

Diavik Diamond Mines (2012) Inc.
P.O. Box 2498
Suite 300, 5201-50th Avenue
Yellowknife, NT X1A 2P8 Canada
T +1-867-669-6500 F +1-866-313-2754

Mason Mantla, Chair
Wek'èezhìi Land and Water Board
PO Box 32
Wekweètì, NT X0E 1W0, Canada

10 January 2025

Dear Mr. Mantla,

Subject: 2024 Annual Dam Safety Inspection – Processed Kimberlite Mine Workings Facility, A418 Underground Hydrostatic Plugs

Please find attached the Annual Dam Safety Inspection (DSI) Report for 2024. The inspection covers the following facilities referenced in The Diavik Diamond Mines (2012) Inc. Type A Water Licence (W2015L2-0001):

- A418 Mine Workings Bulkheads (Part G, Condition 26d)

The following recommendations from WSP Canada Inc, the A418 Underground Hydrostatic Plugs Engineer of Record (EoR), were made and DDMI actions (Implementation Plan) identified as a result of the inspections. DDMI actions and Implementation Plan can be seen under the 2024 Comments and Recommended Actions heading in Table 2.

Please do not hesitate to contact Nicole Goodman at nicole.goodman@riotinto.com or Kyla Gray (kyla.gray@riotinto.com; 867-445-4922) with any questions or concerns.

Yours sincerely,

**Matthew
Breen**

Digitally signed by
Matthew Breen
Date: 2025.01.10 11:05:45
-07'00'

Matt Breen
Chief Operating Officer

Mufaro Chivasa

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Chivasa
Date: 2025.01.09 13:09:44 -07'00'

Mufaro Chivasa
Manager, DDMI Technical

Cc: Marie-Eve Cyr, WLWB
Anneli Jokela, WLWB
Kassandra DeFrancis, WLWB

Attachments: Report on A418 Underground Hydrostatic Plugs – 2024 Annual Dam Safety Inspection for Diavik Diamond Mines (2012) Inc. by WSP Canada Inc. – January 2025

Table 1: Priority Descriptions

Priority	Description
1	A high probability or actual dam safety issue considered immediately dangerous to life, health or the environment, or a significant risk of regulatory enforcement.
2	If not corrected, could likely result in dam safety issues leading to injury, environmental impact or significant regulatory enforcement; or a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in dam safety issues.
4	Best Management Practice - Further improvements are necessary to meet industry best practices or reduce potential risks.

Table 2: WSP Canada Inc (EOR) 2024 DSI Recommendations and DDMI Implementation Plan

Location	Recommendation Description	Source of Recommendation	Priority Level	Recommended Timeline/Status	2024 Comments and Recommended Actions
A418 Underground Hydrostatic Plugs					
9080 Bulkhead	Strain Gauge #2 has an erratic data output, and the results cannot be relied upon.	2024 DSI	3	Q1 2025	DDMI will reposition the strain gauge on the 9130-level bulkhead, such that the pins of the strain gauge are installed into concrete.
9130 Bulkhead (wet side)	Total Earth Pressure Cell on the 9080 and 9130 Bulkheads have failed due to over pressure on the sensor.	2024 DSI	4	Q1 2025	New TEPC and piezometer was installed from the surface, DDMI will calibrate and continue prioritizing monitoring of the TEPC and piezometer installed into the 9080-level drift.
9130 Bulkhead	Volume of water reporting to the dry side of the bulkhead requires monitoring	2024 DSI	4	Q2 2025	DDMI will install a weir to more accurately measure the flow of water that is reporting at the 9080-level bulkhead.



DIAMOND MINES (2012) INC.

TECHNICAL MEMORANDUM

DATE January 9, 2025

Reference No. CA0035294.6784-2557-TM-Rev0-7000

DIAMOND WORK PLAN No. 763 Rev. 0

DIAMOND PO No. 3106222617

TO Mufaro Chivasa
Diamond Diamond Mines (2012) Inc.

FROM Jessica Kent and Ashley Pakula

EMAIL jessica.kent@wsp.com;
ashley.pakula@wsp.com

A418 UNDERGROUND HYDROSTATIC BULKHEAD SITE INSPECTION – 9130 AND 9080 LEVELS

1.0 INTRODUCTION

Diamond Diamond Mines Inc. (2012) (DDMI) retained WSP Canada Inc. (WSP) to complete a detailed design and construction quality control and quality assurance for the construction of two hydrostatic bulkheads (bulkheads) located in the development between the A418 and A154 underground areas. As part of the ongoing technical support, WSP completes annual bulkhead inspections to assess the performance of the bulkheads during their service life.

The site inspection was completed by WSP's Ashley Pakula P.Eng., identified as the Design Engineer, on October 9, 2024. Ashley was accompanied by Marko Pudar of DDMI.

The observations and discussion in this site visit memorandum are limited to the observations made on the dry side of the bulkheads only, along with a review of available instrumentation data for both wet and dry sides, which measures critical components of the performance of the plug.

2.0 BACKGROUND

2.1 Bulkhead Design

The design for the two bulkheads was provided in the following documents:

- *Bulkhead Design to Support Processed Kimberlite Deposition in A418 to Mine Workings* (WSP Golder 2022a)
- *Quality Management Plan – A418 / A154 Hydrostatic Bulkheads* (WSP Golder 2022b)
- *Hydrostatic Bulkheads Design – Self-Consolidating Concrete (SCC) Mix Design* (WSP Golder 2022c)
- *Monitoring Strategy and Trigger Action Response Plan* (WSP 2023a)

The bulkheads were designed to resist the hydrostatic pressure of the FPK slurry and water anticipated to be deposited into the A418 mine area. The bulkhead designs also accounted for potential seismic loads, chemical attack on the concrete, hydraulic jacking of the rock mass surrounding the bulkheads, and excessive seepage to the downstream side of the bulkheads.

The components of the design included the required bulkhead dimensions, SCC mix design, formwork (formwall) design, standpipe layouts (for contact and consolidation grouting of the rock mass), and instrumentation details.

2.2 Record of Construction

Record documents for the construction of the two bulkheads was provided in the following document:

- *A418 9080 and 9130 Bulkhead Construction Quality Assurance Report (WSP 2023b)*

2.3 On-Site Activities Completed Since October 2023 Inspection

Since the last annual inspection in October 2023, the A418 underground mining had ceased and the dewatering pumps had been turned off. The underground was allowed to flood, and processed kimberlite slurry was pumped into the A418 pit, raising the water level in the pit to the design operating level of approximately 9245 m elevation.

A California pipe was installed at the 9080-level bulkhead to measure the flow of water coming from the bulkhead face and stub drift just to the northeast of the bulkhead.

The 9130 level Strain Gauge #2 was replaced at the end of June 2024 as there were concerns about the reliability of the originally installed gauge.

The total earth pressure cells (TEPCs) that had been installed on the wet side of the bulkheads to measure the potential pressure applied to the plugs from the water and processed kimberlite exceeded the pressure ratings of the installed instruments.

A replacement TEPC with a pressure rating of 3 MPa was installed into the drift behind the 9080-level bulkhead in October 2024 through a borehole drilled from surface.

3.0 SITE VISIT

Photographs are included in Attachment 1. New observations pertaining to the performance of the bulkheads are included below. Initial observations for the construction activities associated with construction of the bulkheads, prior to water pressures building on the plugs, is included in the previous site inspection memorandum (WSP 2023c).

9130-Level Bulkhead Inspection

The following observations were made during the site visit:

- Fresh air is vented into the heading and was turned on at the time of visiting the bulkhead, which may contribute to the drying of areas on the bulkhead face compared to when the ventilation is turned off at the heading.
- There was some dampness, but no standing water, on the cement leveling pad in front of the bulkhead.
- One arm of the Strain Gauge #2 is bolted through a wooden beam in the bulkhead face.
- The area immediately in front of, and approximately 50 m behind, the bulkhead is identified as dry to damp with only minor water ponding and damp spots.
- A small seep was identified on the west rib, between the bulkhead face and the instrumentation box.

- The center of the bulkhead is dry, with minor damp spots observed on the two ribs at the concrete bedrock contact.
- At approximately 50 m from the bulkhead, water is flowing through a discontinuity in the back and left rib (when looking towards the bulkhead). Flow from the discontinuity was not measured at the time of the site visit, but was visually estimated to be less than 25 L/min.

9080-Level Bulkhead Inspection

The following observations were made during the site visit:

- Fresh air was being vented into the drive and directed at the bulkhead at the time of the site visit.
- Precipitate observed in bulkhead face and back of drift directly in front of bulkhead.
- The California pipe installed approximately 30 to 40 m from the bulkhead also captures and measures the water flow from the stub drift on the north side of the drive. Observations during the site visit suggest that the majority of the water being measured at the California Pipe is coming from the stub drift and not the bulkhead face.
- Water is flowing from the back and ribs within the stub drift.
- There is water dripping from the back of the 9080-level drift at a location approximately 10 m from the bulkhead face.
- Water reporting from the bulkhead is coming from the contact between the bulkhead and rock wall. Little to no water is coming through the bulkhead.

Office Meetings

A meeting was held with the underground technical team on site to review the observations made during the site visit.

The following discussions were covered:

- Requested that the Strain Gauge #2 on the 9130-level bulkhead be relocated into concrete.
- Discussed the location of the California Pipe and addressed the observation that the water measured by the pipe is an accumulation of water from both the bulkhead and the stub drift to the side. It is understood by WSP that a design for a weir has been received by DDML in September 2024 and is currently under review. The weir will be constructed once the final design report is received by DDML.
- The replacement TEPC and vibrating wire piezometer was installed into the 9080 level and the data logger and instruments were in the process of being calibrated (WSP 2024).
- It is understood that the performance of this TEPC will be monitored before determining if the application is suitable for the intended purpose ahead of installing a TEPC into the drift on the 9130 level.

4.0 BULKHEAD MONITORING

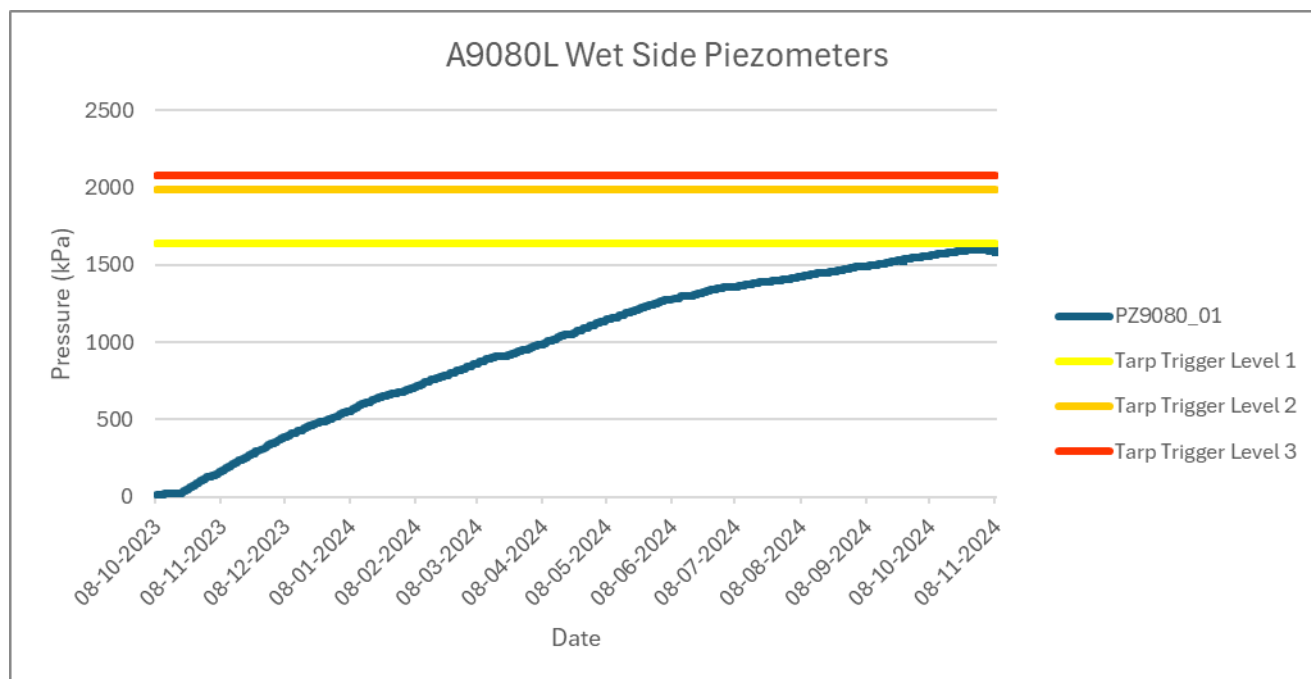
4.1 9080-Level Bulkhead

Wet Side Piezometer

The 9080-level piezometer (PZ9080_01) was placed on the wet side of the concrete bulkhead prior to construction, and the location surveyed to determine the elevation of the sensor.

The pressure acting on the piezometer, and therefore the 9080-level bulkhead, has gradually increased during the monitoring period to reach a maximum pressure of approximately 1598.7 kilopascals (kPa), which is below the Trigger Action Response Plan (TARP) Level 1 of 1642 kPa. The A418 PKMW hydrostatic bulkhead TARP is provided Attachment 2.

Figure 1 shows the increase in applied pressure at the 9080-level piezometer.



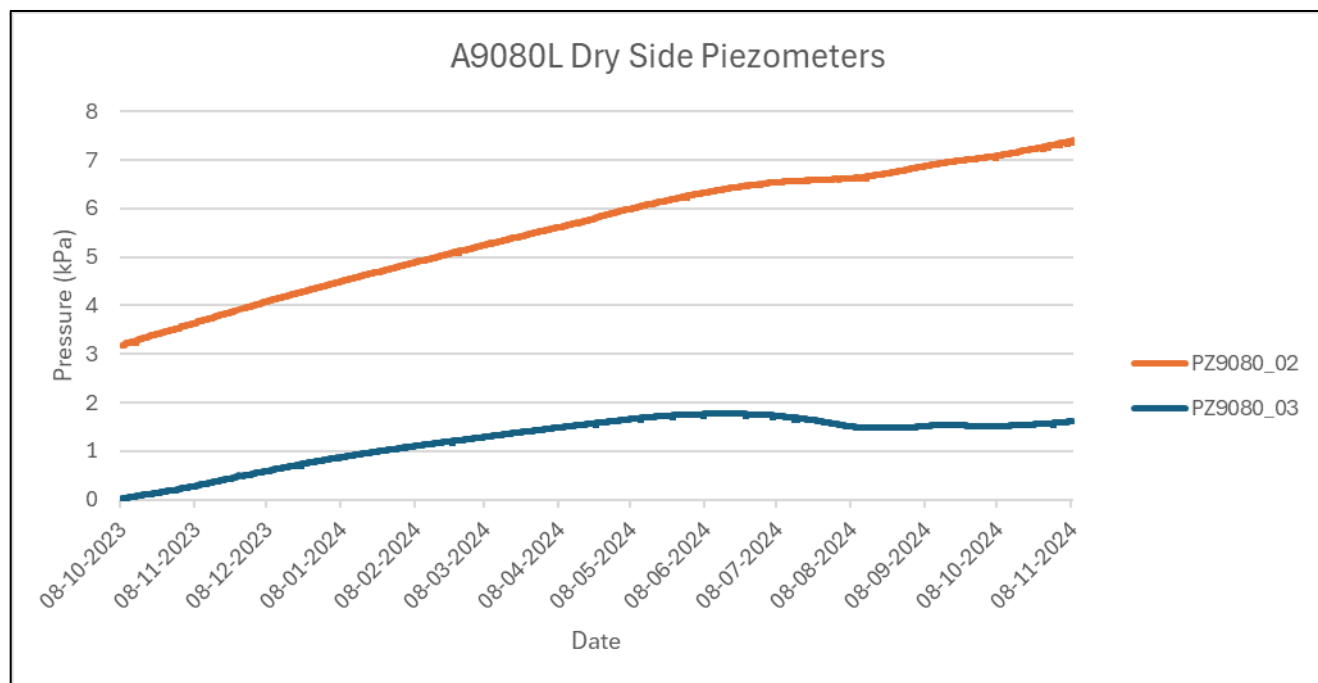
L = level; kPa = kilopascal.

Figure 1: 9080-Level Wet Side Piezometer

Dry Side Piezometers

The two piezometers (PZ9080_02 and PZ9080_03) installed into the ribs of the 9080 level between the rock and bulkhead are used to measure the pressure gradient across the plug (Figure 2).

Pressures recorded by these piezometers have remained low, reaching a maximum pressure of less than 8 kPa, which indicates the consolidation and contact grouting performed during construction has sufficiently reduced the permeability of the bedrock immediately surrounding the bulkhead.

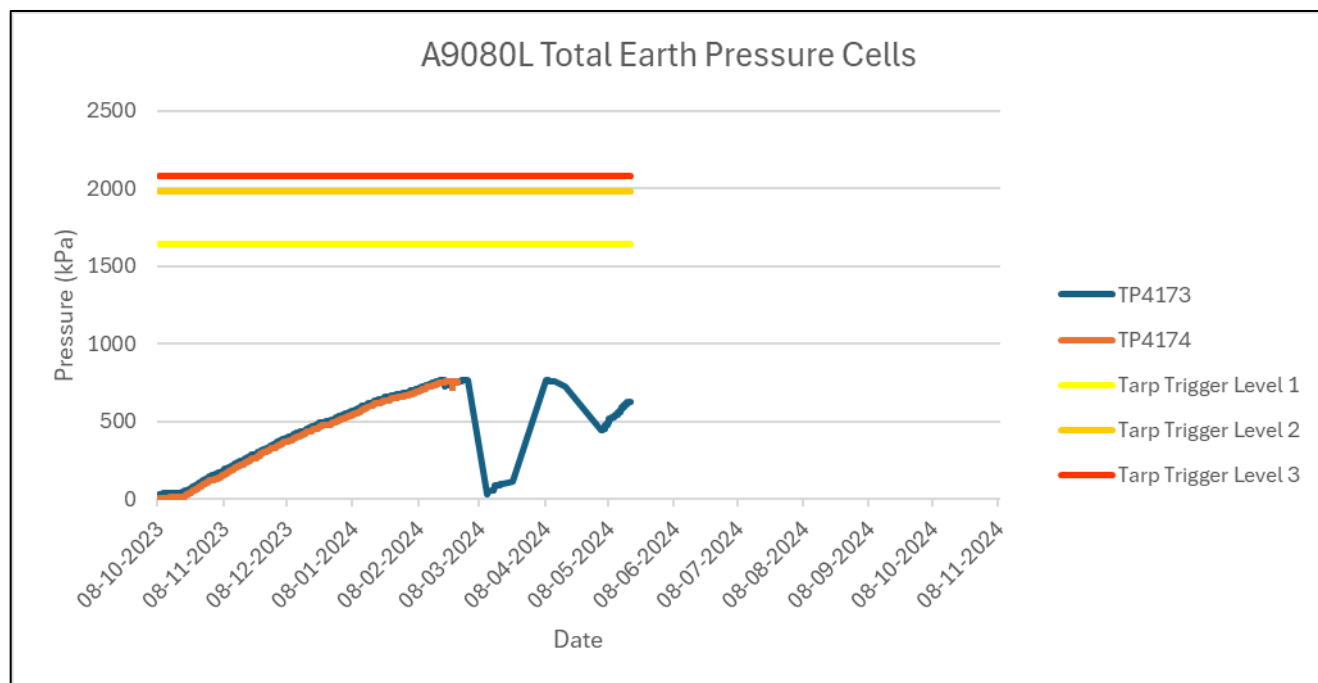


L = level; kPa = kilopascal.

Figure 2: 9080-Level Dry Piezometers

Total Earth Pressure Cells

Two TEPCs (PC9080-01 and PC9080-02) were installed on the bulkhead to measure the total pressure applied to the bulkhead from the water and FPK slurry (Figure 3). PC9080-01 stopped reading on February 25, 2024, while PC9080-02 stopped reading on March 2, 2024, due to pressures exceeding the capacity of the sensor. The loss of these pressure cells means the pressure applied to the bulkheads from the FPK slurry cannot be measured. The maximum pressure recorded was 758.1 kPa and 764.8 kPa on PC9080-01 and PC9080-02, respectively.

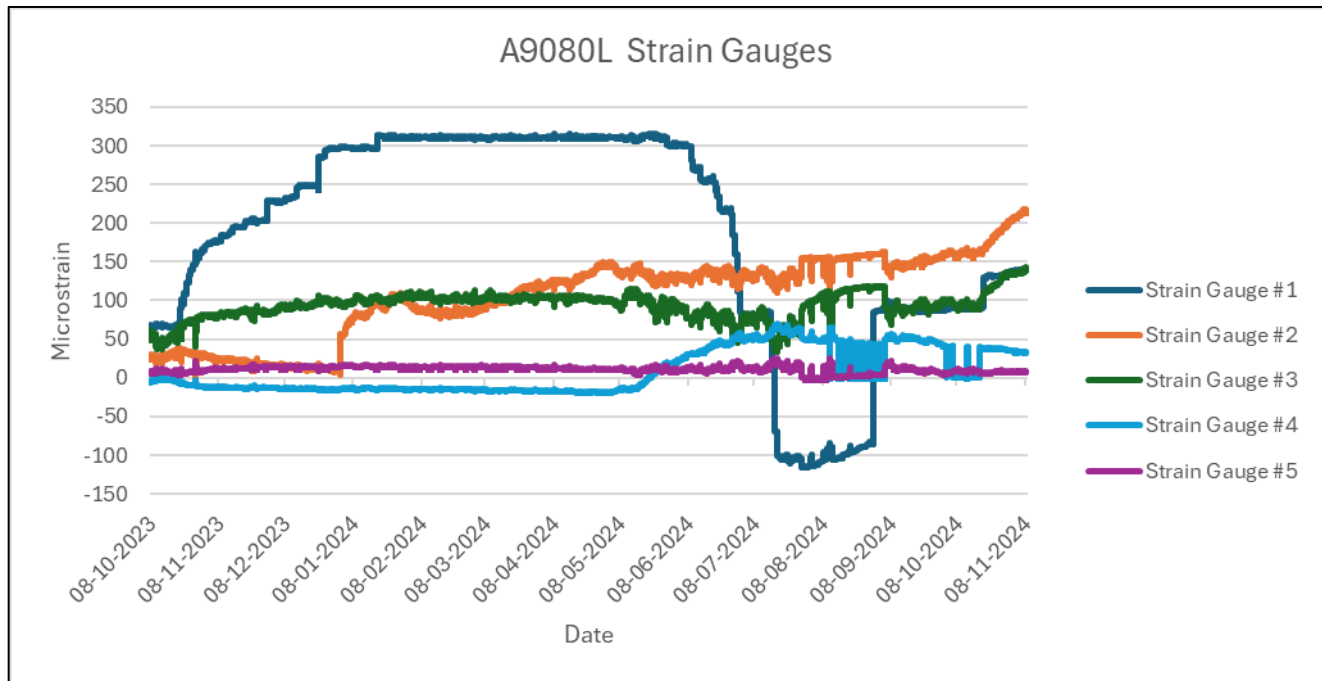


L = level; kPa = kilopascal.

Figure 3: 9080-Level Total Earth Pressure Cells

Strain Gauge

Five strain gauges, installed into the ribs and bulkhead, are used to monitor flexural stability and shearing of the bulkhead. During the reporting period, the strain gauges have experienced minimal strain (maximum micro strain of 316 $\mu\epsilon$), significantly below the Level 2 TARP of 3,000 $\mu\epsilon$ (Figure 4 and Attachment 2). There is no Level 1 trigger for the strain gauges.



L = level.

Figure 4: 9080-Level Strain Gauges

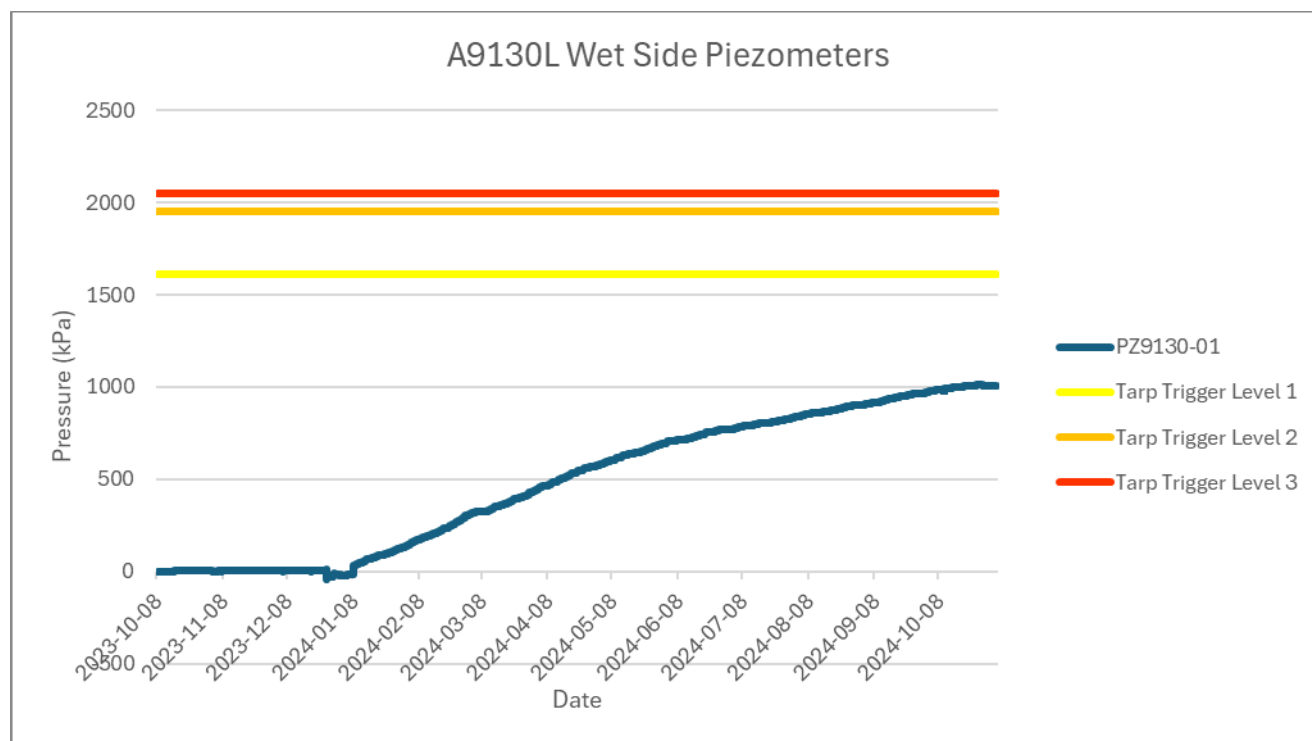
4.2 9130-Level Bulkhead

Wet Side Piezometers

The 9130-level piezometer (PZ9130_01) was placed on the wet side of the concrete bulkhead prior to construction, and the location surveyed to determine the elevation of the sensor.

The pressure acting on the piezometer, and therefore the 9130-level bulkhead, has gradually increased during the monitoring period to reach a maximum pressure of approximately 1010.7 kPa, which is below the TARP Level 1 of 1609 kPa (Attachment 2).

Figure 5 shows the increase in applied pressure at the 9130-level piezometer.



L = level; kPa = kilopascal.

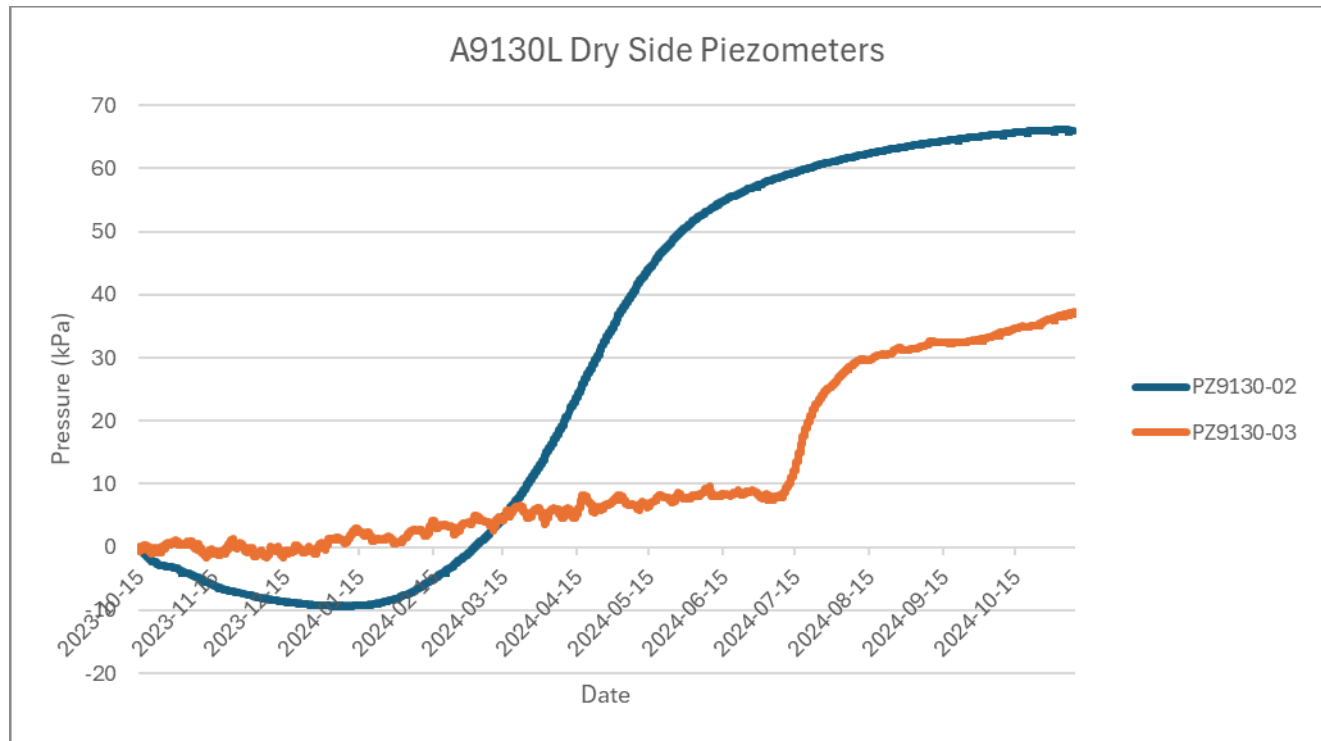
Figure 5: 9130-Level Wet Side Piezometer

Dry Side Piezometers

The two piezometers (PZ9130_02 and PZ9130_03) installed in the ribs of the 9130 level between the rock and bulkhead are used to measure the pressure gradient across the plug (Figure 6).

A maximum pressure of less than 70 kPa for the reporting period was observed, which indicates the consolidation and contact grouting performed during construction has sufficiently reduced the permeability of the bedrock immediately surrounding the bulkhead.

Although the pressure shown in these piezometers is higher than from the 9080 level, pressures are still relatively low in comparison to the pressure acting on the bulkhead.

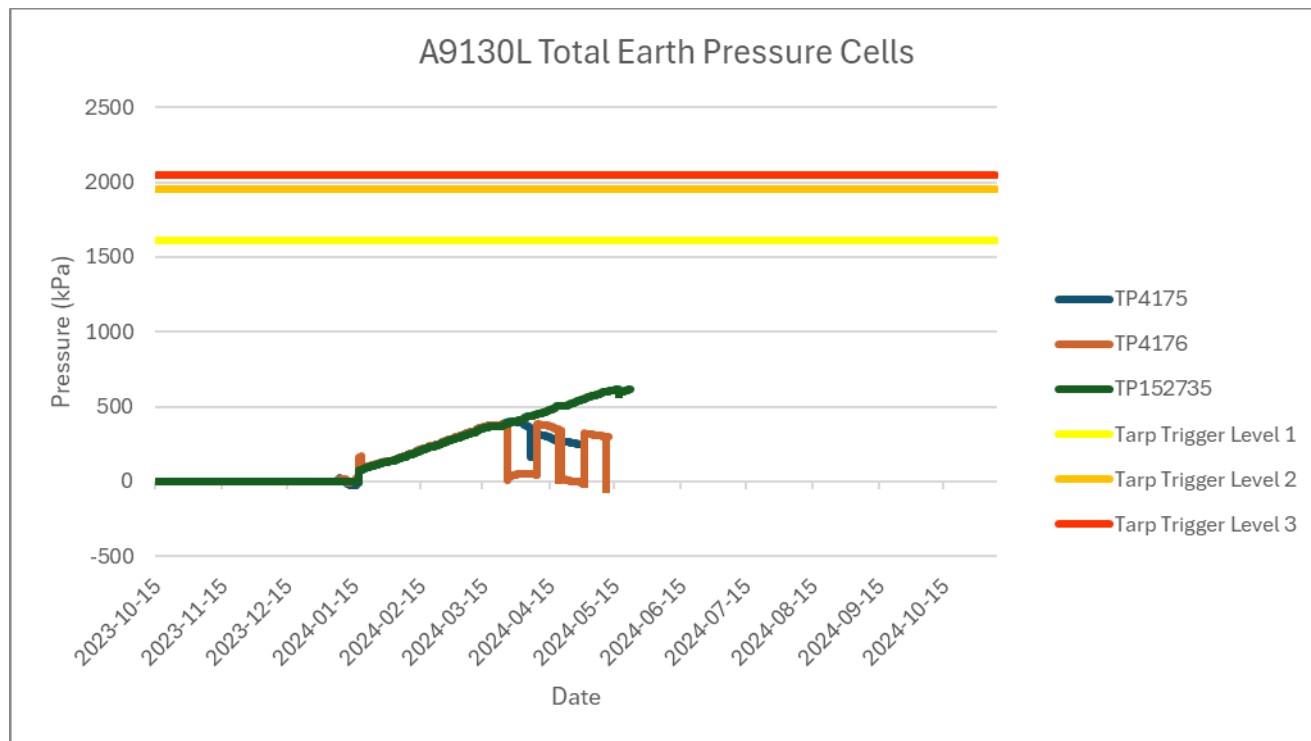


L = level; kPa = kilopascal.

Figure 6: 9130-Level Dry Side Piezometer

Total Earth Pressure Cells

Three TEPCs (TP4175, TP4176, and TP152735) were installed on the bulkhead to measure the total pressure applied to the bulkhead from the water and FPK slurry (Figure 7). TP4175 stopped reading on March 28, 2024, TP4176 stopped on March 25, 2024, while TP152735 stopped reading on May 21, 2024 due to pressures exceeding the capacity of the sensor. The loss of these pressure cells means the pressure applied to the bulkheads from the PK slurry cannot be measured. The maximum pressure recorded was 397.9 kPa, 384.2 kPa, and 617.8 kPa for TP4175, TP4176, and TP152735, respectively.



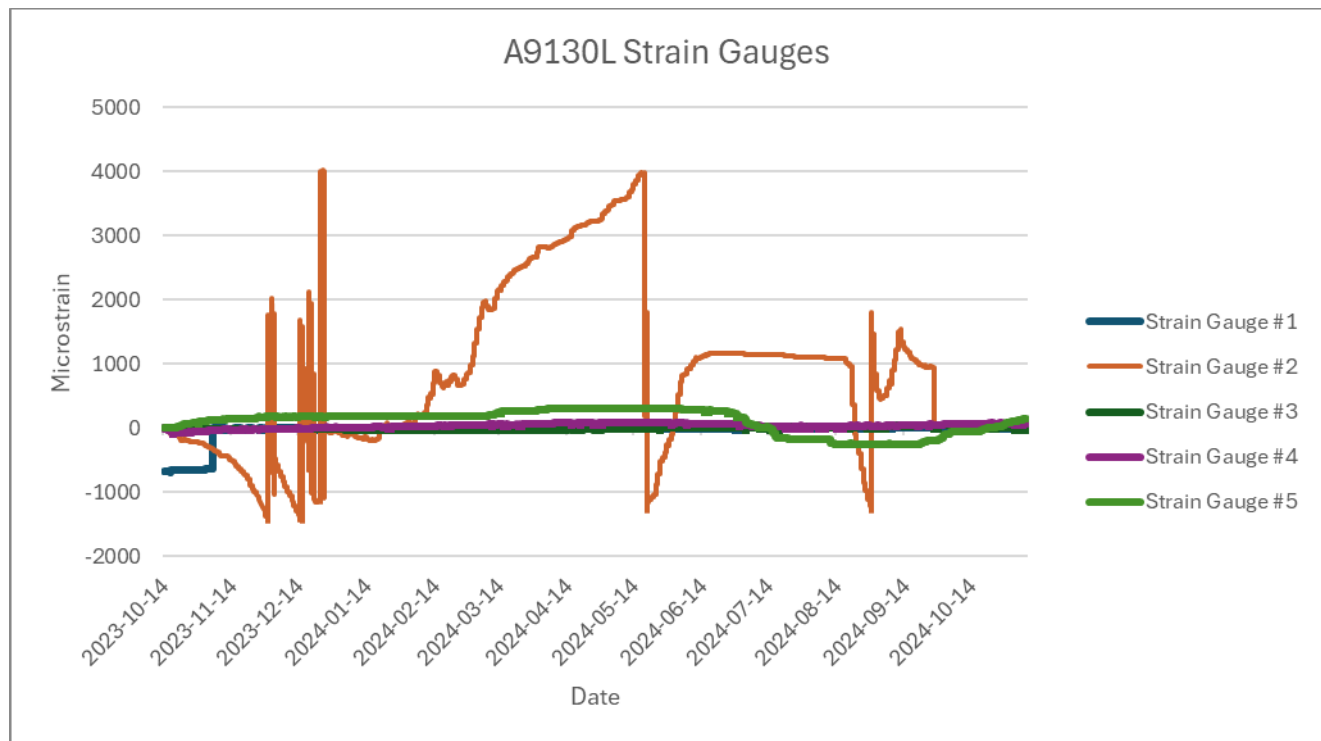
L = level; kPa = kilopascal.

Figure 7: 9130-Level Total Earth Pressure Cells

Strain Gauge

Five strain gauges, installed into the ribs and bulkhead, are used to monitor flexural stability and shearing of the bulkhead. Strain Gauge #2 has historically provided unreliable readings, with strain reaching and exceeding the Level 2 value of 3,000 $\mu\epsilon$ before dropping sharply (Figure 8). Due to reliability concerns for this instrument, DDML replaced the gauge in February 2024; however, the new instrument has continued to record erroneous results.

Apart from Strain Gauge #2, the other four strain gauges have experience minimal strain (maximum micro strain of 590 $\mu\epsilon$), significantly below the Level 2 TARP of 3,000 $\mu\epsilon$ (Figure 8 and Attachment 2). Note that there is no Level 1 trigger for strain gauges.



L = level.

Figure 8: 9130-Level Strain Gauges

4.3 Monitoring Results

The maximum pressure shown on the 9080 and 9130 levels wet side piezometers was 1598.7 kPa and 1010.7 kPa respectively, which occurred on October 31, 2024. These pressures correspond to a water elevation in the A418 pit and underground of approximately 9244.9 m and 9243.5 m, which is approximately equal to the design operating level of 9245 m (DDMI 2023). The project has recorded the surveyed water level from surface at 9243.4 m. The comparative elevation of the water level as it relates to the pressures acting on the bulkhead are considered sufficient for the purposes of monitoring the performance of the bulkhead.

The dry side piezometers at both the 9080 and 9130 levels have shown consistently low pore pressures compared to the applied pressure on the bulkheads. The low-pressure readings compared to the pressure acting on the bulkheads suggest consolidation and contact grouting has sufficiently closed water pathways between the wet and dry sides of the bulkhead. This is further demonstrated by the minimal volume of water observed on the dry side during the year.

The five TEPCs have all stopped reading pressures due to the applied pressure exceeding the capacity of the installed instruments, and the applied load to the bulkheads from the FPK Slurry cannot be monitored. DDMI initiated the replacement of these TEPCs with higher pressure range TEPCs, completing the installation of a replacement TEPC and piezometer, into the 9080-level drift at the beginning of October 2024. Monitoring data for these instruments are being collected routinely and will be reported in the 2025 annual inspection report.

The strain gauges have generally shown minimal microstrain as a result of flexural or punching movement of the bulkhead. The exception is that Strain Gauge #2 on the 9130-level bulkhead has had erratic readings since it was installed. After replacing the instrument, data continued to show erroneous readings. During the site inspection, it was identified that one side of the strain gauge was installed into a piece of timber, which had remained after construction of the bulkheads.

5.0 DISCUSSION AND RECOMMENDATIONS

The two hydrostatic bulkheads on the 9080 and 9130 levels are performing as intended. Since installation, the seepage through each bulkhead has been minimal, with the majority of the face of the bulkheads being dry to damp. An increase in flowing water has been observed at areas downstream of the bulkhead faces, primarily limited to the stub drift at the 9080 level, and approximately 50 m downstream of the 9130 level. This water increase is to continue to be monitored and reported within the weekly monitoring reports, as is currently done.

As the water level within the pit has now reached an operating level of 9245 m, the recommended frequency of data acquisition and inspection can be amended (WSP 2023a). The updated frequency is documented in Table 1.

Table 1: Instrumentation Monitoring Frequency – Phase 2

Stage	Monitoring Type	Data Acquisition or Inspection Frequency	Data Collection and Review Frequency	Data Reporting Frequency
Post FPK Placement ^(a)	Vibrating Wire Piezometer	20-minute intervals, or reduced according to performance	Weekly	Weekly
	Pressure Cell	20-minute intervals, or reduced according to performance	Weekly	Weekly
	Strain Gauge	20-minute intervals, or reduced according to performance	Weekly	Weekly
	Infrared Camera	Continuous	Weekly	Weekly
	Visual Inspection	Bi-weekly	Bi-Weekly	Bi-Weekly

(a) Post-FPK Placement is intended to correlate to the maximum elevation of the water level in the A418 pit. Continued placement of FPK slurry, while maintaining the water level is permitted with this monitoring frequency.

FPK = fine processed kimberlite.

Following the annual site inspection and meetings, WSP has the following recommendations (Table 2). Table 3 provides descriptions of the priority ratings assigned to each observed issue and recommendation.

Table 2: Recommendations from the 2024 Underground Bulkhead Inspection

ID	Location	Identified Issue	Recommendation	Priority	Recommended Timing for Action
A418-2024-01	9130 Bulkhead	Volume of water reporting to the dry side of the bulkhead requires monitoring	The California pipe should be replaced with the weir as soon as possible to more accurately measure the flow of water that is reporting at the 9080-level bulkhead.	4	Q2 2025

Table 2: Recommendations from the 2024 Underground Bulkhead Inspection

ID	Location	Identified Issue	Recommendation	Priority	Recommended Timing for Action
A418-2024-02	9080 Bulkhead	Strain Gauge #2 has an erratic data output and the results cannot be relied upon.	The Strain Gauge #2 on the 9130-level bulkhead is to be repositioned such that the pins of the strain gauge are installed into concrete.	3	Q1 2025
A418-2024-03	9130 Bulkhead (wet side)	Total Earth Pressure Cell on the 9080 and 9130 Bulkheads have failed due to over pressure on the sensor.	Calibration and monitoring of the new TEPC and piezometer, installed into the 9080-level drift, should continue to be prioritized.	4	Q1 2025

TEPC = total earth pressure cell.

Table 3: Priority Descriptions

Priority	Description
1	A high probability or actual safety issue considered immediately dangerous to life or safety of personnel.
2	If not corrected, could likely result in safety issues leading to injury or death; could significantly interrupt mining operations; or a repetitive deficiency that demonstrates a systematic breakdown of procedures.
3	Single occurrences of deficiencies or non-conformances that alone would not be expected to result in safety issues.
4	Best Management Practice – Further improvements are necessary to meet industry best practices or reduce potential risks.

The reader is referred to the Study Limitations section, which follows the text and forms an integral part of this memorandum.

WSP Canada Inc.



Jessica Kent
Mine Stability

Ashley Pakula, P.Eng.
Senior Principal, Mining Geotechnical Engineer

JK/AP/ca/anr

Attachments: Attachment 1: Select Photographs from Site Visit
Attachment 2: A418 PKMW Hydrostatic Bulkhead TARP

[https://wsponlinecan.sharepoint.com/sites/ca-2024ca136784/shared documents/06. deliverables/02. issued/2557-tm-rev0-7000-a418 ug hydrostatic bulkhead site visit/ca0035294.6784-2557-tm-rev0-7000-site visit memo 09jan_25.docx](https://wsponlinecan.sharepoint.com/sites/ca-2024ca136784/shared%20documents/06.%20deliverables/02.%20issued/2557-tm-rev0-7000-a418%20ug%20hydrostatic%20bulkhead%20site%20visit/ca0035294.6784-2557-tm-rev0-7000-site%20visit%20memo%2009jan_25.docx)

Disclaimer

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REFERENCES

- DDMI (Diavik Diamond Mines Inc.). 2023. A418 Hydrostatic Bulkhead Monitoring Trigger Action Response Plan. Document # THSR-205-0823 R0. Dated August 2023
- WSP (WSP Canada Inc.). 2023a. Monitoring Strategy and Trigger Action Response Plan. Prepared for DDMI. Reference No. 20140860- 2399-R-Rev0-2300. Dated March 2, 2023.
- WSP. 2023b. A418 9080 and 9130 Bulkhead Construction Quality Assurance Report. Prepared for DDMI. Reference No. 20140860-2494-R-Rev0-2200. Dated September 25, 2023.
- WSP. 2023c. A418 Underground Hydrostatic Plugs Site Visit - 9080 and 9130 Level. Prepared for DDMI. Reference No. 20140860-2515-TM-Rev0-2000. Dated December 7, 2023.
- WSP. 2024. A418 PKMW Plug Pressure Cell Replacement Design Memo. Prepared for DDMI. Reference No. CA0035294.6784-2545-TM-Rev1-6000. Dated October 18, 2024.
- WSP Golder (Golder Associates Ltd., a member of WSP Canada Inc.). 2022a. Bulkhead Design to Support Processed Kimberlite Deposition in A418 to Mine Workings. Prepared for Diavik Diamond Mines (2012) Inc. (DDMI). Reference No. 20140860-1986-R-Rev4-2000. Dated September 7, 2022.
- WSP Golder. 2022b. Quality Management Plan – A418/A154 Hydrostatic Bulkheads. Prepared for Diavik DDMI. Reference No. 20140860-2376-R-Rev2-2100. Dated December 16, 2022.
- WSP Golder. 2022c. Hydrostatic Bulkheads Design – Self-Consolidating Concrete (SCC) Mix Design. Prepared for DDMI. Reference No. 20140860-2386-R-RevB-2000. Dated December 23, 2022.

STUDY LIMITATIONS

WSP Canada Inc. (WSP) has prepared this document in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this document. No warranty, express or implied, is made.

This document, including all text, data, tables, plans, figures, drawings, and other documents contained herein, has been prepared by WSP for the sole benefit of Diavik Diamond Mines (2012) Inc. It represents WSP's professional judgement based on the knowledge and information available at the time of completion. WSP is not responsible for any unauthorized use or modification of this document. All third parties relying on this document do so at their own risk.

The factual data, interpretations, suggestions, recommendations, and opinions expressed in this document pertain to the specific project, site conditions, design objective, development and purpose described to WSP by Diavik Diamond Mines (2012) Inc. and are not applicable to any other project or site location. In order to properly understand the factual data, interpretations, suggestions, recommendations and opinions expressed in this document, reference must be made to the entire document.

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ATTACHMENT 1

Select Photographs from Site Visit



Photo 1: A418 Pit Lake at operating level.



Photo 2: Ponding water at the 9080 Bulkhead



Photo 3: California Pipe used to measure Flow Rate at 9080 Bulkhead.

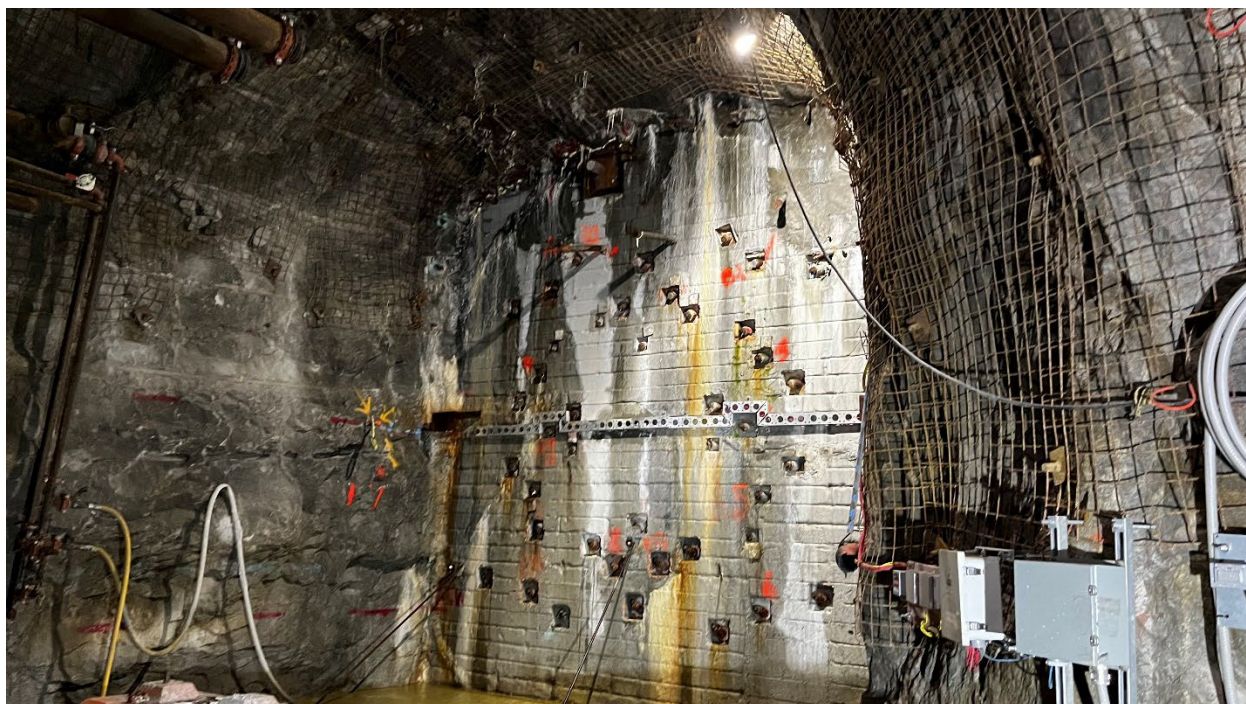


Photo 4: Damp conditions on face of 9080 Bulkhead. Some precipitate observed at Top Centre of Bulkhead.



Photo 5: Precipitate on Face of 9080 Bulkhead (left). Close up of precipitate originating from fracture in bulkhead face (right).



Photo 6: 9130 Bulkhead – Note the face is primarily dry with only small damp areas.

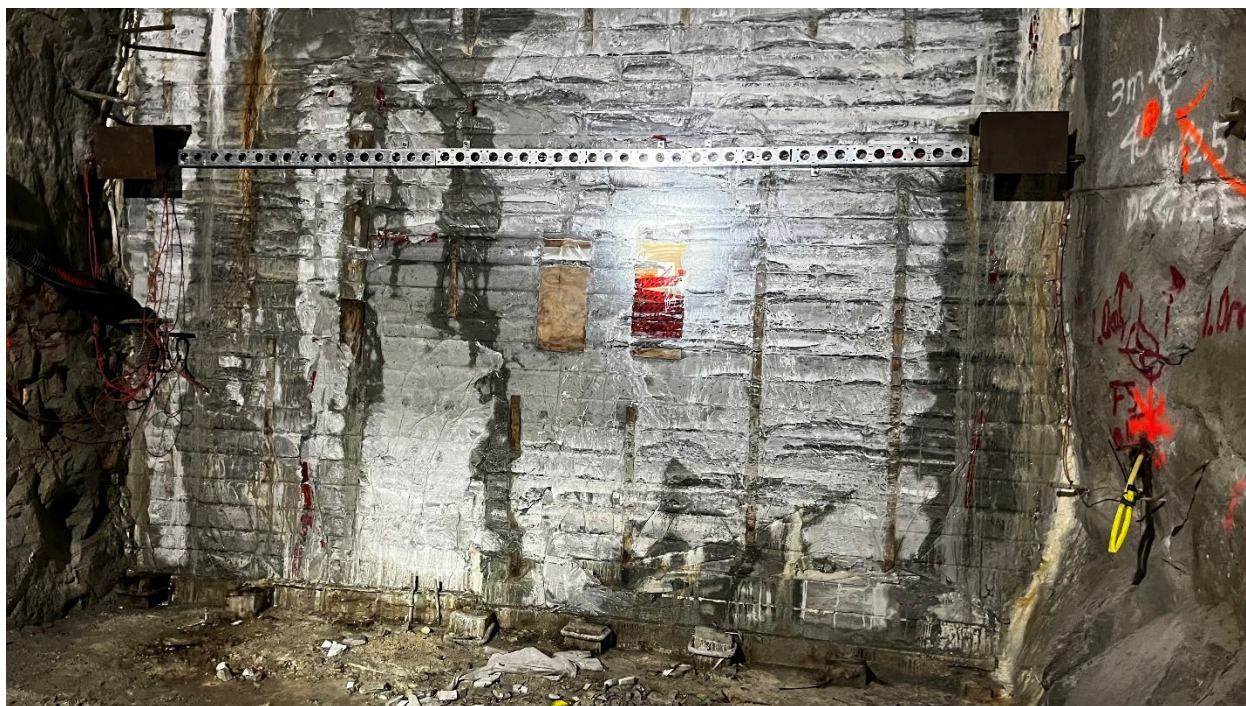


Photo 7: Lower half of 9130 Bulkhead. Note face is primarily dry with only small damp areas.



Photo 8: Source of water at location approximately 50 m from 9130 Bulkhead.

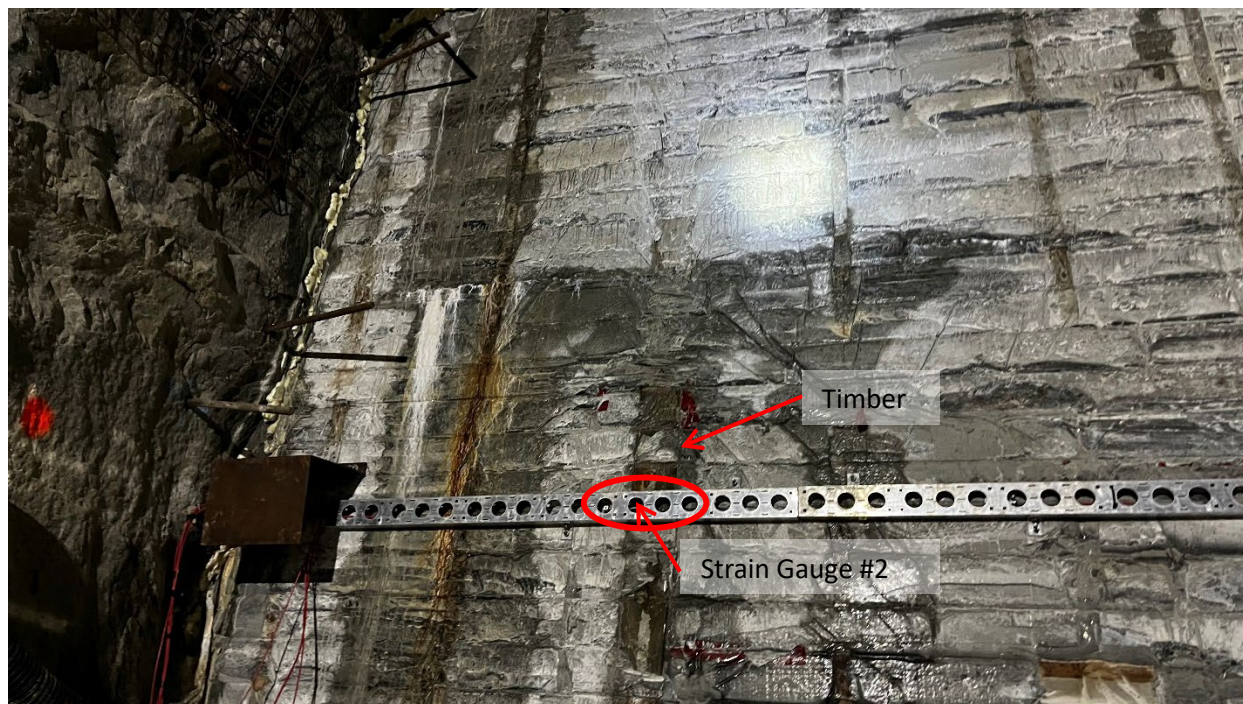


Photo 9: Strain Gauge #2 can be seen behind cable tray, at centre of photo. Right side is installed into timber.



Photo 10: Borehole collar with installed Total Earth Pressure Cell and Piezometer into the 9080 Level Drift.

ATTACHMENT 2

**A418 PKMW Hydrostatic Bulkhead
TARP**

HYDROSTATIC BULKHEAD MONITORING TARP					
Scope		Two hydrostatic bulkheads have been constructed as part of the Life-of-Mine (LOM) plan to isolate portions of the A154 underground area from the closed A418 area. These bulkheads will retain water and fine processed kimberlite (FPK) slurry deposited within the remaining crater and underground workings of the A418.			
ESCALATION TRIGGER LEVELS					
Level		NORMAL	LEVEL 1	LEVEL 2	LEVEL 3
Description and Affected Area		Normal Conditions	Elevated tracking of changes impacting A154 underground. The measured value exceeds the expected value for a water level at 9245 EI.	The measured value exceeds the expected value for a water level at 9280 EI.	A significant event requiring the evacuation of the A154 pit and underground, A418, and water retention dikes. The measured value exceeds the expected value for a water level at 9290 EI.
TRIGGER	1. Strain Gauge	No acceleration in readings or no changes that exceed the typical correlation with the rate of filling for 3 measurements during a period of 1 hour.	N/A	An accelerating rate of change observed that exceeds the typical correlation with the rate of filling for 3 measurements during a period of 1 hour, with cumulative strain at any individual gauge not exceeding 3000 microstrain.	Cumulative strain measurement exceeds 3000 microstrain capacity at any individual gauge.
	2. Piezometer	Total pressure: < 1642 kPa at 9080L < 1609 kPa at 9130L	Total pressure: > 1642 kPa at 9080L > 1609 kPa at 9130L	Total pressure: > 1985 kPa at 9080L > 1953 kPa at 9130L	Total pressure: > 2083 kPa at 9080L > 2050 kPa at 9130L
	3. Total Earth Pressure Cell	Total pressure: < 1642 kPa at 9080L < 1609 kPa at 9130L	Total pressure: > 1642 kPa at 9080L > 1609 kPa at 9130L	Total pressure: > 1985 kPa at 9080L > 1952 kPa at 9130L	Total pressure: > 2083 kPa at 9080L > 2050 kPa at 9130L
	4. Visual Inspection	No visual change in bulkhead conditions. No seepage around the bulkhead.	New localized flaking/feathering of concrete or rock at bulkhead contact. Increasing seepage rates.	New localized flaking/feathering of concrete or rock at bulkhead contact or increasing seepage rates. <ul style="list-style-type: none">To be initiated in conjunction with GRT	Visual and/or infrared camera inspection indicates continuous flaking/feathering of concrete or rock at bulkhead contact. Seepage rates more than 120 LPM.
ACTIONS	UG Geotechnical Engineer	Follow normal bulkhead monitoring procedure.	Review and manage monitoring data (piezometers, strain gauges, and total earth pressure cells) at regular intervals. Regularly inform affected parties (Underground Operations supervision, Diavik Technical supervision) and determine reaction if movement escalates. Inform GRT of level change.	Review and manage monitoring data (piezometers, strain gauges and total earth pressure cells) at regular intervals. Regularly inform affected parties (Underground Operations supervision, Diavik Technical supervision) and determine reaction if movement escalates. Inform Security Control to Initiate Geotechnical Response Team (GRT)	Inform Security Control of L3 Event in the affected area(s). Inform Security Control to Initiate Geotechnical Response Team (GRT)
	Mine Hydrogeologist	No action required	Review and manage monitoring data (both surface and underground Piezometers) at regular intervals. Regularly inform affected parties (UG Geotechnical Engineers) and determine reaction if movement escalates.	Review and manage monitoring data at regular intervals. Regularly inform affected parties and determine reaction if movement escalates.	Inform Security Control of L3 Event in affected area(s).
ACTIONS	Geotechnical Response Team	N/A	N/A	Review data provided by Geotechnical Engineers and Hydrogeologist. Determine path forward and allowed work. Notify BRT that the bulkhead is approaching design parameters. Notify facility engineer-of-record (EOR's) and Design Engineer (DE) that the bulkhead is approaching design parameters (15 m of free board remaining)	Review data provided by Geotechnical Engineer. Initiate evacuation of personnel from A154 Underground and A154 and A418 Pits. Determine path forward and allowed work. Notify BRT of the evacuation order. Notify facility engineer-of-record (EOR's) and Design Engineer (DE) that the bulkhead is approaching design parameters. (5 m of free board remaining)

HYDROSTATIC BULKHEAD MONITORING TARP					
Scope		Two hydrostatic bulkheads have been constructed as part of the Life-of-Mine (LOM) plan to isolate portions of the A154 underground area from the closed A418 area. These bulkheads will retain water and fine processed kimberlite (FPK) slurry deposited within the remaining crater and underground workings of the A418.			
ESCALATION TRIGGER LEVELS					
Level		NORMAL	LEVEL 1	LEVEL 2	LEVEL 3
	Security Control	N/A	N/A	Initiate GRT paging alert.	Broadcast geotechnical alert on site-wide Emergency Channel. Continue broadcast every 15 minutes until told to stop by GRT. Initiate GRT paging alert. Initiate BRT paging alert.
	Underground Dispatch	No action required	No action required	No action required	Page PED system with 'Message 3, Return to surface' and drop 'Winter Green' into main ventilation system
	Affected Open Pit and UG Personnel	No action required	No action required	No action required	All A154 and A418 open pit and all UG personnel to return to surface areas immediately.
	Business Resilience Team	No action required	No action required	Review information (data and any remediation plan) provided by Geotechnical Response Team	Review information (data and any remediation plan) provided by Geotechnical Response Team Facilitate evacuation

HYDROSTATIC BULKHEAD MONITORING TARP					
Scope		Two hydrostatic bulkheads have been constructed as part of the Life-of-Mine (LOM) plan to isolate portions of the A154 underground area from the closed A418 area. These bulkheads will retain water and fine processed kimberlite (FPK) slurry deposited within the remaining crater and underground workings of the A418.			
DE-ESCALATION TRIGGER LEVELS					
Level		NORMAL	LEVEL 1	LEVEL 2	LEVEL 3
Description and Affected Area			Elevated tracking of changes impacting A154 underground. The measured value exceeds the expected value for a water level at 9245 EI.	The measured value exceeds the expected value for a water level at 9280 EI.	Dike breach, bulkhead breach, or full open pit and underground
TRIGGER	1. Strain Gauge	N/A	N/A	Adverse trends have ceased. The deceleration trend must be visible	Values have reduced below the threshold and have remained below the threshold for a minimum of 6 hours.
	2. Piezometer	N/A	Adverse trends have ceased, rate of change is no longer exceeding the linear trend curve.	Total pressure values have dropped below thresholds: > 1985 kPa at 9080L > 1953 kPa at 9130L	Values have reduced below thresholds and have remained below threshold for a minimum of 6 hours. Thresholds are: > 2083 kPa at 9080L > 2050 kPa at 9130L
	3. Total Earth Pressure Cell	N/A	Adverse trends have ceased, rate of change is no longer exceeding the linear trend curve.	Total pressure values have dropped below thresholds: > 1985 kPa at 9080L > 1952 kPa at 9130L	Values have reduced below thresholds and have remained below threshold for a minimum of 6 hours. Thresholds are: > 2083 kPa at 9080L > 2050 kPa at 9130L
	4. Visual Inspection	N/A	N/A	Dam Safety inspection to be conducted by Design Engineer (DE)	Dam Safety inspection to be conducted by Design Engineer (DE)
ACTIONS	UG Geotechnical Engineer	N/A	Confirm that adverse trends have ceased. Complete the actions checklist.	Confirm that adverse trends have ceased. Complete the actions checklist.	Provide data and analysis to GRT. Complete Actions Checklist.
	Security Control	N/A	No action required	No action required	Call stand-down of Geotechnical Alert based on input from GRT.
	Geotechnical Response Team	N/A	No action required	Review relevant information. Stand down Level 2 alarm.	Reduction of a Level 3 Geotechnical Event will require a Hydrostatic Bulkhead inspection by the DE and a L2 Risk Assessment. Review all relevant information and make recommendations to BRT to deescalate the geotechnical alert.
	Business Resilience Team	N/A	Review	Review	BRT to make the final stand-down decision.