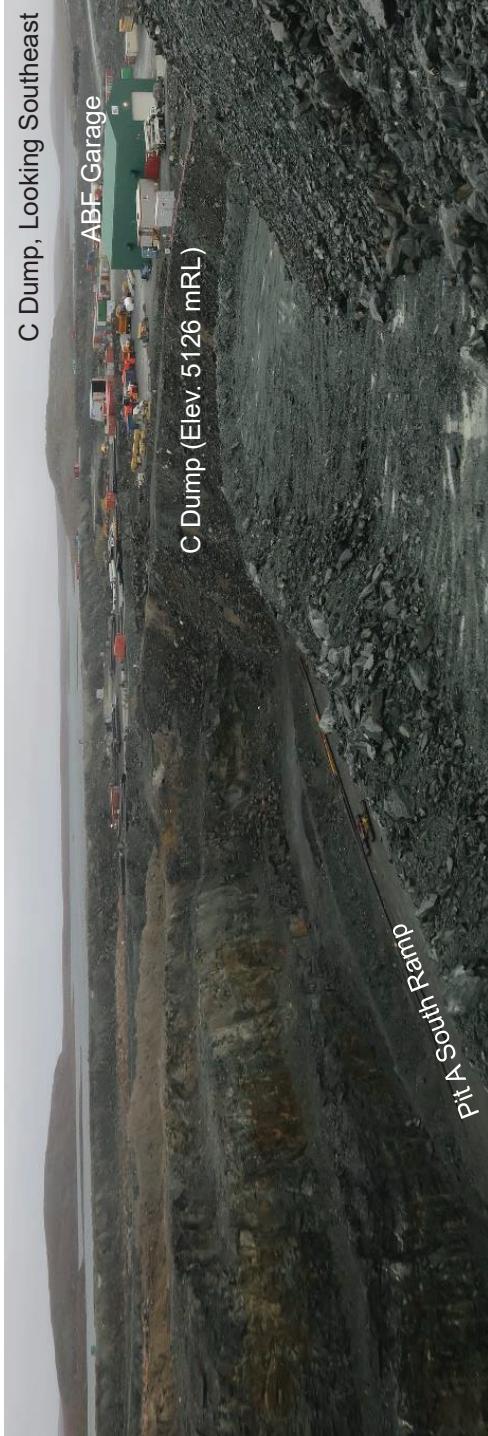
- Evidence of instability was not observed on the Upper Platform.
- The Upper Platform is graded so that water flows to a low point above the area of the Lower Platform where sinkholes have formed. This is a likely cause of the sinkholes. The recommendations from the previous annual inspection remain applicable; recommend filling the low point and re-grading the dump so that water is directed away from this area.
- Recommend constructing a berm to prevent access to the Upper Platform.



# Observed Slope Performance

## C Dump

- The C Dump backfilled Pit C and is located between Pits A and E and is inactive. Access to the dump platform is permitted.
- The ABF Garage was constructed on the C Dump platform in 2020, approximately 35 to 45 m from the crest of the dump. As the water elevation in Pit A and the water/tailings elevation in Pit E reach and surpass the base of the dump, settlement of the dump is expected.
- The associated geotechnical risks for the garage were discussed in detail in the 2020 inspection report. The recommendations from that report remain applicable. It is recommended that the garage be relocated outside of the immediate vicinity of the open pits, waste dumps and tailings/water management areas and that access to the C Dump be prevented with a berm.
- Note that the 2020 inspection report identified a water/tailings elevation of 85 masl as a possible threshold for migration of water below the C Dump. The water elevation in Pit A at the time of the 2021 inspection was just under 81 masl. No evidence of instability was observed at the time of the 2021 inspection.



C Dump, Looking Southeast

ABF Garage

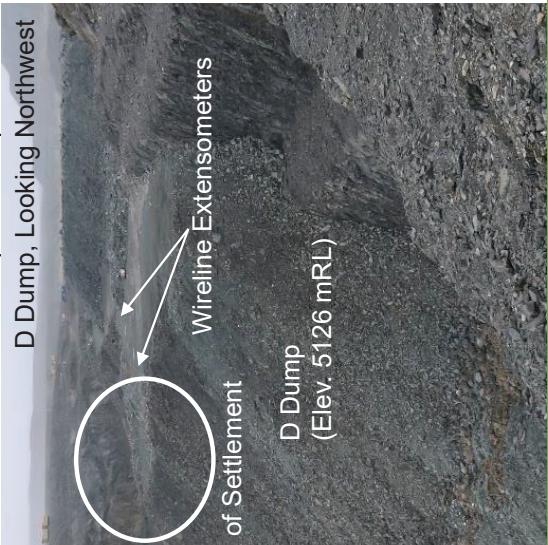
C Dump (Elev. 5126 mRL)

Pit A South Ramp

# Observed Slope Performance

## D Dump

- The D Dump backfilled Pit D and forms the north wall of Pit E. The Pit E Northwest ramp runs along the western toe of the dump.
- The southwestern end of the dump started to settle in 2017 to 2018. Tension cracks are visible in this area as well as along the crest immediately to the north. It is understood that there has been limited change in the settlement or tension cracks since the 2020 inspection. Bulging of the toe of the slump was not observed. Access to the top of the dump is restricted by a berm.
- Two wirelines extensometers have been installed at the crest of the dump in the area of settlement and tensions cracks in 2019. The extensometers are monitored monthly. The data are discussed later in this presentation but the deformation rate is currently less than 1mm/day. The monitoring and the monthly visual inspections should continue while access to the Pit E Northwest ramp is still required.



# Observed Slope Performance

## Pit E - East Wall

- Approximately three benches are exposed above the pit lake in this area.
- The wall is performing well.
- No particular geomechanical concerns.



# Observed Slope Performance

## Pit E - South Wall and Ramp

- The South Wall was established in Ultramafics and has experienced a series of bench-scale instabilities and rock falls.  
Approximately three benches are exposed above the pit lake in this area.
- At least one rockfall has occurred since the 2020 inspection, with material accumulating on the South Wall Ramp. As the South Wall Ramp has been closed since before the 2020 inspection, the instability did not pose a risk to personnel.
- A berm has been constructed at the top of the South Wall Ramp to prevent access.



# Observed Slope Performance

## Pit E - Southwest Wall

- The wall consists of Ultramafics overlying Intermediate Volcanics and is intersected by the Bay Fault. Approximately three benches in the Ultramafics are exposed above the pit lake. The wall is within talik associated with the Third Portage Lake.
- Tailings are discharged from a line at the crest of this wall. Tetra Tech recommended that tailings not be discharged over the Ultramafics due to the potential for erosion of the benches or slope instability due to water infiltration. No significant evidence of these hazards (e.g., erosion, cracking, seeps, etc.) were observed at the time of the inspection. Similarly, no settlement of the adjacent crest road was observed. The wall is performing well.
- Recommend continuing the monthly visual inspections to monitor the area for bench degradation/erosion, tension cracks, seeps, etc.



# Observed Slope Performance

## Pit E - Northwest Wall and Ramp

- The Northwest Ramp is used to access the pit lake and water management infrastructure is present along the ramp.
- Many of the hazards identified during previous inspections have been flooded by the rising pit lake and no longer pose a risk to personnel.
- A rockfall berm was previously constructed and has been effective at managing rockfalls, including one that occurred in 2021. The capacity of the berm reduced over time and a second berm was constructed in 2021 further away from the wall. The two berms appear suitable to retain most rockfall but it is still possible that they could be overtopped in some circumstances. Geotechnical inspections of the area should continue while access to the ramp is still required.
- The water management infrastructure has been partially relocated up the ramp from the rockfall area, and to the outside of the ramp, which effectively reduces exposure.



# Observed Slope Performance

## Pit E - Northwest Wall and Ramp (Cont'd)

- Dump D is located along the eastern side of the ramp. Tension cracks are present along a portion of the crest above the ramp and a wireline extensometer has been installed to monitor the dump (see previous slide on Dump D). Bulging of the toe was not observed. A rockfall berm is in place at the toe of the dump and has capacity. Geotechnical inspections and monitoring of the dump should continue while access to the ramp is still required.
- The Bay Fault intersects the Northwest Wall adjacent the ramp. Several rockfalls have occurred along the wall in the past and rockfalls are expected to continue to occur. Examples of several potential instabilities are shown on the next slide (numbered below for reference).



# Observed Slope Performance

## Pit E - Northwest Wall and Ramp (Potential Hazards)

### Area 1 (Looking South)

- The nose in the Northwest Wall is intersected by the Bay Fault. The zone of reduced rock mass quality associated with the fault has ravelled over time, resulting in rockfall.
- A block was identified at the crest of the bench that represents a rockfall hazard. The block is expected to be retained by the rockfall berms.

### Area 2 (Looking North)

- A large detached and potentially unstable block was identified on the southern side of the nose during the 2020 inspection.
- The block has the potential to overtop the rockfall berm and should continue to be monitored.

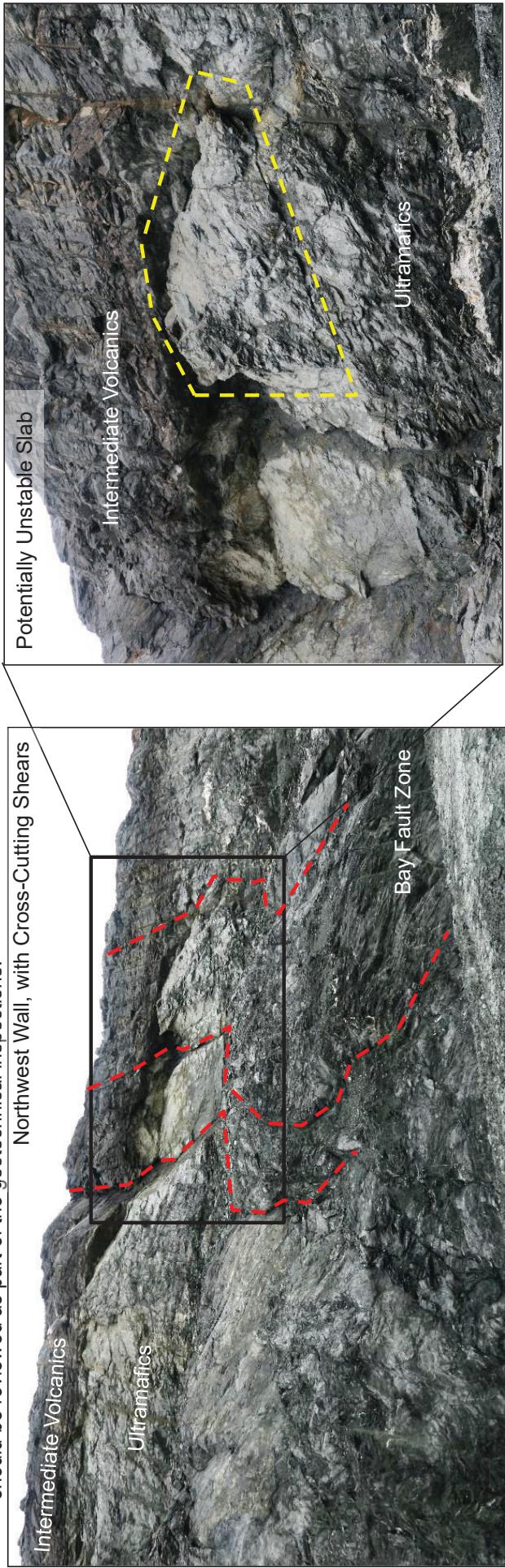


# Observed Slope Performance

## Pit E - Northwest Wall and Ramp (Potential Hazards Cont'd)

### Area 3 (Looking West)

- Several moderately to steeply dipping shear zones (in red below) cross-cut the northwest wall as well as the Bay Fault Zone and the contact between the Intermediate Volcanics and Ultramafics. The combination of the shears, contact, and other jointing has previously resulted in rockfalls.
- A potentially unstable slab was identified on the wall (in yellow below), bounded by the contact, two shears and a sub-vertical joint set. The condition of the slab should be reviewed as part of the geotechnical inspections.



# Observed Slope Performance

## Vault Open Pit - General

- The Vault open pit was inspected on September 14, 2021. Observations made during the inspection are summarized on the following slides.
- The approximate current pit geometry is shown at right.
- Mining of the open pit was completed in March, 2019. An inactive in-pit dump is present along the North Wall of the open pit.
- The open pit reached a final floor elevation of 4955 mRL, with a crest elevation of approximately 5137 mRL.
- Access to the open pit is limited to monthly water quality sampling when the pit lake is not frozen.
- At the time of the inspection, access to the open pit was prevented by a berm. Access to the ring road is partially restricted by a berm at the north end of the road. The berms are shown in yellow at right.
- The open pit is partially flooded. The elevation of the pit lake was last measured in September, 2020 when it was 5011.5 mRL.
- The Amaruq All Weather Road (AWR) crosses between the Vault and Phaser Pits on a rockfill embankment.
- Note that both rain and fog have affected the quality of the photos taken during the inspection.



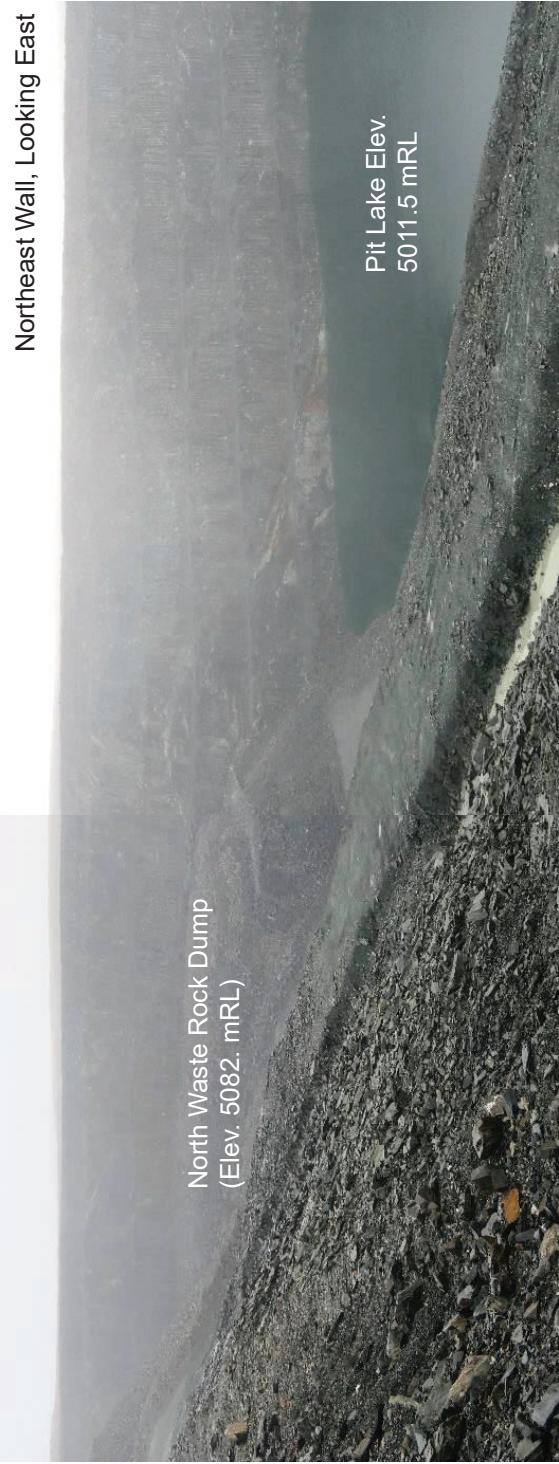
# Observed Slope Performance

## Vault Open Pit - Northeast Wall

- The wall is performing well.
- No particular geomechanical concerns.
- The North Waste Rock Dump is described on a subsequent slide.



Northeast Wall, Looking East



# Observed Slope Performance

## Vault Open Pit - Southeast Wall

- The wall is performing well.
- A substantial quantity of water is flowing from Pond D, to the south of the pit, under the ring road and down the wall. The flow below the road at the crest of the wall is shown at lower right. No erosion of the slope was observed. The flow could result in subsidence of the road or the formation of sinkholes. Additional comments are provided on a subsequent slide focussed on the Ring Road.
- The ice wall continues to form each winter on and below the talik zone in this wall (roughly where the iron staining is present on the wall). Limited seepage through rock was observed at the time of the inspection.
- No particular geomechanical concerns. The area should continue to be visually inspected.



# Observed Slope Performance

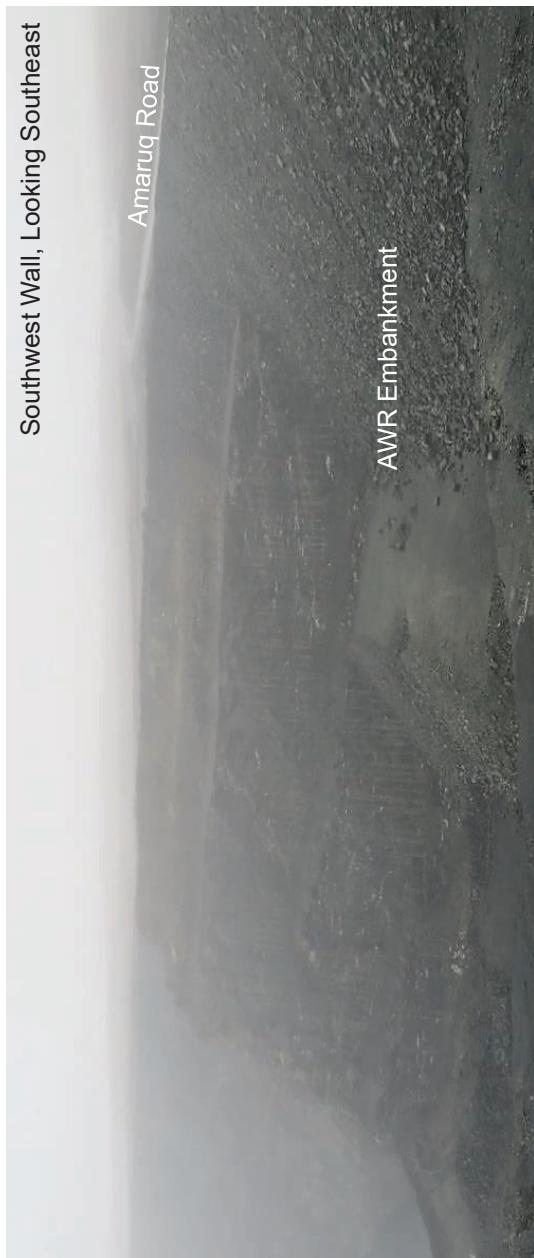
## Vault Open Pit - Southwest Wall

- The Amaruq AWR crosses a saddle between the Vault and Phaser pits on a rockfill embankment.
- No evidence of instability in the AWR embankment was observed. No tension cracks on the surface of the road or bulging of the embankment toe were noted. The embankment is included in the geotechnical inspections.
- The stability of the Amaruq AWR embankment could be adversely impacted if the water level in the Phaser Pit on the other side of the embankment increases and water ponds behind the embankment. No seepage was observed at the time of the inspection. The presence of seepage should be evaluated as part of the monthly inspections.



Southwest Wall, Looking Southeast

Southwest Wall, Looking South



# Observed Slope Performance

## Vault Open Pit - West Wall

- The West Wall is located along the footwall of the deposit, which dips at approximately  $20^\circ$  to the east (mine grid). The wall was established with 7 m high single benches without pre-shear and commonly failed or was scaled back to the foliation.
- The ramp is located along this wall. At the time of the inspection, access to the ramp was prevented by a berm. However, it is understood that monthly water quality monitoring is completed during the summer. Documentation of geotechnical inspections of the ramp in 2021 was not available. A visual geotechnical inspection should be completed each time the pit is accessed (e.g., for water quality monitoring). In addition to the ramp itself, the inspection should consider the open pit walls and in-pit dump as a failure could create a wave in the pit lake. The integrity of the Ring Road between the open pit and Vault Lake should also be considered during the inspection as a failure could result in an inrush to the open pit.
- As an alternative to continued inspections of the Ring Road adjacent Vault Lake, consider breaching the road at that point so that it cannot retain water.



West Wall, Looking North



Berm at Top of Ramp



# Observed Slope Performance

## Vault Open Pit - North Waste Rock Dump

- A waste rock dump was constructed at the north end of the Vault Pit. The dump is inactive and consists of two platforms with elevations at approximately 5133 mRL and 5082 mRL.
- Settlement and tension cracks were observed at the crest of the upper platform at the north end of dump during the 2019 inspection. There appears to have been little change since that time. The affected area is relatively small and is not above the ramp. Consider including this area in the monthly visual inspections.
- No other evidence of instability was observed during the inspection.
- Access to the dump was not restricted at the time of the inspection. Recommend installing a berm to prevent access as the dump is inactive.

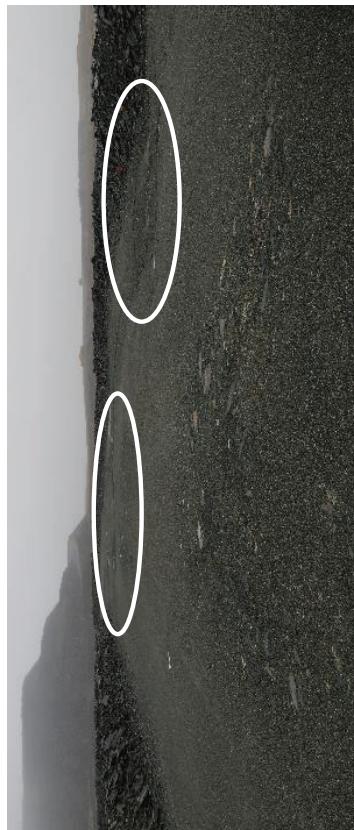
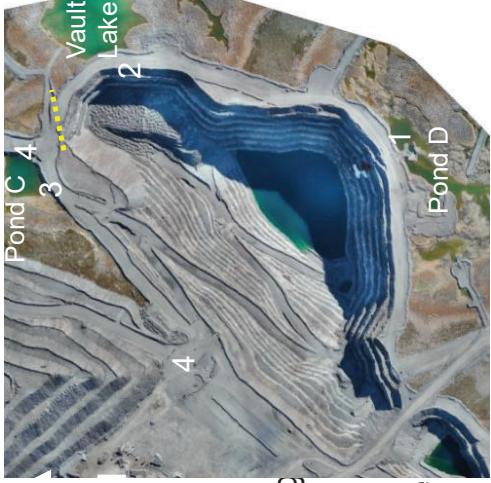


Looking North at Area of Settlement  
Looking South from Crest of Dump  
(Elev. 5133 mRL)

# Observed Slope Performance

## Vault Open Pit - Ring Road

- A berm has been constructed at the northern end of the Ring Road to prevent thru-traffic (yellow dashed line) at rig 2 is still available from the southern end. Several geotechnical hazards have been identified along the road:
  1. Seepage from Pond D is flowing under the road and down the pit wall. This previously only occurred during a high rainfall event in 2019. As the water level in Pond D raises, there is the potential for subsidence of the road in this area.
  2. Subsidence of the road has occurred adjacent Vault Lake. No seepage was observed below road. It is understood that access to this area is no longer required. Recommend constructing a berm to prevent access to this area. The potential for a sudden inrush of water from Vault Lake into the open pit was previously identified as a hazard in the event of a breach or erosion of the Ring Road in this area. As a result, it is recommended that the area be inspected prior to accessing the open pit. Alternatively, the road could be purposely breached in this area to eliminate the hazard.



# Observed Slope Performance

## Vault Open Pit - Ring Road (Cont'd)

- 3. Subsidence of the road has occurred adjacent Pond C. Only part of the road is affected and the road is still used to access exploration drill sites. Recommend filling the subsidence or clearly marking the area of settlement with cones. Note that seepage from Pond C has likely contributed to the formation of tension cracks and subsidence at the northern end of the North Waste Rock Dump.
  - 4. The ramps to the waste rock dump are only partially blocked by berms. Recommend extending the berm so that access is restricted.
- As a general comment, recommend reviewing access requirements along the Ring Road and constructing berms to restrict access to portions of the road that are no longer needed. Areas that continue to be used should be included in the monthly geotechnical visual inspections.



# Observed Slope Performance

## Phaser and BB Phaser Pits - General

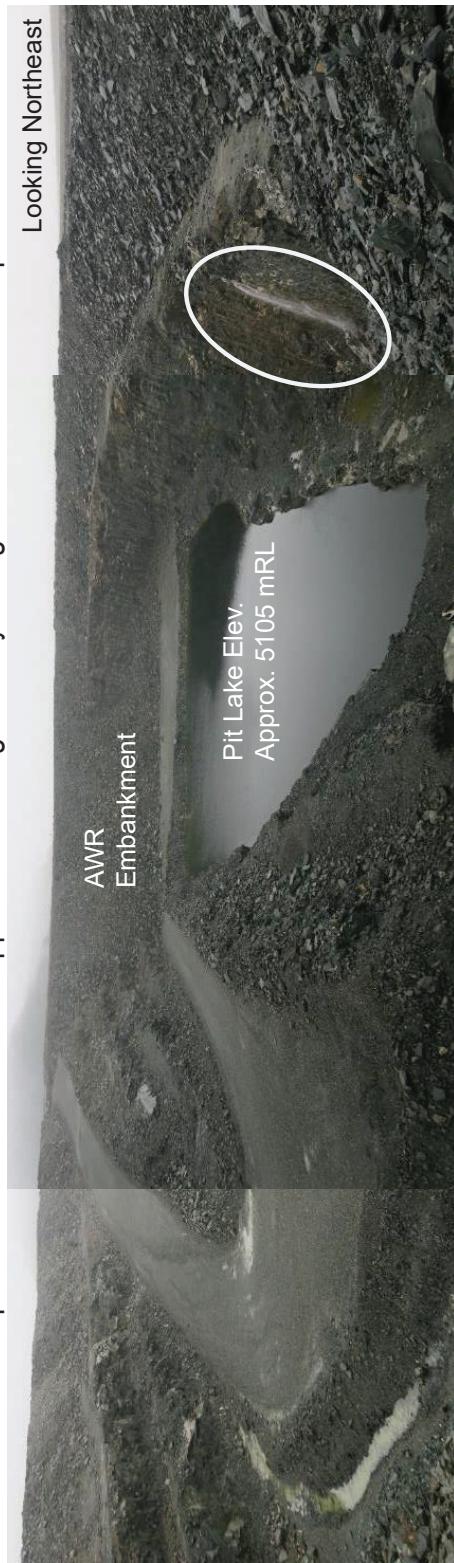


- The Phaser and BB Phaser open pits were inspected on September 14, 2021. Observations made during the inspection are summarized on the following slides.
- Mining of the open pits is complete. The approximate current pit geometry is shown at right.
- The open pits are partially flooded. The elevations of the pit lakes are not recorded, but estimates are shown at right.
- Access to the open pits is limited to monthly water quality sampling when the pit lake is not frozen.
- At the time of the inspection, the accesses to the open pits were barricaded by berms (shown as dashed lines at right).
- Note that the Amarug All Weather Road (AWR) crosses between the Vault and Phaser Pits on a rockfill embankment.
- The potential for approaching the WSCC about ending the third party inspections for both the Phaser and BB Phaser open pits was discussed as the exposed rock slopes and associated hazards are limited. As on-going access to the pits is still required for water quality sampling, AEM should complete internal visual inspections prior to the sampling events. Similarly, the monthly inspections of the AWR should continue.

# Observed Slope Performance

## Phaser Open Pit - General

- The open pit is partially flooded, limiting the current rock exposures to a single bench. No particular concerns were noted.
- Access to the open pit is prevented by a berm.
- No evidence of instability was observed in the Amaruq AWR embankment. The embankment is inspected monthly by the Geotechnical Group and it is recommended these inspections continue.
- Water inflow, likely from the BB Phaser pit, was noted at the south end of the pit (circled below). The pit lake elevation is approximately 20 m higher in the BB Phaser pit than in the Phaser pit. The stability of the Amaruq AWR embankment could be adversely impacted if the water level in the Phaser pit increases and water ponds behind the embankment. A visual assessment of the water level in the open pit should be incorporated into the monthly inspections. Note that the pit lake elevation does not appear to have significantly changed since the 2020 inspection.



# Observed Slope Performance Phaser Open Pit - Ring Road

- Subsidence was observed on the ring road between the Phaser and BB Phaser pits.
- Recommend preventing access to the ring road by constructing a berm at the southern entrance to the road. A berm is already in place at the northern entrance. If access is required to the road in the future, a geotechnical inspection should be completed in advance.



# Observed Slope Performance

## BB Phaser Open Pit - General

- The open pit is flooded, with no rock slopes visible. The pit lake elevation appears to be a couple of meters higher than what was observed during the 2020 inspection.
- Access to the open pit is prevented by a berm.
- No particular geomechanical concerns were noted.



# Monitoring and Inspections



# Monitoring and Inspections

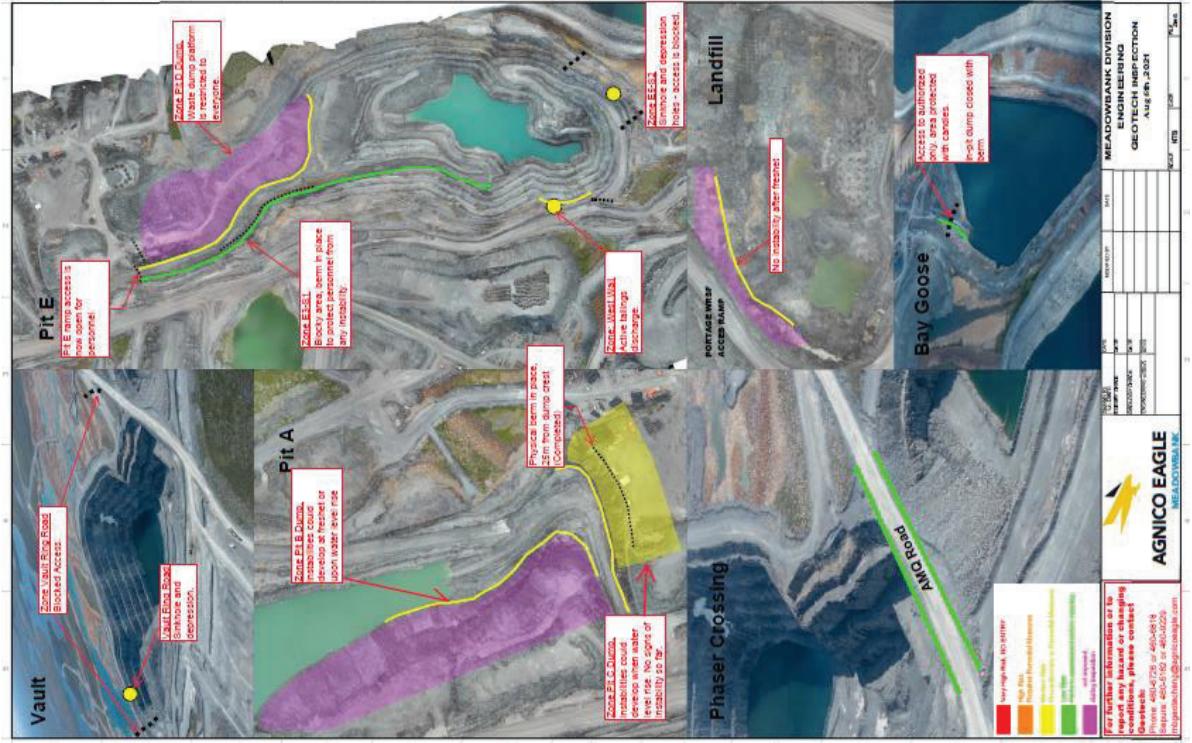
## Inspections

- Visual inspections are completed by the Geotechnical Group on a monthly basis and a summary report and map issued.
- The Rock Mechanics Group does not currently commit to any inspections of the Meadowbanks pits, though an inspection was completed in August of this year. The mine is fortunate that many members of the Geotechnical Group have open pit rock mechanics experience. However, this could change over time. Recommend implementing an annual inspection of the open pits and in-pit dumps by the Rock Mechanics Group in areas where access is still required.
- A selection of the inspection reports were reviewed and the following discussed:
  - Most of the key hazards identified during the 2021 annual inspection are included in the monthly reports. However, the ramps used to access the pit lakes in the Goose Pit, Portage Pit A, Vault Pit, and Phaser/BB Phaser Pits are not. Recommend including these areas, as well as the Vault Ring Road, in the inspections, at least during periods when access to the ramp is required (e.g., for pump maintenance or water quality sampling).
  - The inspections include a series of standard photos from the same positions. This is a good practice as it allows changes to be tracked over time.
  - While the frequency of the visual inspections is reasonable, recommend having a formal mechanism in place to increase the frequency in, for example, the event that an instability is observed. This commonly takes the form of a Trigger Action Response Plan (TARP).
  - At least two rockfalls have occurred in Pit E since the 2020 annual inspection. Rockfalls are commented on in the inspection reports but are not tracked in a rockfall database. Recommend recording and reporting (as appropriate) rockfall events that occur within the open pits used for tailings and water management in areas where there is the potential for worker access.

# Monitoring and Inspections

## Hazard Assessment

- The most recent hazard assessment map (August 6, 2021) was reviewed. A summary is shown at right and comments are provided below.
- Many but not all of the hazards identified during the annual inspection have been captured by the hazard assessment. Recommend including the following:
  - Portage Pit A - Rockfall hazard along the east and west walls of the South Ramp, mitigated by the rockfall berm.
  - Vault Pit & Phaser Pit - Rockfall hazard along the ramp and the potential for a wave caused by a failure of the dump, pit slope or the Ring Road adjacent Vault Lake. Inspection required before accessing the ramp.
  - Vault Pit - Subsidence hazards on the Ring Road adjacent Pond C and Pond D.
- The risk ratings assigned to the identified hazards are thought to be generally reasonable. The following comments are provided:
  - Portage Pit A - The settlement of the B Dump represents a risk to personnel on the lower dump platform (5126 m<sup>3</sup>R<sub>L</sub>) as well as on the ramp below. Recommend enlarging the hazard area to fully encompass the lower dump platform.
  - C Dump - As there is a rockfall berm at the toe of the dump and a berm at the crest, and the dump is inactive, the risk is likely Low rather than Moderate under current conditions.
  - It is recognized that many of the historical hazards have been eliminated due to the partial or complete filling of the open pits with water, tailings and/or waste rock. As a result, the number of hazards is reducing over time.



# Monitoring and Inspections

## Instrumentation

- A series of piezometers and thermistors were installed at many of the open pits. These instruments are no longer monitored from a geomechanical perspective.
- The VWP's and thermistors at Pit E are monitored by the Geotechnical Group from an environmental perspective given the deposition of tailings in the open pit.
- The VWP's and thermistors at the Goose Pit are no longer monitored from an environmental perspective as tailings deposition has stopped.  
Recommend reviewing the need to monitor these instruments periodically given the potential for future tailings deposition.
- TDR cables were installed at Pit E and the Goose Pit and an inclinometer was installed at Pit E. These instruments are no longer monitored.
- Wireline extensometers were installed at the crest of Dump D, above the northern ramp into Pit in response to the development of tension cracks on the upper platform of the dump. The Geotechnical Group commit to monitoring the extensometers on a monthly basis, with more frequent readings depending on the observed displacement, as set out in the procedure "Wireline Extensometer Monitoring in Rock Storage Facility". The procedure also defines displacement rate thresholds and the associated responses.
- Monthly readings for the extensometers are available since June, 2021 although both were reset in July. The data are shown above. Extensometer 2 is reporting displacement, though the current rate of <1 mm/day is much less than the 50 mm/day threshold that would trigger a response under the procedure. Monitoring of the extensometers should continue.
- The extensometers provide point measurements of displacement and are limited to Dump D. Settlement and tension cracks have been observed at most of the in-pit dumps. Recommend evaluating the use of the drone survey imagery and photogrammetry to evaluate settlement across all of the dumps on an annual basis. This would provide a more comprehensive solution without the need for an extensive network of instruments.

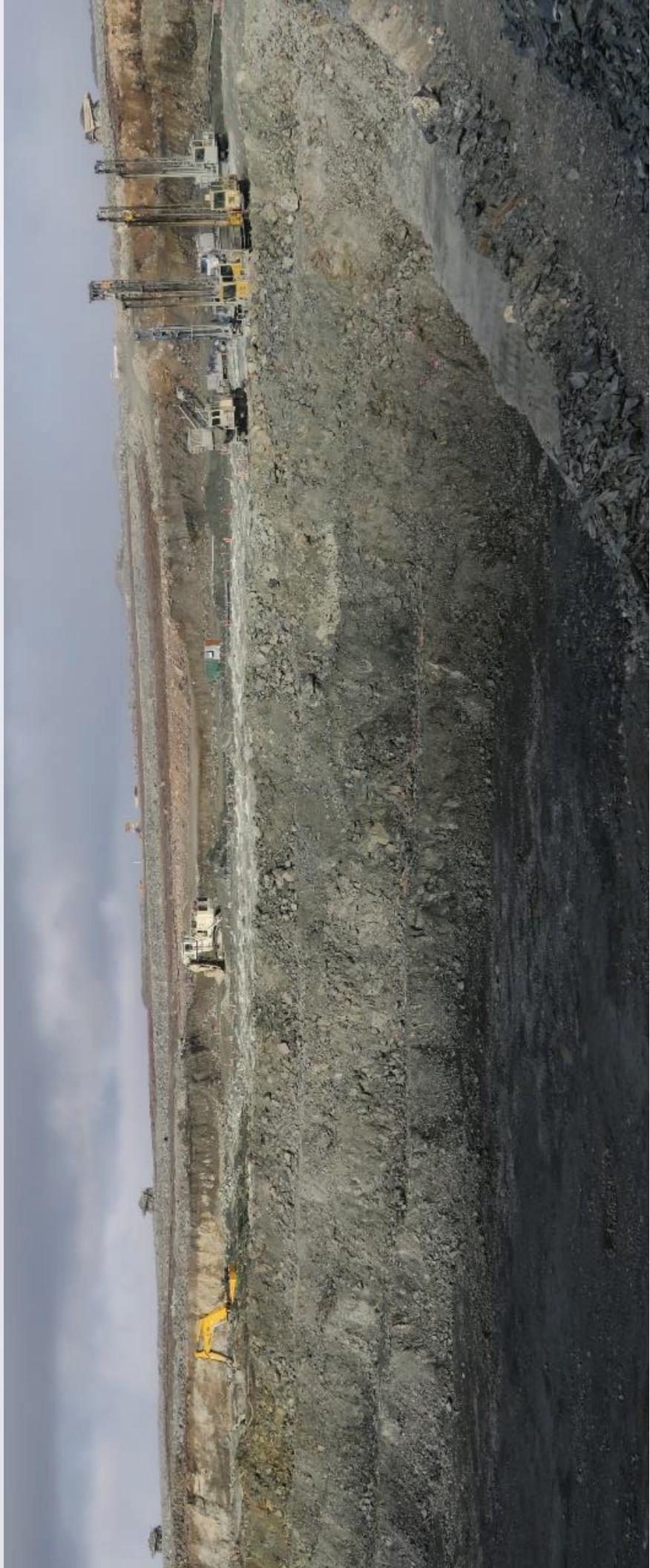


# Monitoring and Inspections

## Ground Control Management Plan (GCMP)

- The GCMP for the Meadowbank Site was last updated in 2018 and does not reflect the current state of operations or ground control activities. The GCMP should be reviewed and updated on an annual basis.
- There is a need to document the inspection and monitoring requirements. In addition, key sources of information on the open pits should be referenced (e.g., a list of reports) so that the information is not lost. This could be included as a section in the GCMP for the Amaruq Site rather than a stand-alone document.

# Recommendations



# Recommendations

## Priorities

The recommendations stemming from the inspection have been grouped into four categories at AEM's request:

- **Priority 1 (P1):** A high priority or structural safety issue considered immediately dangerous to life, health or the environment. Also includes issues with a significant risk of regulatory enforcement.
- **Priority 2 (P2):** An issue that, if not corrected, could plausibly result in a structural safety issue leading to injury, environmental impact or significant regulatory enforcement. Also includes repeated deficiencies that demonstrate a systematic breakdown of procedures.
- **Priority 3 (P3):** Single occurrences of deficiencies or non-conformances that in isolation are unlikely to result in structural safety issues. Also includes recommendations for pro-active measures important to the validation of the open pit slope design.
- **Priority 4 (P4):** Opportunity for improvement, for example to meet industry best practices.

The recommendations contained in this presentation are briefly summarized by category on the following slides.

# Recommendations

## P1 and P2

### Priority 1 (P1):

- None identified

### Priority 2 (P2):

1. Review the topography and bedrock profile below the B Dump and the adjacent Amaruq AWR and assess whether a failure of the dump could impact the road.
2. Construct or re-establish berms to restrict access to the following areas:
  - a) The Pit A East Ramp.
  - b) The upper platform of the B Dump.
  - c) The upper platform of the Vault Pit North Waste Rock Dump.
  - d) The Vault waste rock dump (both access ramps). The existing berms only partially restrict access.
  - e) The southern entrance to the Phaser / BB Phaser Pit Ring Road.
3. Review access requirements for the Vault Pit Ring Road and construct berms to restrict entrance to areas where access is no longer required. In particular, consider berms to prevent access to the areas of subsidence adjacent Pond D and Vault Lake.
4. Fill and grade the area of subsidence on the Vault Pit Ring Road adjacent Pond C or mark the area with pylons.
5. Relocate the ABF Garage and associated infrastructure away from the C Dump and the tailings management areas. Once the garage has been relocated, construct berms to prevent access to the dump platform.

# Recommendations

## P2 (Cont'd)

6. Review and update the Ground Control Management Plan (GCMP) for the Meadowbank Site. The GCMP should be reviewed and updated annually.  
The GCMP could be consolidated with the one for the Amaruq Site. In particular, the following should be completed:
  - a) Specify the inspection and monitoring commitments, including the associated Trigger Action Response Plan (TARP) and who is responsible for the inspections.
  - b) List / reference key sources of information for the Meadowbank open pits, including design reports and previous annual inspections so that the information is not lost.

# Recommendations

## P3

### Priority 3 (P3):

1. Continue the monthly visual inspections of the Goose Pit, Portage Pit A, Portage Pit E, Vault Pit, B Dump, C Dump and D Dump.
2. The monthly visual inspections should consider the presence of seepage below the Amarug AWR Embankment at the Vault Pit as well as the water level in the Phaser Pit.
3. Complete and document a visual inspection of the ramps used to access the pit lakes at the Goose Pit, Portage Pit A, Vault Pit and Phaser Pit either as part of the monthly inspections or prior to access. The pre-access inspections for the Vault Pit should also include the open pit slopes, in-pit waste dumps and Ring Road adjacent Vault Lake. The inspections of the Ring Road could be stopped if the potential for inrush from Vault Lake to the Vault Pit was otherwise mitigated (e.g., by breaching the Ring Road).
4. Implement a formal mechanism to increase the frequency of visual inspections in response to defined criteria.
5. Implement an annual visual inspection of the open pits and in-pit waste rock dumps by the Rock Mechanics Group.
6. Continue to monitor the wireline extensometers at the D Dump.
7. Review the hazard assessment and update it to reflect the hazards identified during the 2021 annual inspection.
8. Record and report (as appropriate) rockfall events that occur within the open pits used for tailings and water management in areas where there is the potential for worker access.

# Recommendations

## P4

### Priority 4 (P4):

1. Implement an annual subsidence assessment of the Goose Pit Waste Rock Dump, B Dump, C Dump, D Dump and Vault Pit Waste Rock Dump using photogrammetry.
2. Grade the upper and lower platforms of the B Dump and fill the sinkholes/depressions in order to prevent water ponding and limit infiltration.
3. Include the Vault Pit North Waste Rock Dump in the monthly visual inspections, focussing on the area of settlement.
4. Review the need to periodically monitor the VWP's and thermistors installed in the east wall of the Goose Pit from an environmental perspective given the potential for future tailings deposition in the open pit.
5. Approach the WSCC about ending the third-party annual inspections of the Phaser and BB Phaser Pits. The exposed rock slopes and associated hazards are limited.

**THANK  
YOU**

