REPORT

Updated Hydrogeology Modelling

Meliadine Extension

Submitted to:

Agnico Eagle Mines Limited

Submitted by:

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Table of Contents

TABLES

FIGURES

1.0 INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) is proposing to expand the development at the Meliadine Gold Project (herein referred to as the Meliadine Extension or the Project), located approximately 25 km north from Rankin Inlet and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. The Project includes open-pits and the Tiriganiaq underground development assessed through the 2014 FEIS (Agnico Eagle 2014a) plus new underground developments.

In 2021, Golder Associates Ltd., a member of WSP (WSP Golder) documented a summary of hydrogeology existing conditions for the Project and subsequently completed a hydrogeological assessment of groundwater conditions that are expected to develop in the Project area during mining in support of the Environmental Impact Statement (EIS) (Golder 2021a; Golder 2021b). Since completion of this work, supplemental hydrogeological data has been collected to enhance the understanding of hydrogeological conditions (Golder 2022b), which has formed the framework for an updated hydrogeological assessment.

This report presents the results of the updated hydrogeological assessment of groundwater conditions that are present now and that are expected to develop in the Project area during mining. Specifically, it addresses the approaches and assumptions adopted in the estimate of the potential groundwater inflow quantity and groundwater quality (total dissolved solids [TDS] only) associated with the development of the open pits and undergrounds. In this assessment, an updated three-dimensional numerical groundwater model was developed using FEFLOW (V7.5). This model incorporates the mine plan provided by Agnico Eagle for the Project.

2.0 BACKGROUND

The numerical groundwater model developed in this assessment was built to support the proposed mine plan for the Project. In consideration of the expanded number and location of undergrounds, the model domain is larger than the model developed for the 2014 FEIS for the Tiriganiaq underground. The model also incorporates an updated conceptual model relative to the 2014 FEIS, as described in the Updated Summary of Hydrogeology Existing Conditions (Golder 2022b).

The numerical hydrogeological model is constructed in FEFLOW, which is the same software used in past versions of the numerical model. The FEFLOW model developed for the 2014 FEIS (Agnico Eagle 2014) was adjusted in subsequent years as new information was collected to provide revised inflow predictions and was further refined for the Project and associated EIS in consideration of updated understanding of existing conditions and the layout of proposed pits and undergrounds. Table 1 presents a summary of the Project predicted groundwater inflows for the EIS for the Base Case Scenario. The Base Case Scenario represents the best estimate of groundwater inflow and groundwater TDS based on the measured data and the results of the model calibration. Table 1 presents a summary of the Project predicted groundwater inflows for the EIS for the Upper Bound Scenario. The Upper Bound Scenario is designed to be a reasonable, yet more conservative, assessment of potential groundwater inflow quantity and TDS quality than values that might be adopted for mine operation planning (i.e., Base Case Scenario). The Upper Bound Scenario was selected in consideration of the sensitivity results which indicate the most sensitive parameter is the bedrock hydraulic conductivity. For the Upper Bound Scenario, the following assumptions were made:

- Tiriganiaq Underground: Groundwater inflows predicted to the Tiriganiaq Underground for a factor of 2 increase in shallow and deep competent bedrock.
- Other Undergrounds: Groundwater inflows predicted to the remaining underground areas for a factor of 3 increase in shallow and deep competent bedrock. This reflects that limited test data was available local to these developments although the geologic units were understood from Agnico Eagle to be like those observed at Tiriganiaq. Testing of the bedrock near the other developments was a focus of supplemental data collection in 2021 (Golder 2022b).

Table 1: Predicted Base Case Scenario Groundwater Inflows from 2021 Model – Groundwater Inflow, TDS Quality and Lake Water Contributions

Base Case Predictions																					
Year	Predicted Groundwater Inflow (m^3/day)							Predicted TDS in Groundwater Inflow (mg/L)							Lake Water Contribution (%)						
	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery
	Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf			
2021	350	<50	-	-	-	-	-	59,500	59,500	-	-	-	-	-	<1	<1	-	-	-	-	-
2022	500	<50	-	-	-	-	-	59,500	60,000	-	-	-	-	-	<1	<1	-	-	-	-	-
2023	550	50	<50	-	-	-	-	59,500	59,000	38,000	-	-	-	-	<1	<1	<1	-	-	-	-
2024	700	100	<50	-	-	-	-	59,500	59,500	21,500	-	-	-	-	<1	<1	5	-	-	-	-
2025	1,050	100	<50	-	-	-	-	57,500	59,500	13,000	-	-	-	-	<1	<1	19	-	-	-	<1
2026	1,500	100	<50	-	-	-	50	56,000	59,000	10,000	-	-	-	59,000	<1	<1	30	-	-	-	<1
2027	1,650	150	<50	-	-	-	100	56,000	58,500	9,000	-	-	-	59,000	<1	<1	34	-	-	-	<1
2028	1,450	150	<50	-	-	-	100	56,000	58,000	10,000	-	-	-	60,000	<1	<1	36	-	-	-	<1
2029	1,400	150	<50	-	-	<50	200	56,000	58,000	9,000	-	-	59,000	59,000	1	<1	47	-	-	<1	<1
2030	1,400	150	<50	-	-	100	200	55,500	57,000	8,000	-	-	57,500	60,000	2	<1	52	-	-	<1	<1
2031	1,350	200	<50	-	-	100	200	55,500	54,500	7,500	-	-	51,500	60,000	2	1	54	-	-	<1	-
2032	1,350	150	<50	-	-	100	-	55,500	55,000	11,000	-	-	49,000	-	3	2	48	-	-	1	-
2033	1,350	150	<50	-	-	150	-	55,500	53,500	11,500	-	-	44,000	-	3	3	48	<1	<1	2	-
2034	1,300	150	<50	-	50	150	-	55,000	53,000	10,000	-	59,000	44,500	-	4	4	54	<1	<1	3	-
2035	1,300	150	<50	<50	100	100	-	55,000	52,500	8,000	56,500	59,000	45,500	-	4	5	60	<1	<1	3	-
2036	1,300	150	<50	50	150	-	-	55,000	51,500	7,500	53,000	59,500	-	-	5	6	65	<1	<1	-	-
2037	1,300	150	<50	50	150	-	-	55,000	50,500	6,500	50,500	60,000	-	-	5	8	68	<1	<1	-	-
2038	-	-	-	100	150	-	-	-	-	-	49,500	60,000	-	-	-	-	-	2	<1	-	-
2039	-	-	-	150	150	-	-	-	-	-	52,500	60,000	-	-	-	-	-	2	<1	-	-
2040	-	-	-	150	-	-	-	-	-	-	52,000	-	-	-	-	-	-	4	-	-	-
2041	-	-	-	150	-	-	-	-	-	-	52,000	-	-	-	-	-	-	5	-	-	-
2042	-	-	-	150	-	-	-	-	-	-	51,000	-	-	-	-	-	-	7	-	-	-
2043	-	-	-	150	-	-	-	-	-	-	49,500	-	-	-	-	-	-	9	-	-	-

Table 2: Predicted Upper Bound Scenario Groundwater Inflows from 2021 Model – Groundwater Inflow, TDS Quality and Lake Water Contributions

Upper Bound Scenario Predictions																					
Year	Predicted Groundwater Inflow (m^3/day)							Predicted TDS in Groundwater Inflow (mg/L)							Lake Water Contribution (%)						
	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery
	Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf			
2021	500	<50	-	-	-	-	-	59,500	59,500	-	-	-	-	-	<1	<1	-	-	-	-	-
2022	650	<50	-	-	-	-	-	59,500	60,000	-	-	-	-	-	<1	<1	-	-	-	-	-
2023	700	100	<50	-	-	-	-	59,500	59,000	35,000	-	-	-	-	<1	<1	<1	-	-	-	-
2024	900	100	<50	-	-	-	-	59,000	59,500	18,000	-	-	-	-	<1	<1	8	-	-	-	-
2025	1,450	100	<50	-	-	-	-	57,500	59,500	10,500	-	-	-	-	<1	<1	28	-	-	-	<1
2026	2,250	100	<50	-	-	-	50	56,000	58,500	6,000	-	-	-	59,500	<1	<1	52	-	-	-	<1
2027	2,550	150	<50	-	-	-	200	56,000	58,000	5,000	-	-	-	59,000	<1	<1	59	-	-	-	<1
2028	2,300	150	<50	-	-	-	200	56,500	57,500	5,500	-	-	-	60,000	<1	<1	62	-	-	-	<1
2029	2,200	150	<50	-	-	<50	300	56,500	57,500	4,000	-	-	59,500	59,500	1	<1	73	-	-	<1	<1
2030	2,150	150	<50	-	-	150	300	56,500	55,000	3,000	-	-	57,500	60,000	2	2	80	-	-	<1	<1
2031	2,100	200	<50	-	-	150	-	57,000	51,000	2,500	-	-	53,500	-	2	5	81	-	-	<1	-
2032	2,150	150	<50	-	-	150	-	57,000	50,500	4,000	-	-	51,500	-	3	6	77	-	-	1	-
2033	2,100	150	<50	-	-	200	-	57,000	49,000	4,500	-	-	48,000	-	3	9	77	<1	<1	2	-
2034	2,100	150	<50	-	<50	200	-	57,000	48,500	3,500	-	59,000	47,000	-	4	11	80	<1	<1	4	-
2035	2,050	150	<50	<50	150	200	-	57,500	47,500	3,000	55,000	59,000	48,000	-	4	12	82	<1	<1	4	-
2036	2,050	150	<50	100	150	-	-	57,500	46,000	2,500	51,000	59,500	-	-	5	14	84	<1	<1	-	-
2037	2,050	150	<50	100	200	-	-	57,500	45,000	2,500	49,000	60,000	-	-	5	16	85	2	<1	-	-
2038	-	-	-	100	200	-	-	-	-	-	48,000	60,000	-	-	-	-	-	5	<1	-	-
2039	-	-	-	150	200	-	-	-	-	-	50,500	60,000	-	-	-	-	-	5	<1	-	-
2040	-	-	-	150	-	-	-	-	-	-	50,000	-	-	-	-	-	-	8	-	-	-
2041	-	-	-	200	-	-	-	-	-	-	50,000	-	-	-	-	-	-	9	-	-	-
2042	-	-	-	200	-	-	-	-	-	-	49,000	-	-	-	-	-	-	11	-	-	-
2043	-	-	-	200	-	-	-	-	-	-	47,500	-	-	-	-	-	-	13	-	-	-

3.0 CONCEPTUAL HYDROGEOLOGICAL MODEL

Prior to model development for the Project, a conceptual hydrogeological model was developed to aid in the construction of the numerical groundwater model. A conceptual hydrogeological model is a pictorial and descriptive representation of the groundwater regime that organizes and simplifies the site conditions so they can be readily modelled. The conceptual model must retain sufficient complexity so that the analytical or numerical models developed from it adequately reproduce or simulate the actual components of the groundwater flow system to the degree necessary to satisfy the objectives of the modelling study.

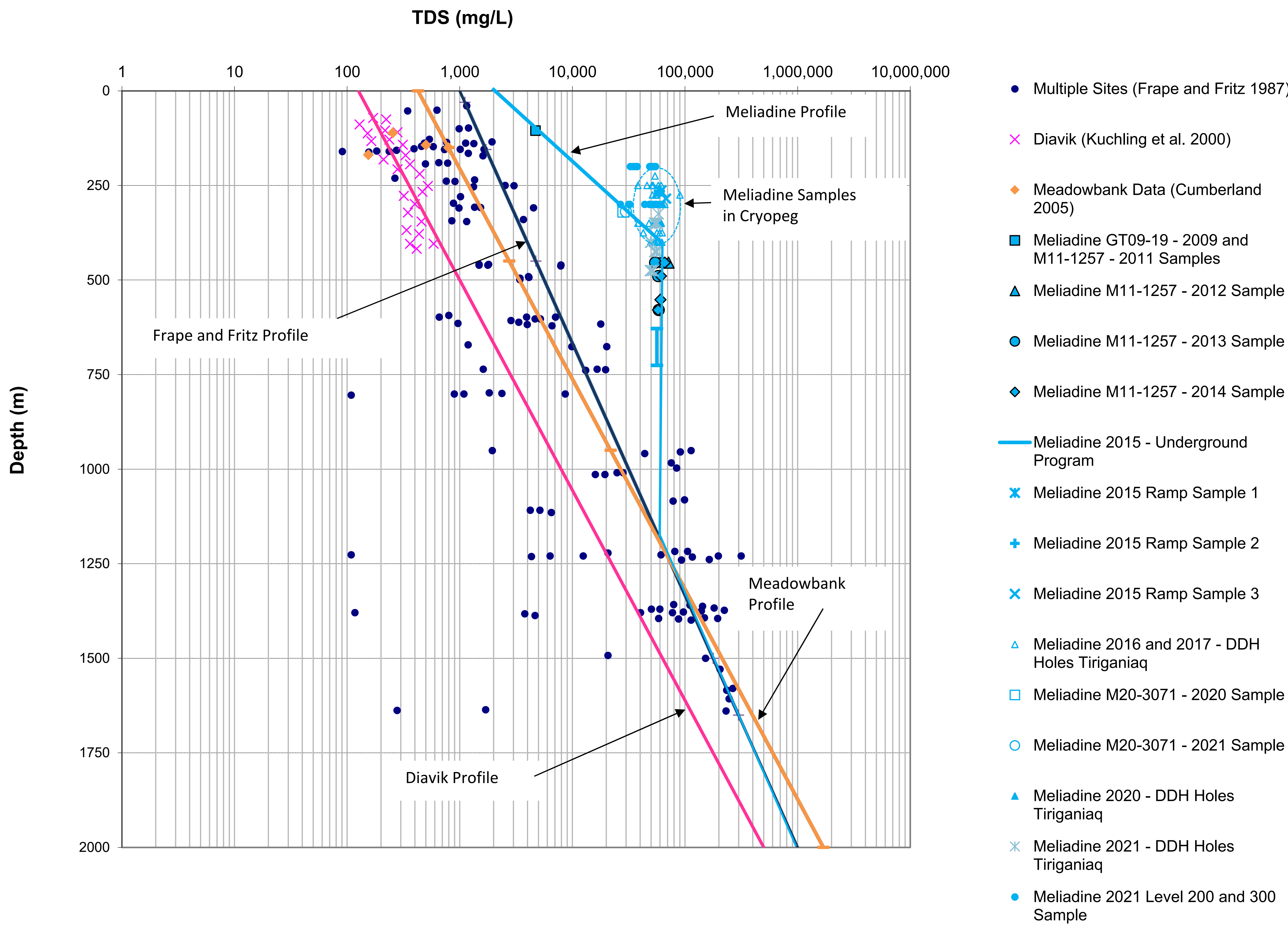
This conceptual model developed to describe key features of the pre-mining hydrogeological regime in the environmental study area is discussed in the Updated Summary of Hydrogeology Existing Conditions (Golder 2022b). The key features included in this conceptual model are the hydostratigraphy, groundwater flow quantity and quality, and dominant groundwater flow directions. The following section summarizes the conceptual hydrogeological models for each stage of mining: predevelopment, mining, and closure. For further detail on the data used to develop the conceptual model components, including the 2021 supplemental data, the reader is referred to the Updated Summary of Hydrogeology Existing Conditions Report (Golder 2022b).

3.1 Permafrost Depth

The Meliadine Project is located within the zone of continuous permafrost (AEM 2014a). Thermal modelling indicates the depth to permafrost varies between 320 and 490 m depth, with the interpreted depth dependent on the proximity to nearby lakes. Based on the groundwater quality (salinity) data for the Project (Figure 1), and the results of thermal modelling, cryopeg conditions are assumed between the 0-degree and -3-degree isotherm. Near Tiriganiaq, this results in the depth to the basal cryopeg of approximately 280 to 290 m bgs (depth where unfrozen groundwater may first be encountered).

Open taliks (defined by the 0-degree isotherm) are predicted to be present beneath portions of each of the following lakes near the proposed open pits and undergrounds: Lake B4, B5, B7, A6, A8, and CH6. The model results expand the list of lakes with potential open talik compared to what was estimated in the 2014 Freshwater Environment FEIS, where only the Meliadine lake, and Lakes A8, B7 and D7 were considered large enough to support open talik.

Closed talik is interpreted below Lake D4 based on the 0-degree isotherm. Predicted temperatures, however, suggest that the ground below the lake may not be fully frozen in consideration of the groundwater salinity, and that the lake may be connected to the regional groundwater flow system through the cryopeg zone.



CLIENT

AGNICO EAGLE

PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

CONSULTANT

wsp GOLDER

YYYY-MM-DD	2021-11-04	
PREPARED	HG	
DESIGNED	HG	
REVIEWED	JL	
APPROVED	DC	

TITLE

GROUNDWATER SALINITY PROFILE WITH DEPTH

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	1

3.2 Hydostratigraphy

Table 3 and Table 4 present a summary of the hydrostratigraphic units defined for the Project Area and their estimated hydraulic properties based on hydraulic testing and observations made in the underground mine workings. Where test data was unavailable, the properties were defined based on published data for similar lithologies.

The shallow bedrock at the site is primarily within the frozen permafrost except in areas of taliks underlying lakes. The deeper competent bedrock has been subdivided into two separate units: Mafic Volcanic Rock formations and Sedimentary Rock formations. The Mafic Volcanic Rock formations are present between the Lower Fault and Pyke Fault and are inferred to transition to Sedimentary Rock formations to the east. Sedimentary Rock formations are present to the North of the Lower Fault, and South of Pyke Fault. Synthesis of the hydraulic testing results up to the end of 2021, indicates that the hydraulic conductivity of the bedrock decreases with depth.

In crystalline rocks, fault zones may act as groundwater flow conduits, barriers, or a combination of the two in different regions of the fault depending on the direction of groundwater flow and the fault zone architecture (Gleeson and Novakowski 2009). Within the Project area, three regional faults (North, Lower and Pyke) are present. In addition, review of structures in the Project area by Agnico Eagle identified 17 additional faults that have been incorporated into the conceptual hydostratigraphy near the underground developments. Each of these faults have been assumed to have enhanced permeability relative to the surrounding competent bedrock. The additional structures are generally located between the Lower Fault and Pyke Fault within the Mafic Volcanic Rock formations and range in thickness from 2 to 6 m. An exception is the KMS Fault corridor, located in the sedimentary rock formations to the north of the Lower Fault at the Tiriganiaq Underground. This corridor is a wider zone of rock located between the KMS Fault and Lower Fault that is associated with poor rock quality. The continuity of this corridor is unknown but based on rock quality is interpreted to thin to the east and west.

The hydraulic conductivity of the competent bedrock and faults is assumed to be linearly reduced by an order of magnitude between the top of the cryopeg and base of permafrost (zero-degree isotherm). This assumption reflects that this portion of the permafrost, which will contain partially unfrozen groundwater due to freezing point depression, is expected to have reduced hydraulic conductivity relative to the unfrozen bedrock reflecting the presence of isolated pockets of frozen groundwater within this zone. These frozen zones will result in a decrease in the hydraulic conductivity of the rock compared to that of the entirely unfrozen rock.

Table 3: Estimated Hydraulic Properties – Competent Bedrock

Hydrostratigraphic Unit	Depth Interval (mbgs)	Hydraulic Conductivity(a) (m/s)	Specific Storage(b) (1/m)	Effective Porosity(c) (-)
Shallow Rock	0 to 55	3×10^{-6}	1×10^{-6}	0.001
Sedimentary Rock Formations(d)	55 to 320	2×10^{-8}	1×10^{-6}	0.001
	320 to 500	3×10^{-9}	1×10^{-6}	0.001
	500 to 1500	3×10^{-9}	2×10^{-6}	0.001
Mafic Volcanic Rock Formations(d)	55 to 320	2×10^{-8}	1×10^{-6}	0.001
	320 to 500	3×10^{-9}	1×10^{-6}	0.001
	500 to 1500	3×10^{-10}	2×10^{-7}	0.001

Note: Hydraulic conductivity within the unfrozen permafrost zone is assumed to be lower than in the deeper unfrozen rock. Linearly decreasing hydraulic conductivity with temperature is assumed within this zone with a full order of magnitude decrease assumed at the top of the basal cryopeg, and hydraulic conductivity equivalent to unfrozen rock at the bottom of the basal cryopeg.

a) Parameter values based on in situ testing

b) Parameter values based on in situ testing and values documented in literature (Maidment 1992; Stober and Bucher 2007).

c) Values consistent with literature values (Guimerà J, Carrera J. 2000).

Table 4: Estimated Hydraulic Properties – Enhanced Permeability Zones

Hydrostratigraphic Unit	Depth Interval[e] (m)	Thickness[d] (m)	Packer Test Hydraulic Conductivity Estimates (m/s)	# of Tests	Assumed Hydraulic Conductivity[a] (m/s)	Specific Storage[b] (1/m)	Effective Porosity[c] (-)	Source of Assigned Hydraulic Conductivity
Lower Fault Zone	0 to 1000	5	5×10^{-8} to 1×10^{-7}	4	1×10^{-7}	2×10^{-7}	0.005	2020 Model Calibration and In Situ Testing
RM-175	0 to 1000	5	2×10^{-8}	1	5×10^{-8}	2×10^{-7}	0.005	2020 Model Calibration and In Situ Testing
KMS Fault Corridor	0 to 1000	100	4×10^{-7}	1*	4×10^{-7}	2×10^{-7}	0.005	2020 Model Calibration and In Situ Testing
North Fault	0 to 1000	5	-	-	1×10^{-7}	2×10^{-7}	0.005	Unchanged from FEIS Assumption
A	0 to 1000	6	2×10^{-8} to 2×10^{-7}	6	1×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2 and In Situ Testing
B	0 to 1000	5	-	-	1×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
C	0 to 1000	3	4×10^{-9}	1	2×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
D	0 to 1000	5	-	-	1×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
Pyke Fault	0 to 1000	15	7×10^{-9} to 3×10^{-7}	3	3×10^{-7}	2×10^{-7}	0.005	Maximum from In Situ Testing
AP0	0 to 1000	3	-	-	2×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
ENE1/ENE2	0 to 1000	5	3×10^{-8}	1	1×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
ENE3	0 to 1000	3	-	-	2×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
UM2	0 to 1000	6	-	-	1×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
NW1	0 to 1000	5	2×10^{-10} to 2×10^{-9}	3	5×10^{-7}	1×10^{-7}	0.005	Assumed T Equal to Fault 2
WNW1	0 to 1000	3	-	-	2×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
WNW2	0 to 1000	3	-	-	2×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
UAU2	0 to 1000	2	-	-	3×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
Fault 1	0 to 1000	5	8×10^{-7}	1	1×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2
Fault 2	0 to 1000	5	3×10^{-7} m/s and 5×10^{-7}	4	1×10^{-6}	2×10^{-7}	0.005	In Situ Testing
Fault 3	0 to 1000	5	-	-	1×10^{-6}	2×10^{-7}	0.005	Assumed T Equal to Fault 2

a) Hydraulic conductivity within the unfrozen permafrost zone is assumed to be lower than in the deeper unfrozen rock. Linearly decreasing hydraulic conductivity with temperature is assumed within this zone with a full order of magnitude decrease assumed at the top of the basal cryopeg, and hydraulic conductivity equivalent to unfrozen rock at the bottom of the basal cryopeg.

b) Assumed parameter in consideration of competent bedrock testing.

c) Values consistent with literature values (Guimerà J, Carrera J. 2000).

d) Width of structures estimated by Agnico Eagle from review of borehole records.

e) Where fault hydraulic conductivity is less than shallow rock, the fault was excluded from 0 to 60 m depth interval. Where fault hydraulic conductivity is greater than shallow rock, fault was be included within 0 to 60 m depth interval.

3.3 Conceptual Groundwater Flow – Pre-Mining

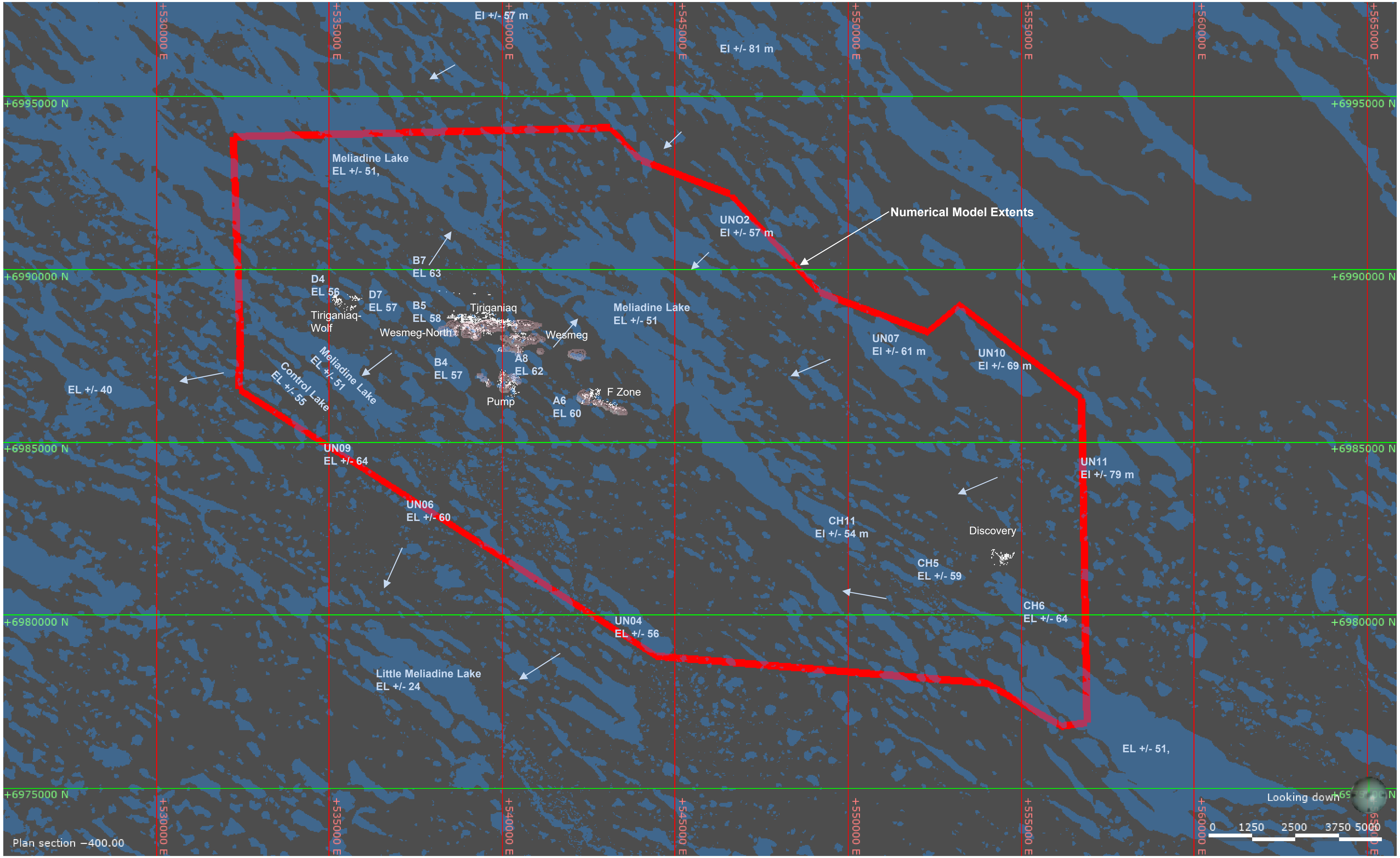
The conceptual hydrogeological model for pre-disturbance conditions is presented on Figure 2 through Figure 6.

In areas of continuous permafrost there are generally two groundwater flow regimes; a deep groundwater flow regime beneath the base of the permafrost and a shallow flow regime located in an active (seasonally thawed) layer near ground surface (Figure 3). Permafrost reduces the hydraulic conductivity of the rock by several orders of magnitude (McCauley et al. 2002; Burt and Williams 1976), therefore the shallow groundwater flow regime has little to no hydraulic connection with the groundwater regime located below the permafrost. Taliks (areas of unfrozen ground surrounded by permafrost) may be present in the permafrost in areas underlying lakes. Depending on lake size, depth, and thermal storage capacity, the taliks beneath lakes may fully penetrate the permafrost layer resulting in an open talik providing a hydraulic connection between surface water and the deep groundwater flow regime.

The elevations of the lakes underlain by open taliks provide the driving force for deep groundwater flow (Figure 2). The presence of thick permafrost beneath land masses results in negligible recharge to the deep groundwater flow regime from these areas. Consequently, recharge to the deep groundwater flow regime is predominantly limited to areas of taliks beneath large, surface water bodies. Generally, deep groundwater will flow from higher-elevation lakes to lower-elevation lakes. Groundwater beneath the permafrost is also influenced by density differences due to the upward diffusion of deep-seated brines (density-driven flow).

The Westbay multi-level monitoring system that was installed in borehole M11-1257 (Figure 7) is situated between Lake B7 and D7, and directly underneath Lake B5. Each of these lakes are predicted to be connected to the deep groundwater flow regime through open taliks. Relative to Lake B5, a variable vertical groundwater flow direction was observed at M11-1257. This may reflect that Lake B5 is both a recharge and discharge boundary given the relative elevation of the surrounding lakes.

The Westbay multi-level monitoring system that was installed in borehole M20-3071 is situated below Lake CH6. The overall groundwater flow direction below Lake CH6 appears to be upwards based on pressure measurements at M20-3071 corrected for buoyancy effects. At deeper depths the interpreted gradient reverses, potentially because of the higher salinity groundwater at depth. The calculated directions of groundwater flow are approximate and sensitive to the assumed TDS versus depth profile, which is presented conceptually on Figure 1 and Figure 6. For example, if the TDS at depth is assumed to trend to a lower value at depth (approximately 54,000 mg/L), a consistent upward gradient would be measured between each of the M20-3071 ports and Lake CH6.



CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

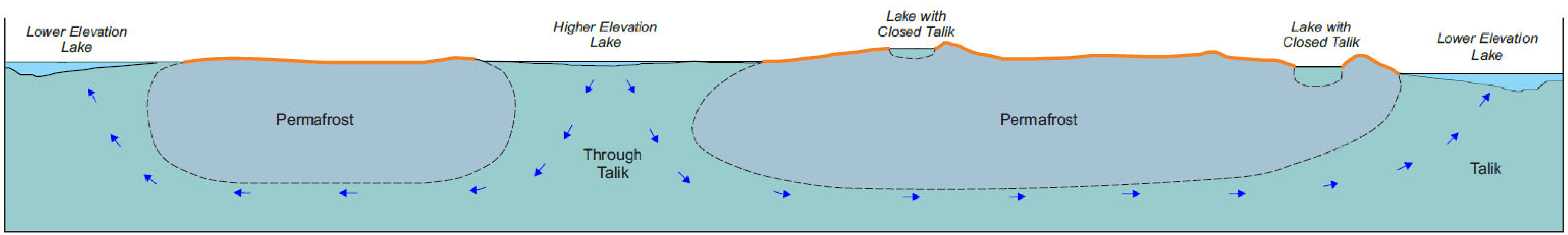
TITLE

HYDROGEOLOGY MODEL EXTENTS AND CONCEPTUAL REGIONAL GROUNDWATER FLOW DIRECTIONS

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25 mm



CROSS SECTION

Schematic Only
Not to Scale

LEGEND

Conceptual Groundwater Flow Direction

Active Layer

CLIENT

AGNICO EAGLE

CONSULTANT

GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

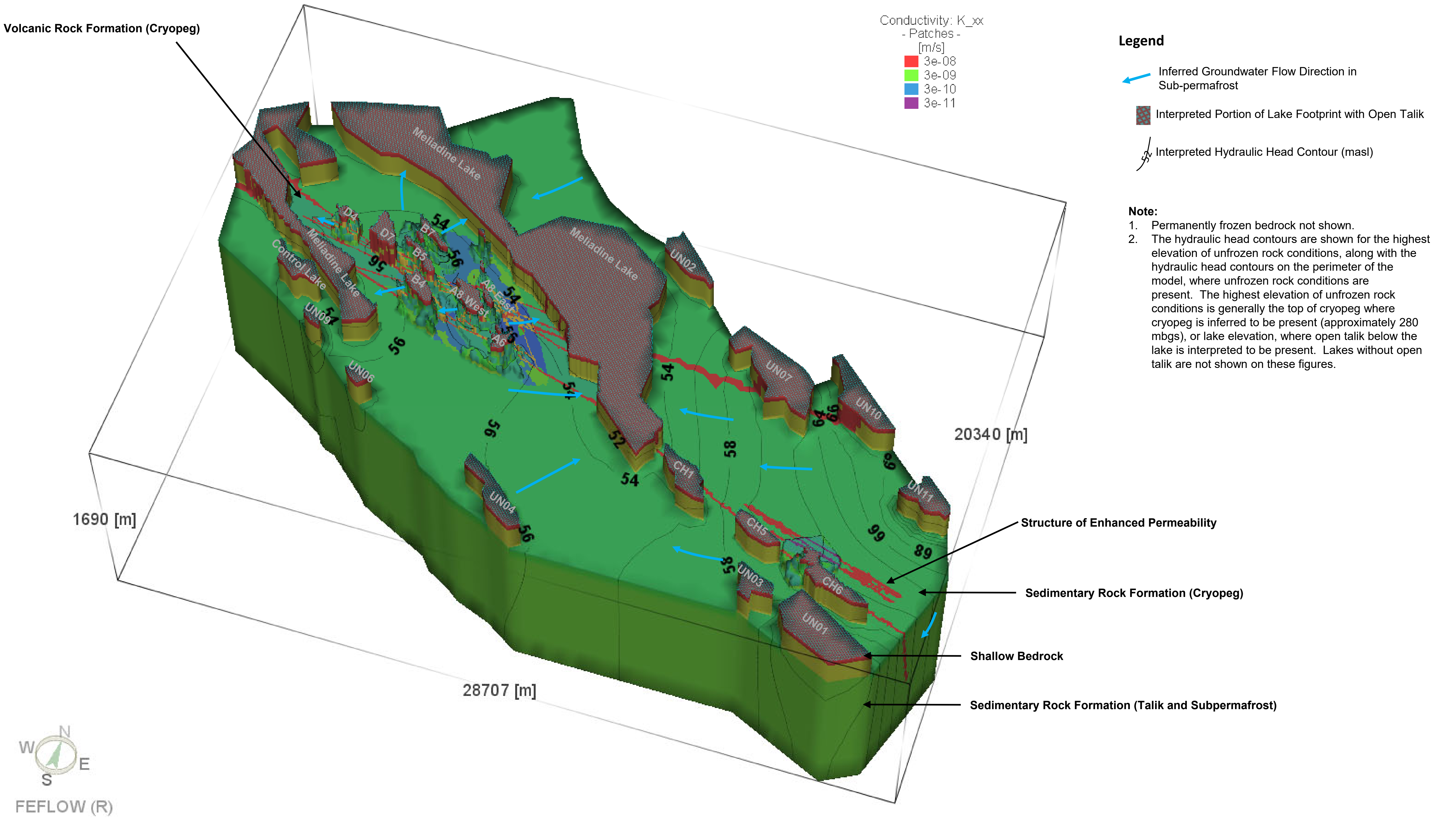
PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE

SCHEMATIC OF CONCEPTUAL PERMAFROST AND GROUNDWATER FLOW CONDITIONS IN AREAS OF CONTINOUS PERMAFROST

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	3



CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

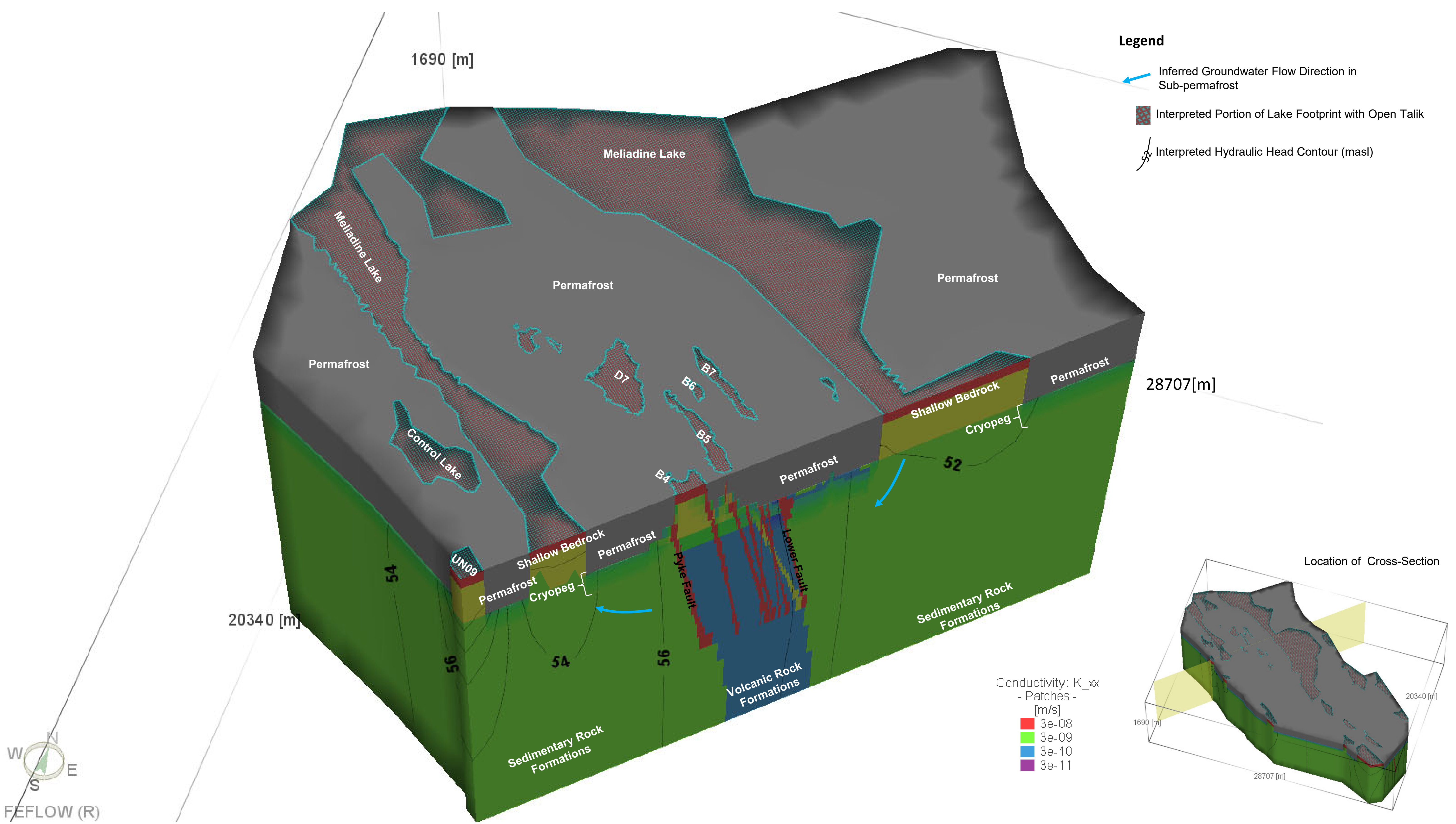
PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE

PRE-MINING CONCEPTUAL GROUNDWATER FLOW DIRECTIONS AND DISTRIBUTION OF HYDROSTRATIGRAPHIC UNITS

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	4



Update

5x Vertical Exaggeration

CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

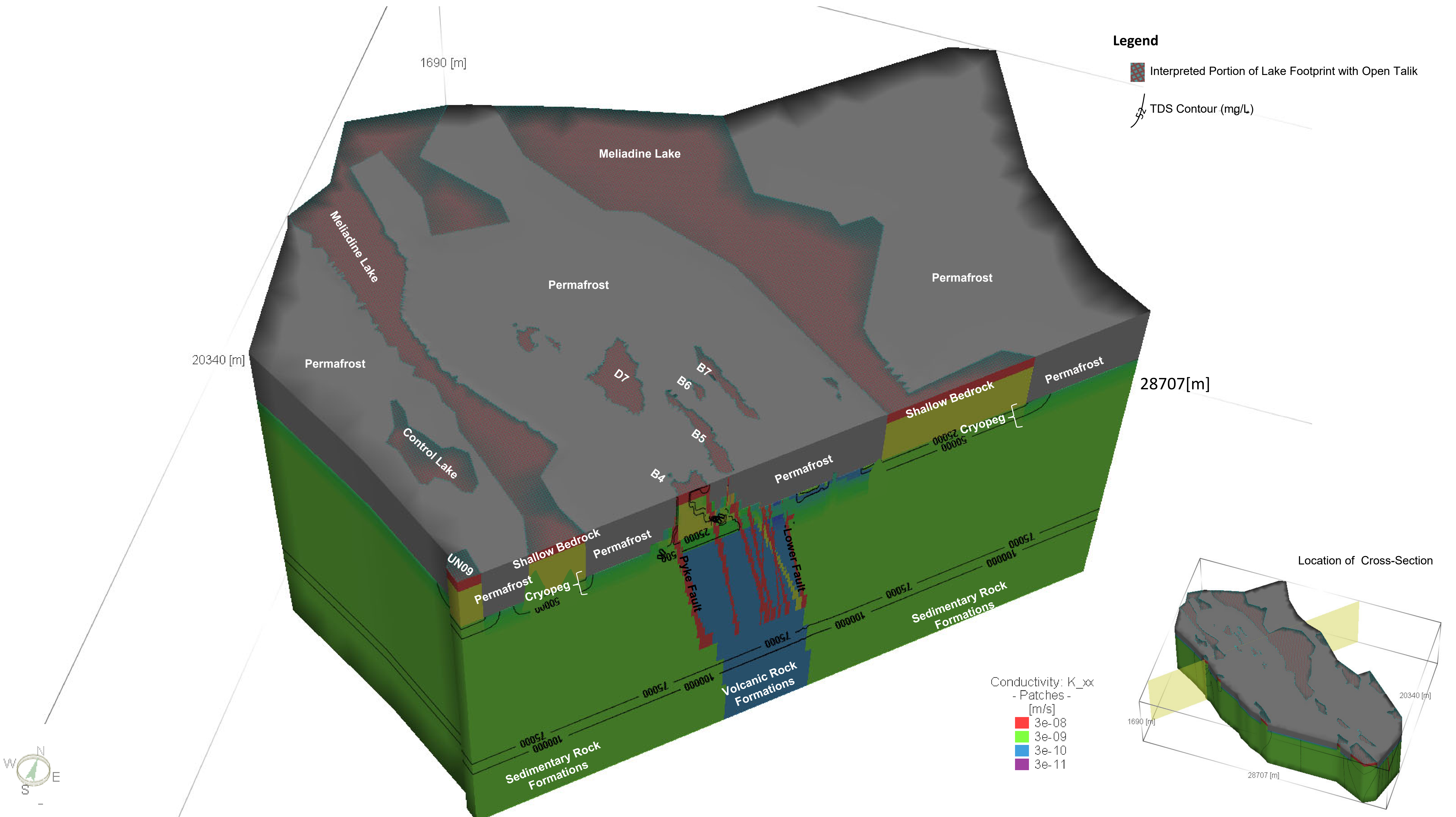
PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE

CROSS-SECTION VIEW OF PRE-MINING CONCEPTUAL GROUNDWATER FLOW DIRECTIONS NEAR TIRIGANIAQ

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	**5**



Update

5x Vertical Exaggeration

CLIENT

AGNICO EAGLE

CONSULTANT

wsp GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

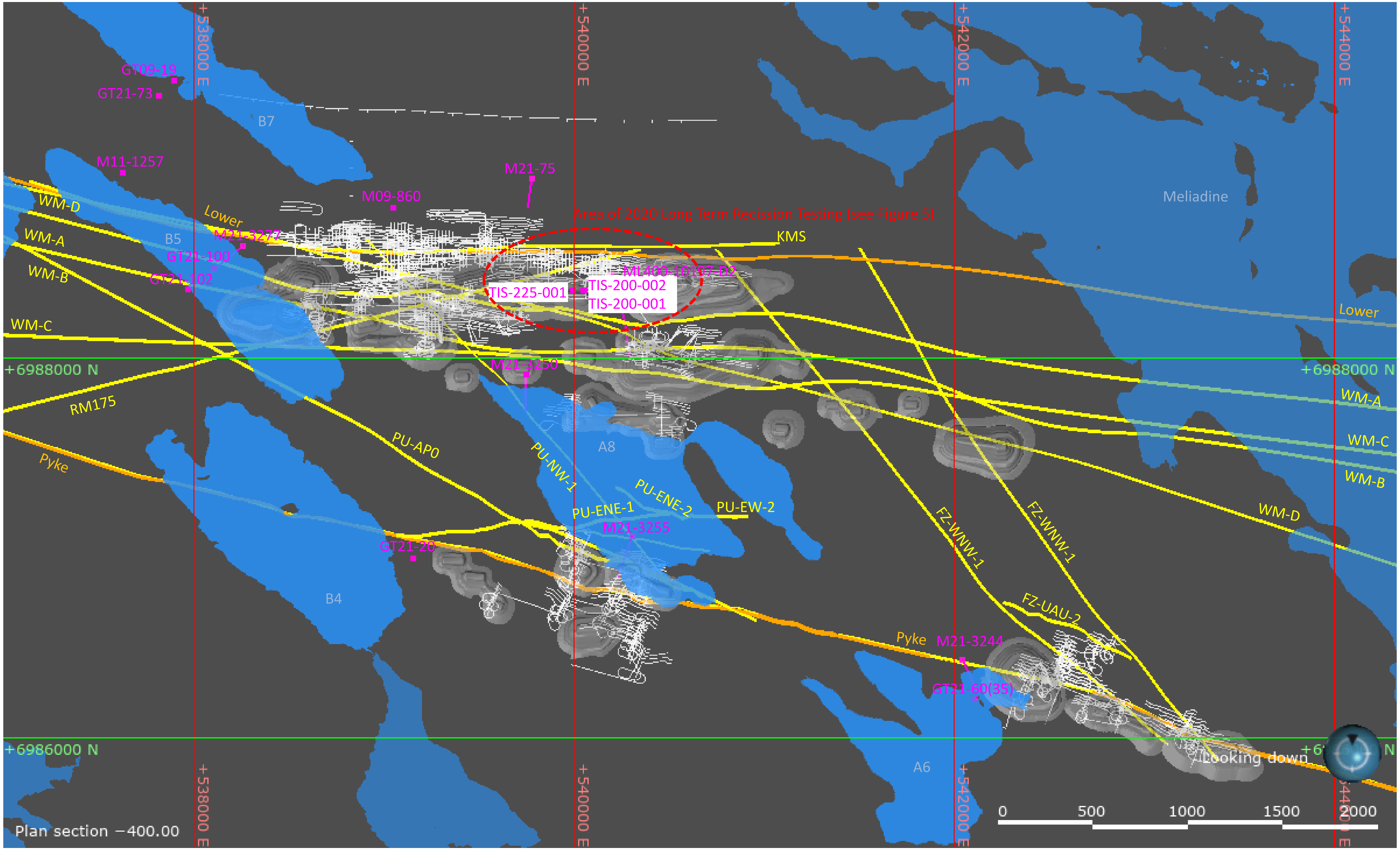
PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE

CROSS-SECTION VIEW OF PRE-MINING CONCEPTUAL TDS CONCENTRATIONS IN GROUNDWATER NEAR TIRIGANIAQ

PROJECT NO.	PHASE	REV.	FIGURE
[illegible]	2000	0	6



LEGEND

Inferred Lake with Open Talik

Regional Fault

Supplemental Faults Based on 2020 Agnico Eagle Review

Borehole Collar / Borehole Trace

Fault traces are shown for an elevation of -400 masl.

CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE

BOREHOLE LOCATIONS FOR HYDRAULIC TESTING AND GROUNDWATER SAMPLING – MAIN AREA

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	7

3.4 Conceptual Groundwater Flow – Existing Conditions

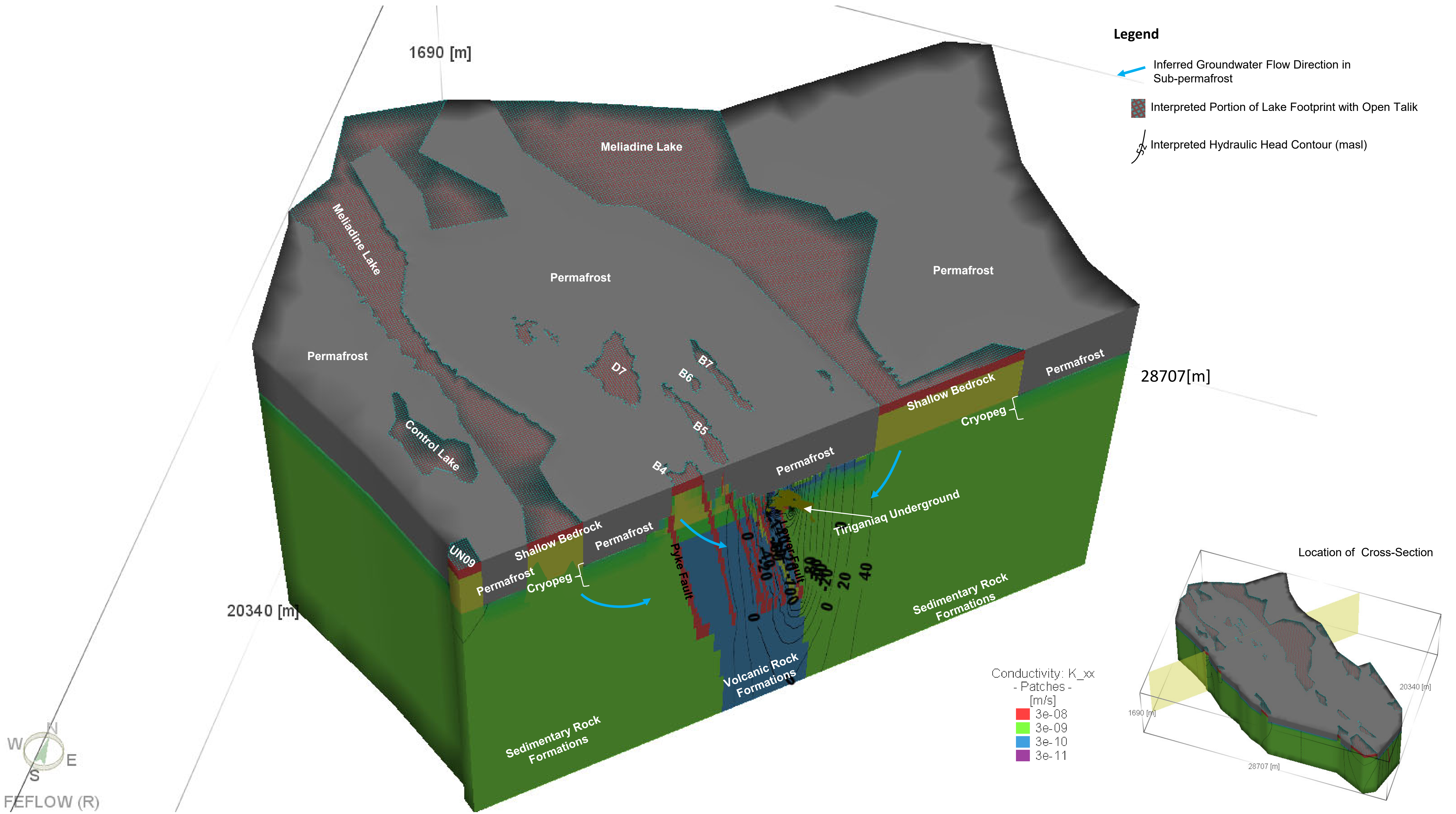
Groundwater inflows are presently intercepted at the Tiriganiaq Underground, where mining has extended into the cryopeg and sub-permafrost groundwater flow system. In September of 2015, the mine development extended to the estimated depth of basal cryopeg and groundwater inflow was observed to the underground. Groundwater inflows were low (approximately 15 m^3/day in the fourth quarter of 2015) but have since increased on an average of between 220 and 340 m^3/day in 2021/2022. Groundwater inflows are mitigated by active grouting which locally reduces the effective hydraulic conductivity of structures adjacent to the development.

At Tiriganiaq, local depressurization of over 450 m has been observed at piezometers installed near the underground (Figure 8). Further depressurization is expected at other undergrounds and open pits as they develop. To date, no open pit mining in bedrock connected to open taliks has occurred. Tir02 pit is located at the south end of CP5. A shallow closed talik may be present below the pond resulting in some seepage to the open pit. This seepage, if present, would not be expected to significantly increase given the pit depth is likely already past the base of the closed talik.

3.5 Groundwater Flow – Mining

Like existing conditions near the Tiriganiaq underground, each of the Project proposed undergrounds and pits in connection with open taliks or the sub-permafrost groundwater flow system will act a sink for groundwater flow. Excavation will induce the water to flow through the bedrock to the mine workings once the mine has advanced below the base of the permafrost or into open talik.

Thermal modelling has shown that each of the underground developments will extend into the sub-permafrost groundwater flow system. Except for NOR01, WES05, and PUM04, none of the other open pits are interpreted to intersect the cryopeg or the deep groundwater regime below the permafrost. Portions of the pits may intersect small lakes that may have limited unfrozen groundwater within closed taliks. Lake dewatering is planned for each pit that may have such a hydraulic connection. This may result in freeze-back of the pit slopes, limiting the seepage of local groundwater from closed taliks into the open pits.



Update

5x Vertical Exaggeration

CLIENT	AGNICO EAGLE
CONSULTANT	WSP GOLDER
YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
CROSS-SECTION VIEW OF CONCEPTUAL GROUNDWATER FLOW DIRECTIONS NEAR TIRIGANIAQ – YEAR 2021 (EXISTING CONDITIONS)

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	8

4.0 NUMERICAL HYDROGEOLOGICAL MODEL

4.1 Code Selection

The numerical groundwater model was constructed using FEFLOW (Version 7.5). This numerical code was selected because it is capable of simulating transient, saturated-unsaturated groundwater flow, and density-coupled solute transport in heterogeneous and anisotropic porous media under a variety of hydrogeologic boundaries and stresses. FEFLOW is well suited for development of the site model because it allows for simultaneous predictions of groundwater flow and solute transport and has been successfully used for simulated groundwater inflow to the Tiriganiaq underground as part assessments.

Specific assumptions and limitations adopted in the model are summarized below, with additional detail presented in Section 4.2 to 4.6 and the model calibration is described in Section 5.0.

- The model predictions assumed fully saturated confined conditions. Hydraulic head measurements between 2015 and 2020 indicate saturated conditions are present near the underground developments, and with respect to the future inflow predictions this assumption will likely bias prediction high because if unconfined conditions are encountered later in the mine life, these conditions would tend to reduce inflows. However, under continuous permafrost conditions the seepage from above is already very small and unconfined conditions may not reduce inflows much from what are predicted with confined conditions.
- The model treats the bedrock as an equivalent porous medium (EPM), although flexibility exists to introduce discrete structures as warranted to evaluate potential preferential flow paths along discrete faults. Flow in bedrock is assumed to be laminar, steady, and governed by Darcy’s Law.
- Horizontal and vertical mesh discretization of approximately 10 to 25 m was considered to provide sufficient spatial resolution for simulation of groundwater flow and transport near the underground mine.
- Initial values of model input parameters were based on the results of permeability testing across the Project and previous modelling in the area of Tiriganiaq. Where testing results were not available, initial model properties were based on typical values published in the literature.
- Surface waterbodies were simulated using specified head boundaries. It was assumed that the permeability of lake bed sediments beneath these waterbodies is the same as those of the underlying geologic strata. Thus, no restriction of flow between the surface water and individual hydrostratigraphic units was simulated.
- Groundwater flow deeper than approximately 1.7 km below ground surface (800 m deeper than the deepest mine) was assumed to be negligible and to have negligible influence on model predictions.

4.2 Model Domain and Discretization

The extent of the numerical hydrogeological model was based on the understanding of groundwater flow conditions, with model boundaries set sufficiently distant from the mine workings to allow adequate representation of groundwater conditions near the open pits and undergrounds. As part of the prediction scenarios, checks were completed to verify that the predicted extent of depressurization from the underground dewatering did not extend to the lateral model boundaries.

The model domain is approximately 305 km^2 and consisted of over 2.8 million triangular elements (Figure 8). The element size is refined in the areas of the underground developments, ranging between 10 to 25 m, and increases in size towards the periphery of the model where elements are approximately 500 m. The model domain encompasses potential areas where open pits and underground developments may influence the sub-permafrost groundwater flow system.

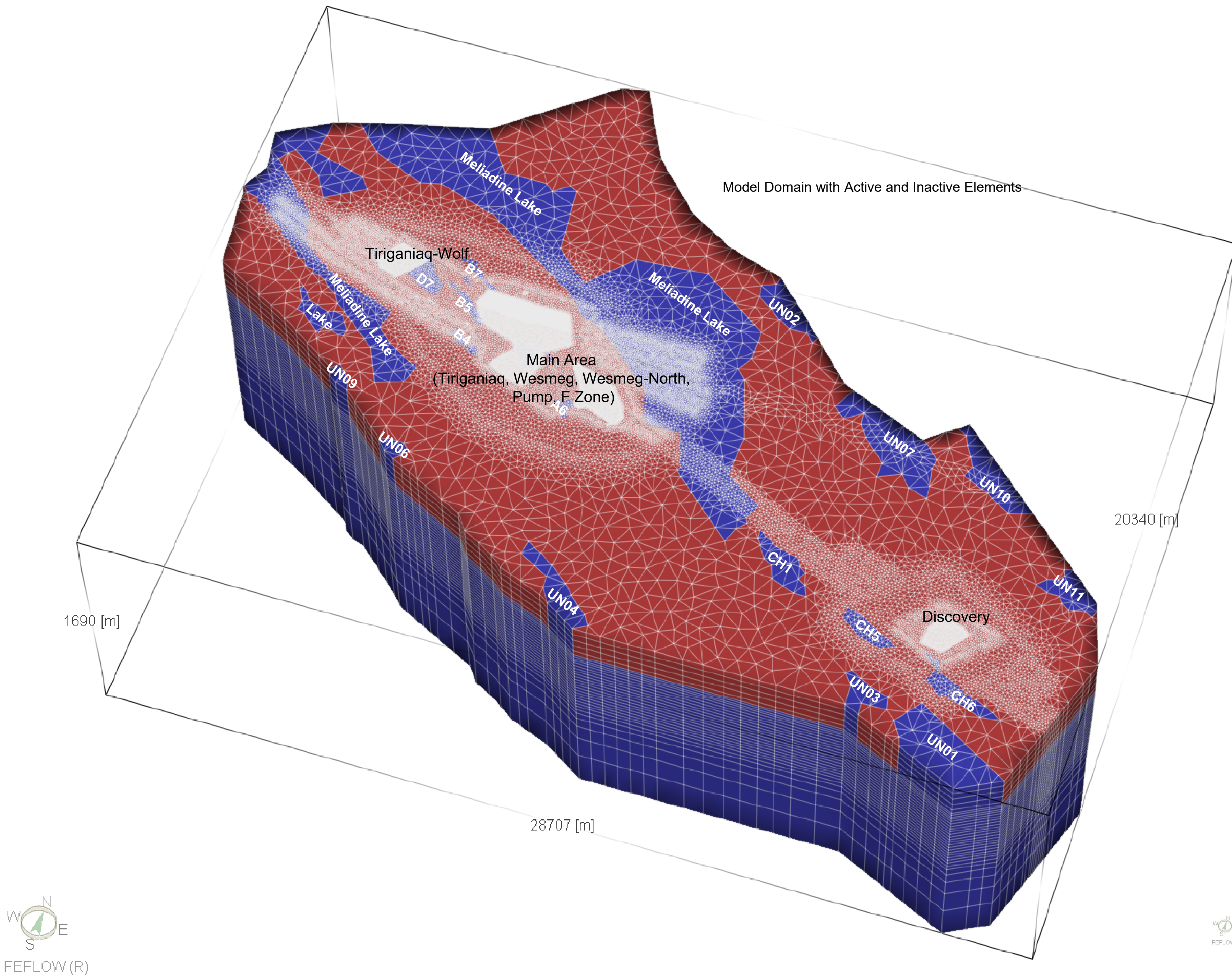
Vertically, the model domain is discretized into 32 layers. The top of Layer 1 is generally set to approximately 55 masl, the ground surface elevation in the Tiriganiaq area, with local adjustment under lakes with open talik in consideration of lake elevations. The bottom of layer 32 was set to a constant elevation of -1635 masl (approximately 1.7 km below ground surface and approximately 800 m below the deepest proposed underground).

4.3 Hydostratigraphy and Initial Model Parameters

Table 3 and Table 4 of Section 3.2 present a summary of the hydrostratigraphic units and their estimated hydraulic properties. These parameters were later adjusted as part of model calibration, as described in Section 5.0. Figure 4 presents the relative location of the hydrostratigraphic units, with more detail on the fault locations presented on Figure 10 and Figure 11.

Faults within the Project area generally range from 2 to 6 m thick, which is less than the element size near the undergrounds (10 to 25 m). An exception of the Pyke Fault and KMS corridor that have larger interpreted widths (15 to 100 m). Faults were simulated in model by assigning an effective hydraulic conductivity representative of the combined transmissivity of the fault and competent bedrock to elements parallel to the fault alignment, with the fault set to be approximately two elements wide. The faults have been conservatively assumed to extend several kilometres away from the underground development and to extend to a depth of approximately one kilometre (-1025 m elevation).

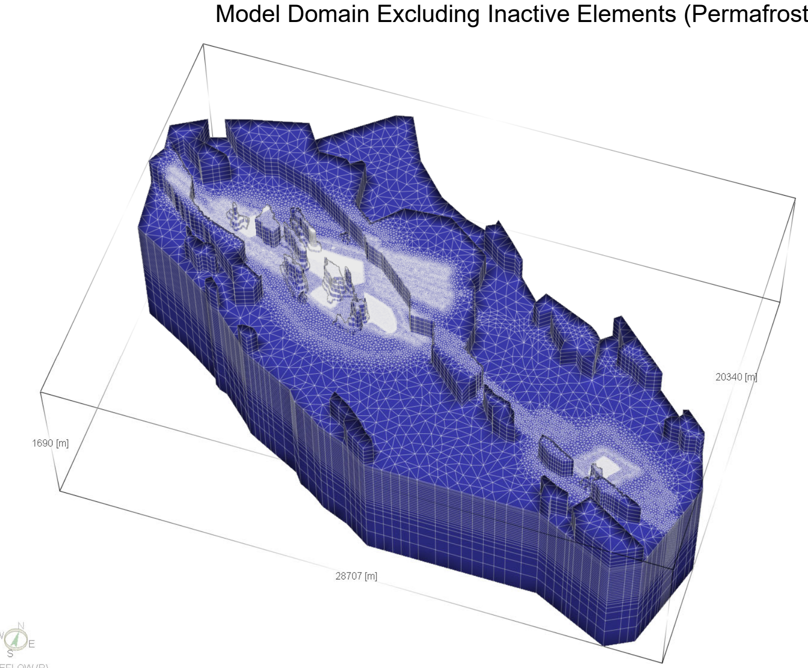
To mitigate groundwater inflows, Agnico Eagle actively grouts faults, joints and other structures within the rock that contribute to inflow to the underground. To simulate this grouting, elements representative of the faults within 30 m of the underground were assigned an effective hydraulic conductivity of 1×10^{-8} m/s. This parameter was then iteratively adjusted in the model to improve the match between measured and predicted inflows to the underground.



Legend

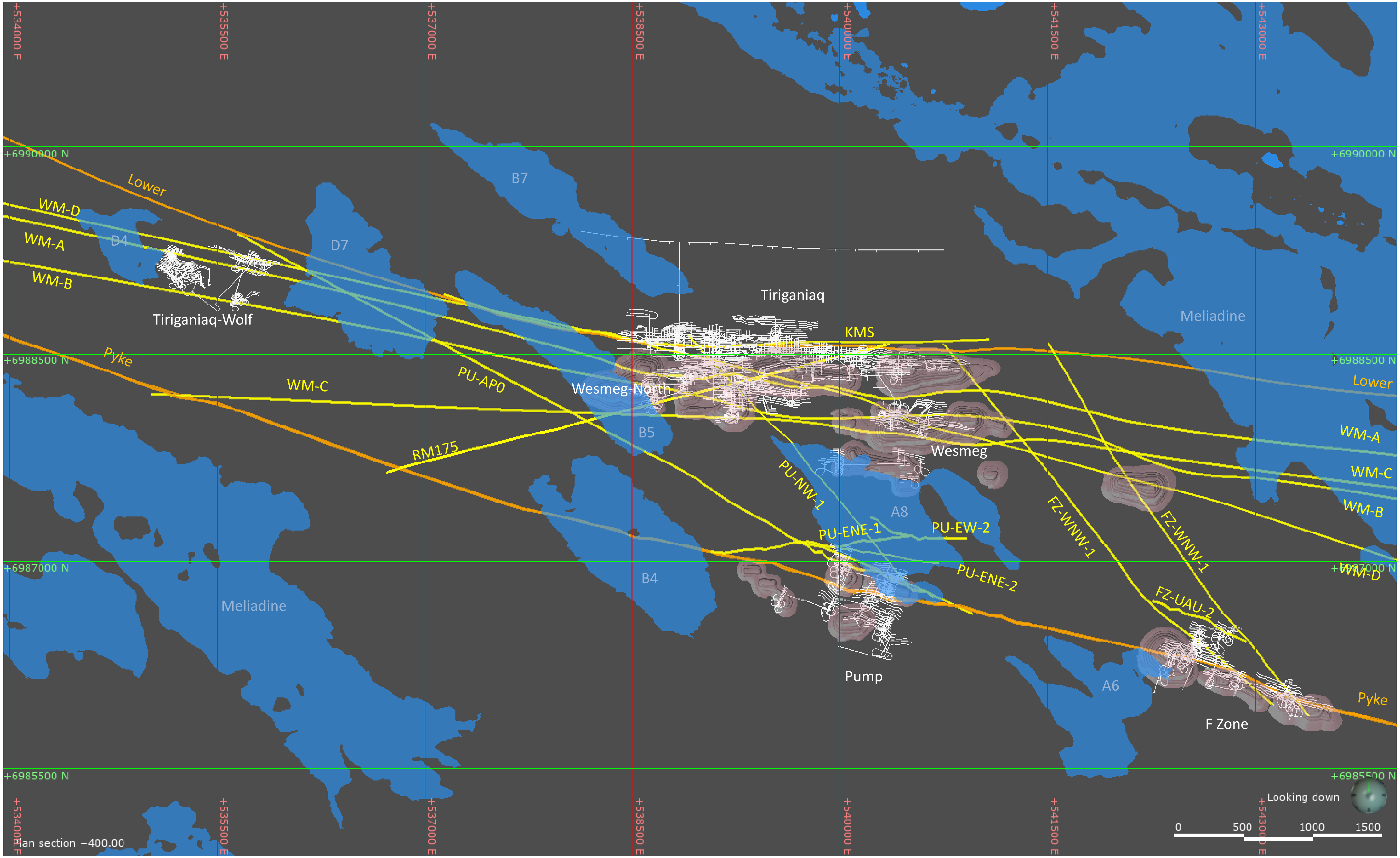
- Active Model Elements (Cryopeg and Unfrozen Bedrock)
- Inactive Model Elements (Permafrost Excluding Cryopeg)

Model Domain Excluding Inactive Elements (Permafrost)



5x Vertical Exaggeration

CLIENT	AGNICO EAGLE	PROJECT	AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT
CONSULTANT	WSP GOLDER	TITLE	**FINITE ELEMENT MESH AND ACTIVE MODEL DOMAIN**
YYYY-MM-DD	2021-11-04	PROJECT NO.	20136436
PREPARED	HG	PHASE	2000
DESIGNED	HG	REV.	0
REVIEWED	JL	FIGURE	**9**
APPROVED	DC		



LEGEND

Inferred Lake with Open Talik

Regional Fault

Supplemental Faults Based on 2020 Agnico Eagle Review

Fault traces are shown for an elevation of -400 masl.

CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

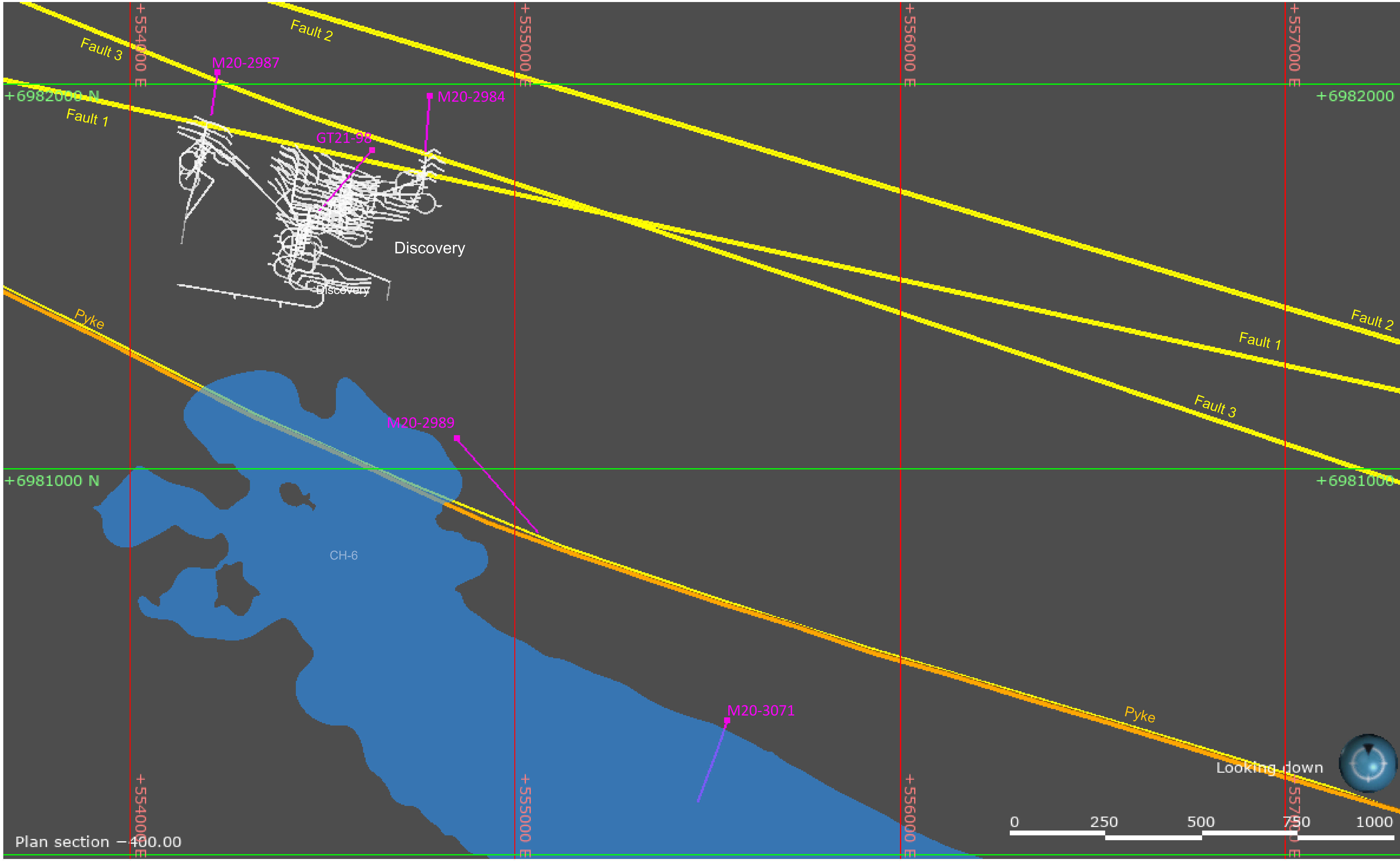
PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE

STRUCTURES OF ENHANCED PERMEABILITY – MAIN AREA AND TIRIGANIAQ-WOLF

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	**10**



LEGEND

- Inferred Lake with Open Talik
- Regional Fault
- Supplemental Faults Based on 2020 Agnico Eagle Review
- Borehole Location

Fault traces are shown for an elevation of -400 masl.

CLIENT	AGNICO EAGLE	PROJECT	AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT
CONSULTANT	WSP GOLDER	TITLE	**STRUCTURES OF ENHANCED PERMEABILITY – DISCOVERY**
YYYY-MM-DD	2021-11-04	PROJECT NO.	20536896
PREPARED	HG	PHASE	2000
DESIGNED	HG	REV.	0
REVIEWED	JL	FIGURE	**11**
APPROVED	DC		

4.4 Mine Schedule

This model incorporates the mine plan provided by Agnico Eagle, as summarized in Table 4 for the lowest elevation of the underground development.

Table 5: Lowest Elevation of Underground Development

Year	Lowest Elevation of Underground Development (masl)						
	Tiriganiaq	Wesmeg	Wesmeg-North	F Zone	Pump	Tiriganiaq-Wolf	Discovery
2021	-490	-395	-	-	-	-	-
2022	-560	-395	-	-	-	-	-
2023	-640	-395	-245	-	-	-	-
2024	-735	-395	-245	-	-	-	-
2025	-845	-395	-245	-	-	-	-110
2026	-845	-465	-245	-	-	-	-255
2027	-845	-585	-275	-	-	-	-315
2028	-845	-590	-275	-	-	-	-395
2029	-845	-590	-275	-	-170	-	-400
2030	-845	-590	-275	-	-340	-	-400
2031	-845	-590	-275	-	-340	-	-400
2032	-845	-590	-395	-	-340	-	-
2033	-845	-590	-395	-150	-340	-20	-
2034	-845	-590	-395	-310	-340	-140	-
2035	-845	-590	-395	-460	-340	-280	-
2036	-845	-590	-395	-460	-	-400	-
2037	-845	-590	-395	-460	-	-400	-
2038	-	-	-	-500	-	-400	-
2039	-	-	-	-500	-	-400	-
2040	-	-	-	-	-	-400	-
2041	-	-	-	-	-	-480	-
2042	-	-	-	-	-	-480	-
2043	-	-	-	-	-	-480	-

Based on permafrost limits (Golder 2022a), open pits in the F Zone, Pump and Discovery, which vary in depth between 70 and 140 mbgs, will be within permafrost and/or intersect shallow closed taliks in adjacent lakes. Where open pits in the F Zone, Pump and Discovery intersect lakes, these taliks are planned to be dewatered in advance of mining.

Wesmeg-North Pit is planned to be about 130 m deep with the ultimate base of the pit at -65 masl and is under a portion of Lake B5 where thermal models predict the existence of an open talik (Golder 2022a).

Pump Pit PUM04pit is planned to be about 40 m deep with the ultimate pit at -20 masl and is under the southern portion of Lake A8 West.

Wesmeg Pit Wes05 pit is planned to be about 120 m deep with the ultimate base of the pit at -55 masl and is partially under the north side of Lake A8 West, where thermal models predict the presence of an open talik (Golder 2022a). For purposes of this hydrogeological model, it was assumed that Lake B5 and Lake A8 West would be dewatered in advance of both underground and open-pit mining in these areas.

4.5 Model Boundary Conditions – Flow

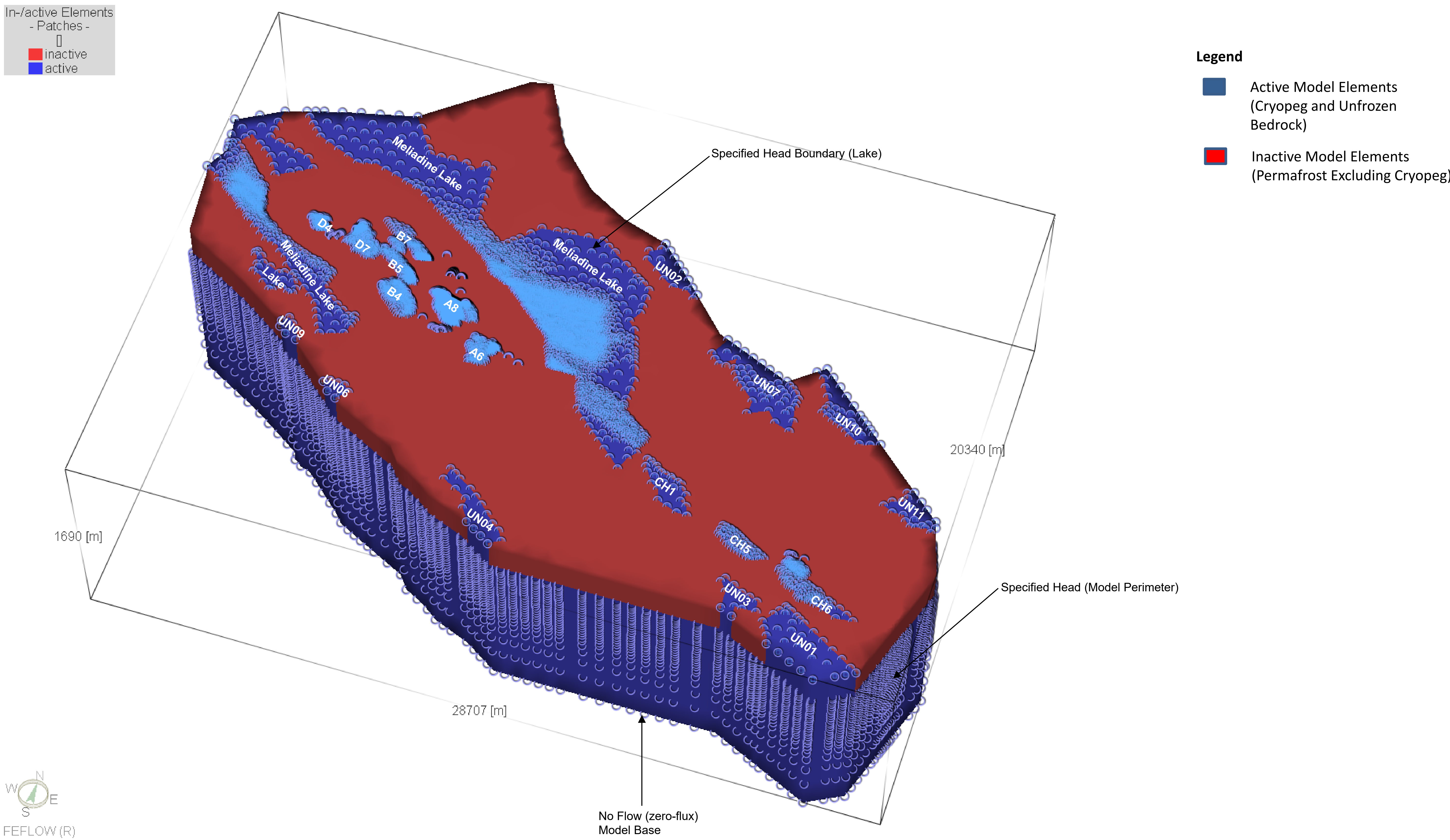
Model boundary conditions provide a link between the model domain and the surrounding hydrologic and hydrogeologic systems. Two types of flow boundary conditions were used in the model: specified head and no-flow (zero-flux) boundaries. The locations of these boundaries are shown in Figure 11 and are summarized below.

Specified head boundaries were assigned to Layer 1 of the model to represent all lakes assumed to have open taliks connected to the deep groundwater flow regime. Each of these boundaries was set to the lake elevation derived from site topographic data. It was conservatively assumed that the surface water/groundwater interaction at all lakes is not impeded by lower-permeability lakebed sediments that may exist on the bottom of some of these lakes. Specified head boundaries were also assigned beneath the permafrost along the perimeter of the model along inferred flow lines for predictions during operations. Overall, model limits are set sufficient far enough from the mine developments to not influence model predicted inflow and were assessed as part of sensitivity analysis (Section 6.3).

During operations, time-variable specified head boundaries were assigned to Layer 1 of the model to represent dewatering of Lake A8 West and Lake B5. Lake A8 West is located over the Wesmeg and Pump undergrounds and overlaps with open pits WES05 and PUM04. Lake B5 is located over the Wesmeg underground and overlaps with the NOR01 open pit. For one month of the year, it was assumed that dewatering would not keep up with freshet inflows and standing water would be present in the lakes; the remaining 11 months it assumed that the lake is fully dewatered and that any water reporting to the dewatered lake footprint would report as runoff to the open pit or dewatering system, which is not a predicted component of the groundwater flow model.

Mine workings in unfrozen bedrock (open pits and undergrounds) were simulated in the model using time-variable specific head boundaries. At each mesh node within the perimeter of the open pit and/or along the underground development, a specified head boundary was assigned and the head value at this boundary was varied over time to represent progressive expansion of the mine development according to the mine schedule provided by Agnico Eagle and generally described in Section 4.4. In addition, all boundaries representing mine workings during mining were constrained to allow only outflow from surrounding sediments/bedrock into the mine (i.e., these boundaries act as seepage faces).

A no-flow boundary applied along the bottom of the model at a depth of 1.7 km below ground surface (-1,635 masl). Flow at greater depth is expected to be negligible in comparison to lateral inflow above this elevation, and therefore is expected to have negligible impact on model predictions. No-flow boundaries were also assigned along the edges of the permafrost as the permafrost is essentially impermeable. Mesh elements representing permafrost (excluding the cryopeg) were deactivated in all model simulations (Figure 9). The permafrost zones were assigned to the model based on the updated thermal modelling results (Golder 2022a).



5x Vertical Exaggeration

CLIENT	AGNICO EAGLE	PROJECT	AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT
CONSULTANT	WSP GOLDER	YYYY-MM-DD	2021-11-04
		PREPARED	HG
		DESIGNED	HG
		REVIEWED	JL
		APPROVED	DC

TITLE
MODEL BOUNDARY CONDITIONS FOR GROUNDWATER FLOW

PROJECT NO.	PHASE	REV.	FIGURE
20536890	2000	0	**12**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm
0

Initial groundwater flow conditions in the model were established by running the model in steady state with no active mine developments. This simulation represents the pre-mining flow regime described in the Updated Summary of Hydrogeology Existing Conditions (Golder 2022b), where the groundwater flow pattern is controlled by the water elevations of the large lakes (Figure 2). The predicted groundwater flow contours from this simulation are presented on the conceptual flow model shown on Figure 5 and is consistent with the interpreted flow pattern interpreted from Lake Elevations associated with open taliks (Figure 2).

4.6 Model Boundary Conditions – Transport

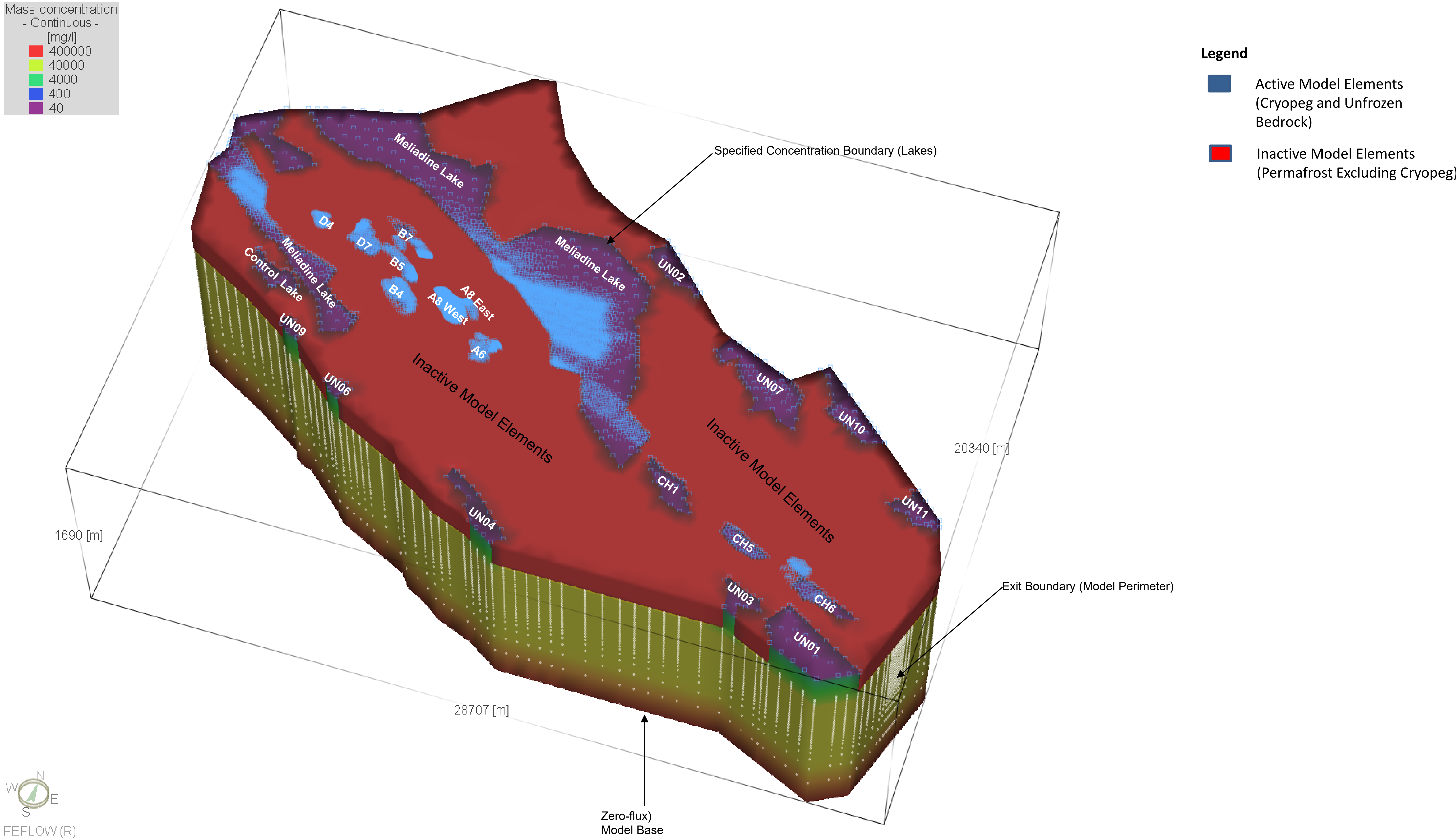
Initial TDS concentrations in each model layer were assigned based on the assumed concentrations of TDS versus depth shown on Figure 1.

Three types of boundary conditions were used to simulate transport of TDS in groundwater: specified concentration boundaries, zero flux boundaries, and exit (Cauchy type) boundaries. The location of these boundaries is shown Figure 13.

Specified concentration boundaries of zero milligrams per litre (mg/L) (freshwater) were assigned along the bottom of all lakes assumed to have open taliks in connection with the deep groundwater flow regime. TDS predictions in the model do not account for changes in the TDS concentrations in these lakes; TDS from these sources will be accounted for the in the Site Wide Water Quality Analysis. The numerical hydrogeologic model provides estimates of the groundwater flow from lakes over time to a specified underground or open pit for this purpose.

A specified concentration boundary of 500 mg/L was applied to Lake B4 starting in Year 2025 to represent that it will be dewatered and filled with contact water. A specified concentration boundary of 55,000 mg/L was applied to Lake B7 starting in Year 2025 to represent that it will be dewatered and then filled with saline water. The concentration of the saline water is an approximation and will need to be verified through surface water balance modelling. The saline concentration is likely to be variable given that it will mix with fresh water during freshet.Zero flux boundaries were assigned along the model bottom, which corresponds to the no flow boundaries described in Section 4.5.

Exit (Cauchy type) boundaries were assigned to the nodes representing the pit walls and underground developments. These boundaries simulated the movement of TDS mass out of the surrounding groundwater system and into the mine workings. Exit boundaries were also assigned to specified head boundaries along the perimeter of the model, allowing groundwater to enter or exit the model domain according to the predicted groundwater quality in the area of the specified head boundary.



CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
MODEL BOUNDARY CONDITIONS FOR TRANSPORT

PROJECT NO.	PHASE	REV.	FIGURE
20536890	2000	0	13

5.0 MODEL CALIBRATION

The calibration process involves refining the numerical model parameters to achieve the desired degree of correspondence between the model simulation results and the observations of the groundwater flow system, while reasonably representing the conceptual groundwater model. It consists of adjustments to hydraulic parameters within a reasonable range of values. If the hydraulic property adjustment fails to provide adequate calibration results, the conceptual model may be reviewed and refined, and the iterative adjustments of model parameters repeated.

The following sub-sections presents the calibration approach, targets and results of calibration. As documented in these sub-sections, a reasonable calibration is achieved to measured inflow and hydraulic heads, increasing model prediction confidence for predictions of groundwater inflow.

5.1 Calibration Approach

Due to the size of the model mesh and complexity of hydrostratigraphic units and boundary conditions, an automatic parameter estimation method was not appropriate for the model calibration, and calibration was carried out manually using professional judgement and observation to guide the trial-and-error changes to successive iterations during model calibration. During the calibration, the model was run repeatedly in transient model to simulate the development of the Tiriganiaq Underground between 2015 (first year where groundwater inflow was observed) and 2020 (the most recent full year of mining) available prior to initiating this modelling study, and the model parameters (hydraulic conductivity and specific storage) were iteratively adjusted until a reasonable agreement between predicted and observed hydraulic heads and groundwater inflow rates near the Tiriganiaq Underground were achieved. Model parameter adjustments were limited to values considered reasonable for a given hydrostratigraphic unit in consideration of the measured data.

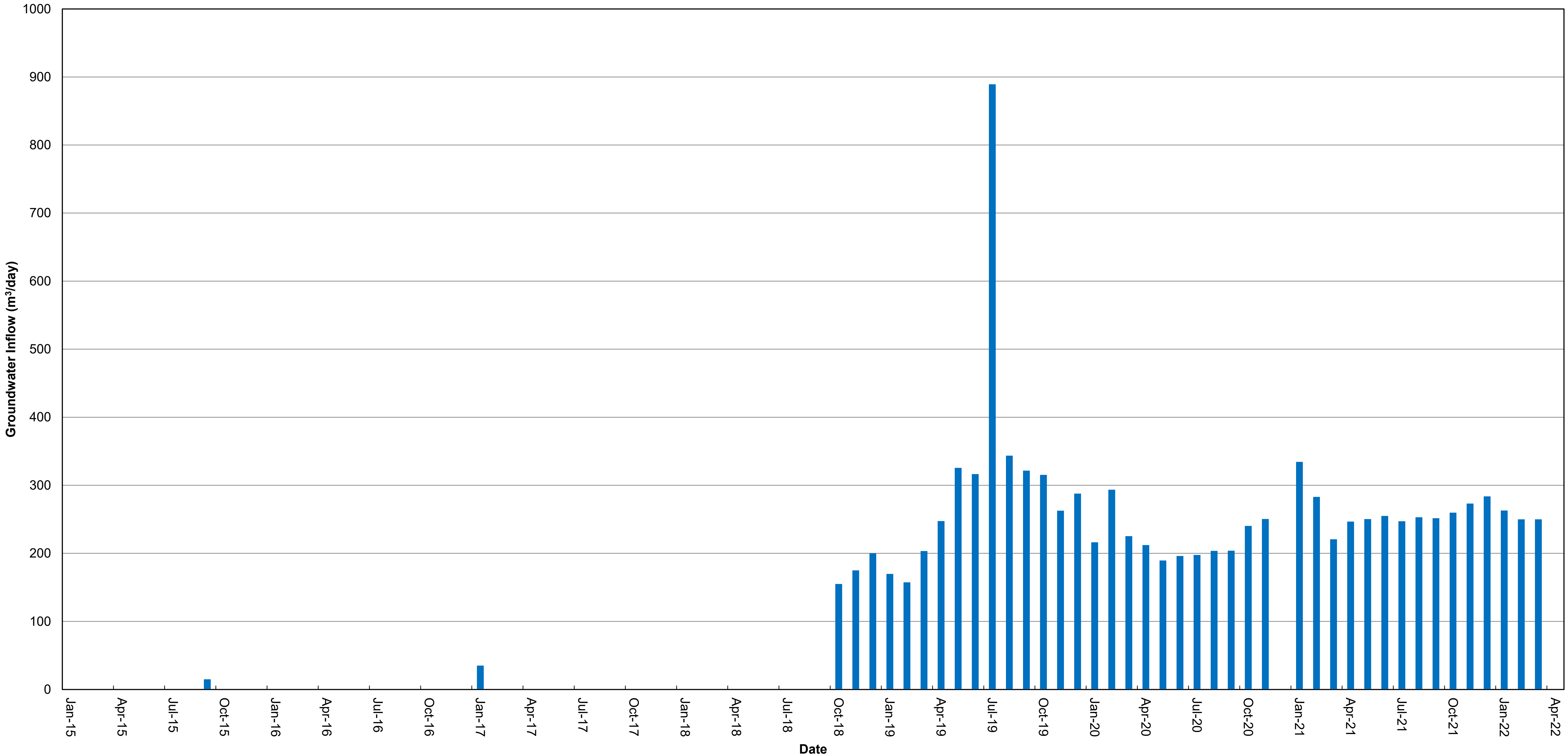
For the transient run, it is not practical to simulate the continual daily expansion of the underground development. Instead, the model boundaries were set to reflect ten development stages provided by Agnico Eagle for which calibration data is available. These stages included:

- Q4 2015, June 2016 and June 2017
- November 2018 and January 2019
- April and December 2020
- June and December 2021
- March 2022

5.2 Calibration Targets

Three data sets were used to assess the overall quality of calibration, as follows:

- Changes in hydraulic head observed in response to mining between 2015 and early 2022 at piezometers installed from the Tiriganiaq Underground.
- Changes in hydraulic head observed in response to the long-term recession test in the KMS Corridor at piezometers installed from the Tiriganiaq Underground.
- Estimated groundwater inflow to the Tiriganiaq Underground between 2015 and early 2022 (Figure 14).



CLIENT		PROJECT
AGNICO EAGLE		AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT
CONSULTANT	YYYY-MM-DD 2021-11-04	TITLE
wsp GOLDER	PREPARED HG	**GROUNDWATER INFLOW MEASUREMENTS FOR THE TIRIGANIAQ UNDERGROUND**
	DESIGNED HG	
	REVIEWED JL	
	APPROVED DC	PROJECT NO. 20136890 · PHASE 2000 · REV. 0 · FIGURE **14**

5.3 Calibration Results

5.3.1 Post-Calibration Hydraulic Parameters

As described in Section 5.1, hydraulic parameters (hydraulic conductivity, specific storage, and grouting properties) were adjusted from the initial values presented on Table 2 and Table 3 to achieve a suitable match between predicted and observed hydraulic heads and Tiriganiaq Underground inflows. Table 6 and Table 7 summarizes the final parameters for hydraulic conductivity and storage that provide the best fit to the measured data.

Table 6: Post-Calibration Hydraulic Properties – Competent Bedrock

Hydrostratigraphic Unit	Depth Interval (mbgs)	Hydraulic Conductivity[a] (m/s)	Specific Storage (1/m)	Effective Porosity (-)
Shallow Sedimentary Rock Formations	0 to 55	3×10^{-6}	1×10^{-6}	0.001
Sedimentary Rock Formations[b]	55 to <u>280</u>	<u>7×10^{-9}</u>	1×10^{-6}	0.001
	<u>280</u> to <u>370</u>	3×10^{-9}	1×10^{-6}	0.001
	<u>370</u> to 1500	3×10^{-9}	<u>1×10^{-6}</u>	0.001
Shallow Sedimentary Rock Formations	0 to 55	3×10^{-6}	<u>1×10^{-7}</u>	0.001
Mafic Volcanic Rock Formations[b]	55 to <u>280</u>	<u>7×10^{-9}</u>	<u>1×10^{-7}</u>	0.001
	<u>280</u> to <u>370</u>	<u>2×10^{-9}</u>	<u>1×10^{-7}</u>	0.001
	<u>370</u> to 1500	3×10^{-10}	<u>1×10^{-7}</u>	0.001

(a) Linearly decreasing hydraulic conductivity with temperature is assumed within the cryopeg zone with a full order of magnitude decrease assumed at the top of the basal cryopeg, and hydraulic conductivity equivalent to unfrozen rock at the bottom of the basal cryopeg.

(b) Underline value indicates parameter value changed from pre-calibration value (Table 3).

Table 7: Post-Calibration Hydraulic Properties – Enhanced Permeability Zones

Hydrostratigraphic Unit	Primary Deposit Area	Depth Interval (m)[(b)]	Thickness (m)	Hydraulic Conductivity (m^2/s)[(a)]	Specific Storage (1/m)	Effective Porosity (-)
Lower Fault Zone (Outside of KMS Corridor)	Tiriganiaq	0 to 1000	20	1×10^{-7}	1×10^{-7}	0.005
Lower Fault Zone (in KMS Corridor)	Tiriganiaq	0 to 1000	5	2×10^{-7}	1×10^{-7}	0.005
RM-175	Tiriganiaq	0 to 1000	5	5×10^{-8}	1×10^{-7}	0.005
KMS Fault Corridor	Tiriganiaq	0 to 1000	100 (variable)	$\underline{5 \times 10^{-7}}$	1×10^{-7}	0.005
North Fault	Tiriganiaq	0 to 1000	5	5×10^{-7}	1×10^{-7}	0.005
A	Wesmeg	0 to 1000	6	$\underline{5 \times 10^{-7}}$	1×10^{-7}	0.005
B	Wesmeg	0 to 1000	5	$\underline{5 \times 10^{-7}}$	1×10^{-7}	0.005
C	Wesmeg	0 to 1000	3	$\underline{1 \times 10^{-6}}$	1×10^{-7}	0.005
D	Wesmeg	0 to 1000	5	$\underline{5 \times 10^{-7}}$	1×10^{-7}	0.005
Pyke Fault	Pump	0 to 1000	15	$\underline{2 \times 10^{-7}}$	1×10^{-7}	0.005
AP0	Pump	0 to 1000	3	$\underline{1 \times 10^{-6}}$	1×10^{-7}	0.005
ENE2	Pump	0 to 1000	5	$\underline{5 \times 10^{-7}}$	1×10^{-7}	0.005
ENE3	Pump	0 to 1000	3	$\underline{1 \times 10^{-6}}$	1×10^{-7}	0.005
UM2	Pump	0 to 1000	6	$\underline{5 \times 10^{-7}}$	1×10^{-7}	0.005
NW1	Pump	0 to 1000	5	5×10^{-7}	1×10^{-7}	0.005
WNW1	F Zone	0 to 1000	3	$\underline{1 \times 10^{-6}}$	1×10^{-7}	0.005
WNW2	F Zone	0 to 1000	3	$\underline{1 \times 10^{-6}}$	1×10^{-7}	0.005
UAU2	F Zone	0 to 1000	2	$\underline{2 \times 10^{-6}}$	1×10^{-7}	0.005
Fault 1	Discovery	0 to 1000	5	1×10^{-6}	1×10^{-7}	0.005
Fault 2	Discovery	0 to 1000	5	1×10^{-6}	1×10^{-7}	0.005
Fault 3	Discovery	0 to 1000	5	1×10^{-6}	1×10^{-7}	0.005

(a) Hydraulic conductivity within the unfrozen permafrost zone is assumed to be lower than in the deeper unfrozen rock. Linearly decreasing hydraulic conductivity with temperature is assumed within this zone with a full order of magnitude decrease assumed at the top of the basal cryopeg, and hydraulic conductivity equivalent to unfrozen rock at the bottom of the basal cryopeg.

(b) Where fault hydraulic conductivity is less than shallow rock, the fault was excluded from 0 to 60 m depth interval. Where fault hydraulic conductivity is greater than shallow rock, fault was be included within 0 to 60 m depth interval.

(c) Underline value indicates parameter value changed from pre-calibration value (Table 4).

The following changes were made to improve the match to mine inflow and hydraulic heads:

- The hydraulic conductivity of the competent bedrock between approximately 55 and 500 mbgs was lowered to improve the match between measured and predicted groundwater inflows. Prior to model calibration, the assigned hydraulic conductivity for this depth interval had generally been raised relative to the previous groundwater model to reflect supplemental data collection in 2021 (Golder 2022b). This change, however, was found to significantly over predict groundwater inflow and the hydraulic conductivity was therefore reduced. Assigned hydraulic conductivity values are within the range of measurements measured from packer testing (Golder 2022b).
- The hydraulic conductivity of the faults within the Project area were reduced by a factor of 2, except for the Lower Fault Zone, KMS Corridor and RM-175. This change improved the match between measured and predicted groundwater inflows and is supported by recent supplemental fault testing in 2021 (test results from supplemental testing were lower than the final values at the end of calibration).

  The hydraulic conductivity of the KMS corridor was increased slightly from 4×10^{-7} to 5×10^{-7} m/s to improve the match to predicted changes in hydraulic head during the long-term recession test.

5.3.2 Measured versus Predicted Hydraulic Head

Figure 7 and Figure 15 show the locations of boreholes with vibrating wire sensors to monitor hydraulic heads. A summary of pressure monitoring data used in the calibration process is presented on Figure 16 to 19. The pressure recorded at each vibrating wire sensor was converted to equivalent fresh water hydraulic head according to the following equation:

$$P = \rho_{fw} * g * H_{fw}$$

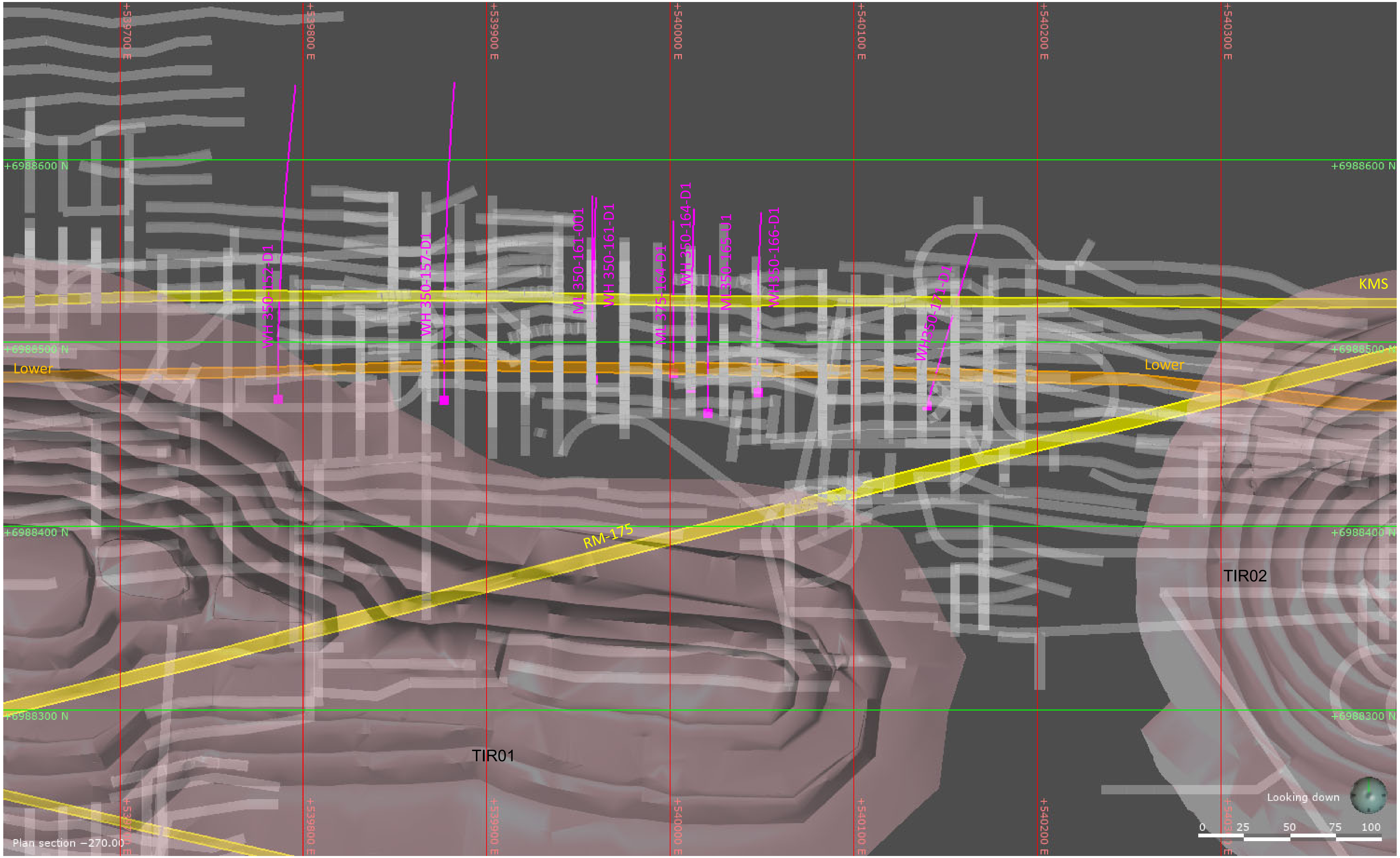
$$H_{fw} = \frac{P}{\rho_{fw} * f}$$

Where P is the pressure measured at the sensor, ρ_{fw} is density of freshwater (1000 kg/m^3), g is the gravitation constant (9.8 m^2/s) and H_{fw} is the equivalent freshwater hydraulic head. The long-term trends in the measured hydraulic head data (expressed as equivalent freshwater hydraulic head) were used to understand the extent of depressurization near the underground and the relative changes in that hydraulic head at different locations as mining progressed (the relative change in hydraulic head was a calibration target).

5.3.2.1 Flow Recession Test

Figure 7 and Figure 15 show the locations of boreholes with vibrating wire sensors to monitor hydraulic heads. Figure 20 to Figure 22 presents a summary of the measured versus predicted hydraulic head during the flow recession test in 2020. During this test, a ‘pumping well’ was allowed to flow from an open borehole for approximately 72 hrs and the change in head recorded at piezometers installed nearby. The flowing borehole was simulated in FEFLOW using discrete features elements to represent the borehole, with a specified flux boundary assigned to the collar equal to the observed flow rate.

During the test, minimal response to testing was observed in piezometer sensors at PZ-RF-200-01 and PZ-ES225-02 within the Volcanic Rock Formations, which is consistent with model predictions. For the other piezometers, responses were observed that were also reasonably reproduced by the model predictions (Figure 21 and Figure 22) indicating a good fit to the observed data. Where a response was observed, the magnitude of the response varied from less than 10 m to just under 25 m. As discussed in the existing conditions report (Golder 2022b) the responses were variable, even for sensors equidistance to the pumping well, suggesting some compartmentalization within the corridor. Given that this compartmentalization can not be accurately defined nor practically simulated in a model of this scale, the objective of the calibration was to match the general trend of data, which would indicate the model can predict the influence of this corridor on groundwater flow to the underground. This objective is considered to have been achieved.



LEGEND

Regional Fault

Supplemental Faults Based on 2020 Agnico Eagle Review

Borehole Collar / Borehole Trace

Fault traces are shown for an elevation of -270 masl.

CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT

AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

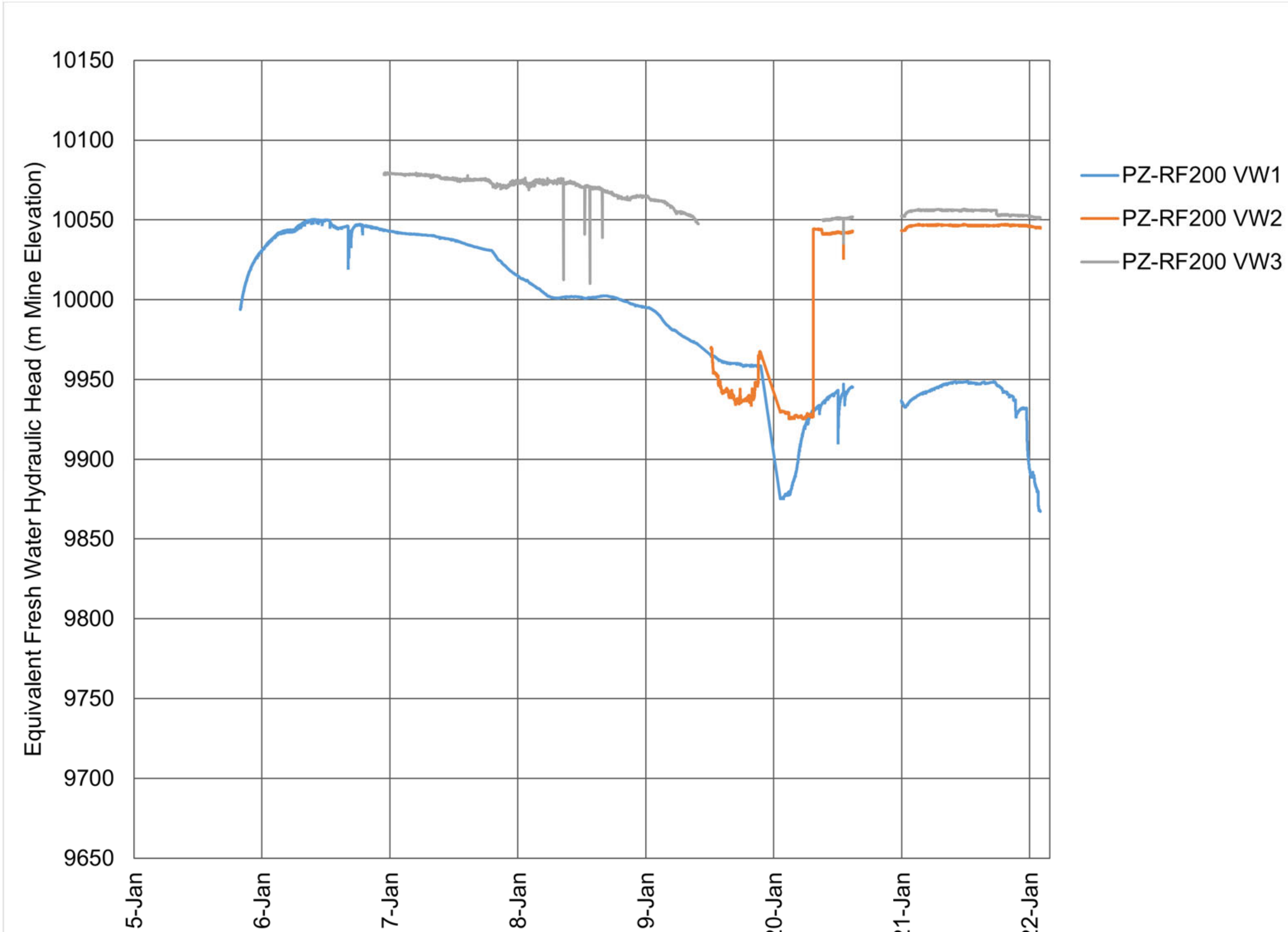
TITLE

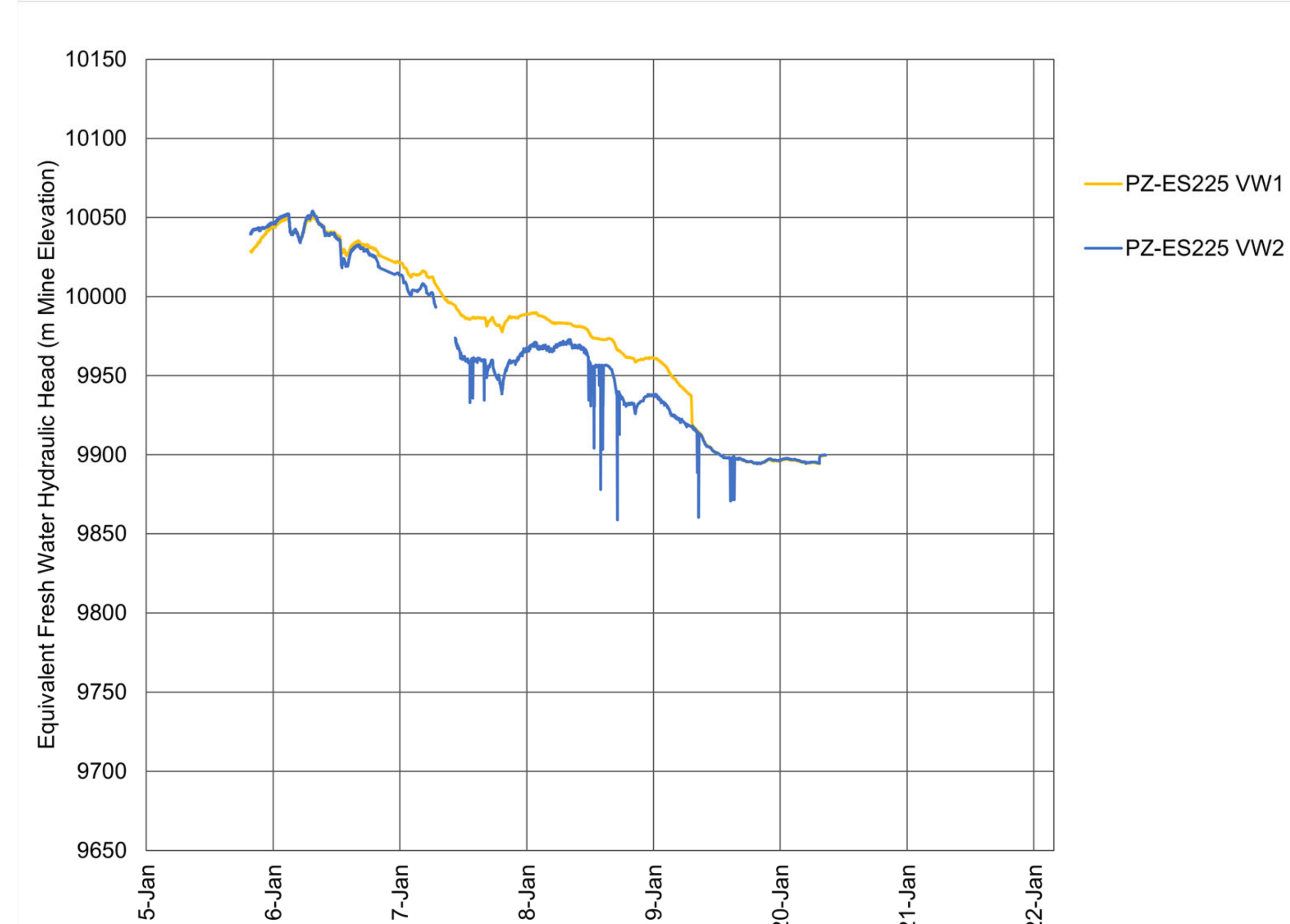
BOREHOLE LOCATIONS FOR HYDRAULIC TESTING AND GROUNDWATER SAMPLING – KMS CORRIDOR

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	**15**

25 mm

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B





Piezometer	Borehole ID	Node	Sensor Elevation (m Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)	Hydrostratigraphic Unit
PZ-RF200-01	TIS-200-001	VW1	9729.3	-270.7	325.7	Volcanic Rock Formations
		VW2	9680.9	-319.1	374.1	Volcanic Rock Formations
		VW3	9435.3	-564.7	619.7	Volcanic Rock Formations
PZ-ES225-02	TIS-225-001	VW1	9726.8	-273.2	328.2	Volcanic Rock Formations
		VW2	9678.5	-321.5	376.5	Volcanic Rock Formations

Note: Mine Grid Elevation is 10,000 m higher than Geodetic Elevation (masl).

As-Built Stage	Deepest Elevation of Mine (masl)	Deepest Elevation of Mine (m Mine Grid)
Q4 2015	-235	9765
Jun-16	-280	9720
Jun-17	-325	9675
Nov-18	-355	9645
Jan-19	-355	9645
Apr-20	-375	9625
Mar-22	-430	9570

CLIENT

AGNICO EAGLE

CONSULTANT

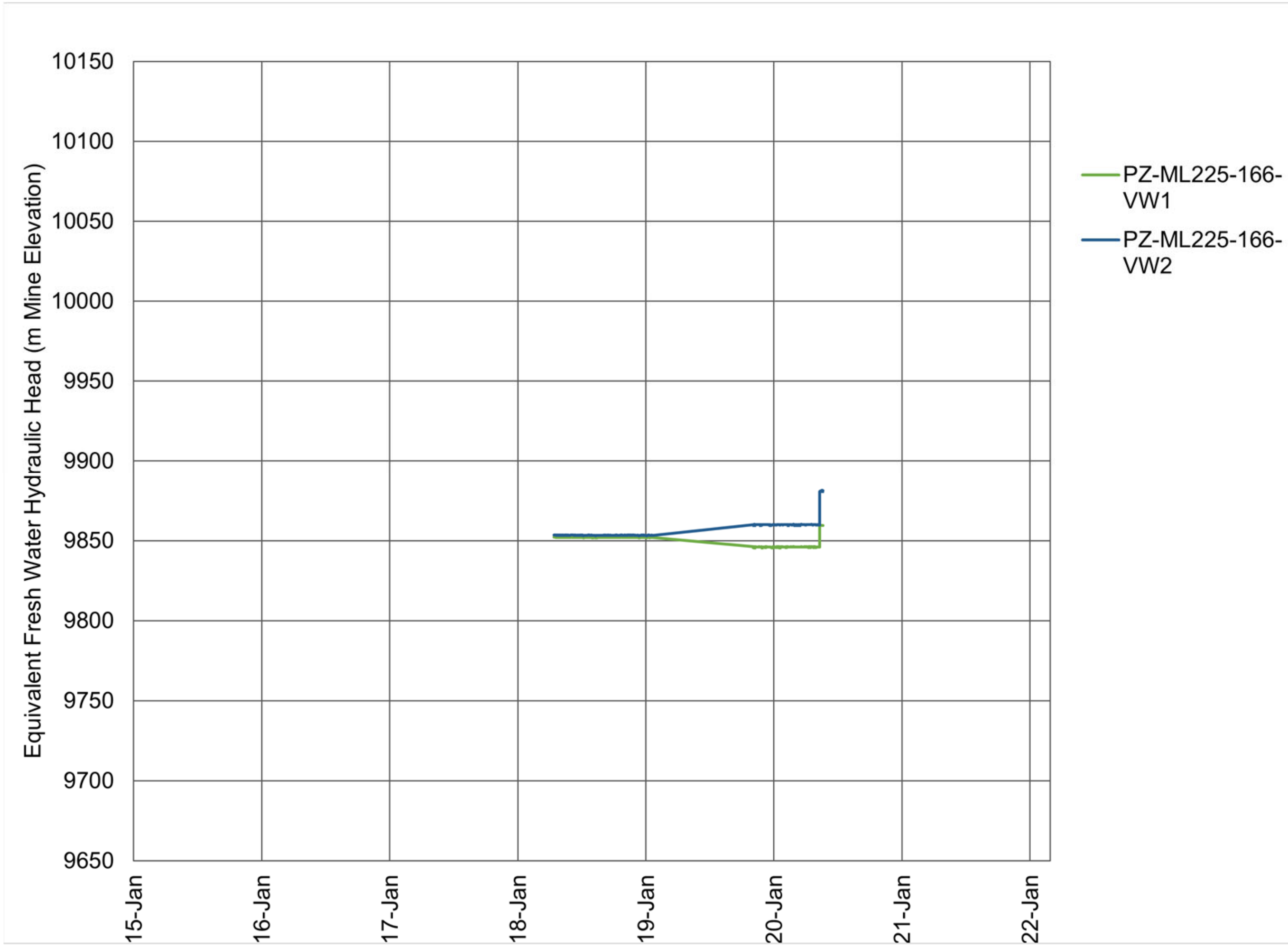
wsp GOLDER

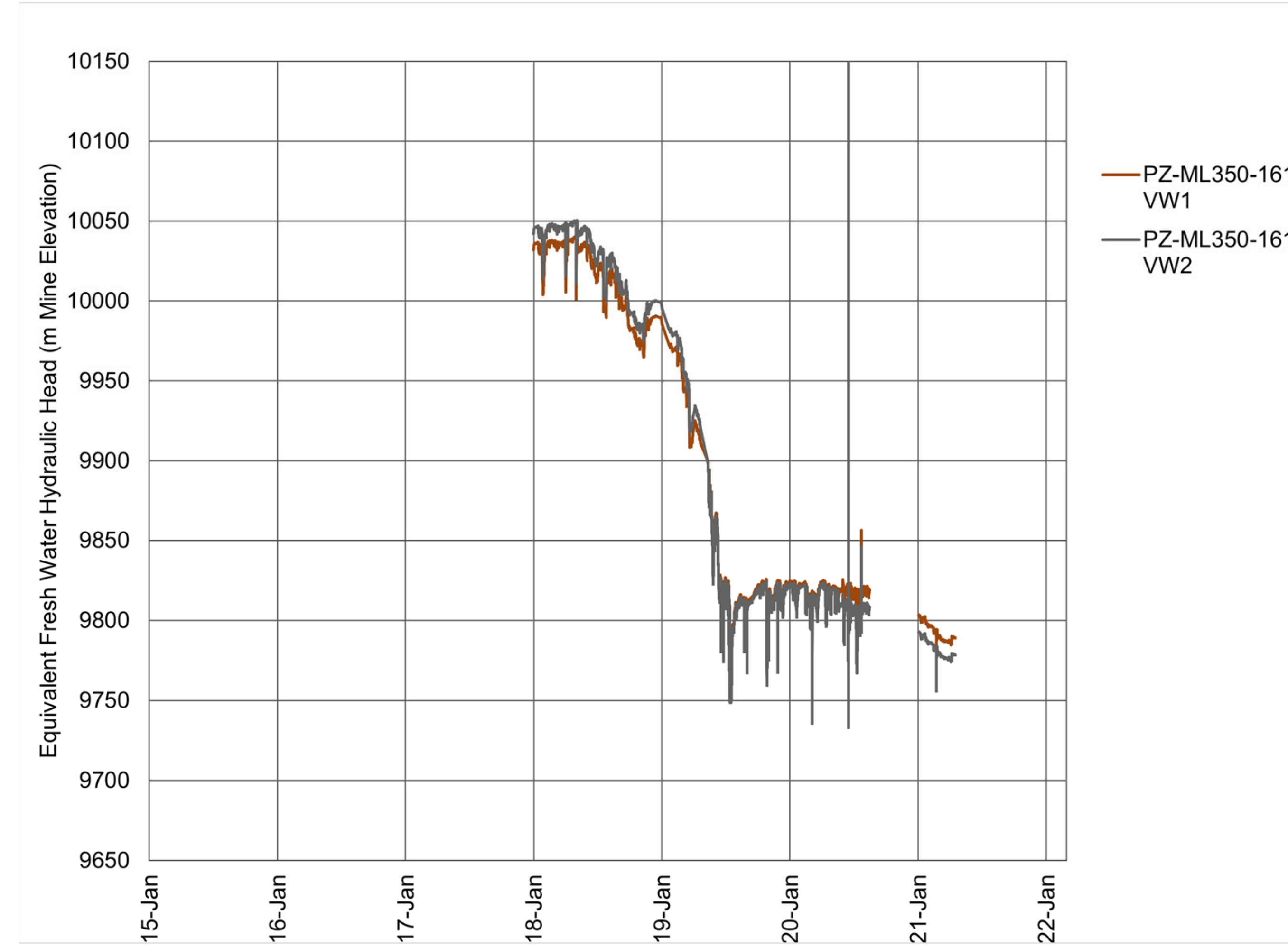
YYYY-MM-DD 2021-11-04
PREPARED HG
DESIGNED HG
REVIEWED JL
APPROVED DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
PRESSURE MONITORING DATA – TIRIGANIAQ UNDERGROUND – PART 1

PROJECT NO. 20136896
PHASE 2000
REV. 0
FIGURE 16





Piezometer	Borehole ID	Node	Sensor Elevation (m Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)	Hydrostratigraphic Unit
PZ-ML17-225-166	ML17-225-166-F1	VW1	9856.1	-143.9	198.9	Volcanic Rock Formations
		VW2	9856	-144	199.3	Lower Fault/KMS Corridor
PZ-ML17-350-161	ML17-350-161-001	VW1	9732	-268	323.4	Lower Fault/KMS Corridor
		VW2	9732	-268	323.2	Lower Fault/KMS Corridor

Note: Mine Grid Elevation is 10,000 m higher than Geodetic Elevation (masl).

As-Built Stage	Deepest Elevation of Mine (masl)	Deepest Elevation of Mine (m Mine Grid)
Q4 2015	-235	9765
Jun-16	-280	9720
Jun-17	-325	9675
Nov-18	-355	9645
Jan-19	-355	9645
Apr-20	-375	9625
Mar-22	-430	9570

CLIENT
AGNICO EAGLE

CONSULTANT
WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
PRESSURE MONITORING DATA – TIRIGANIAQ UNDERGROUND – PART 2

PROJECT NO.	PHASE	REV.	FIGURE
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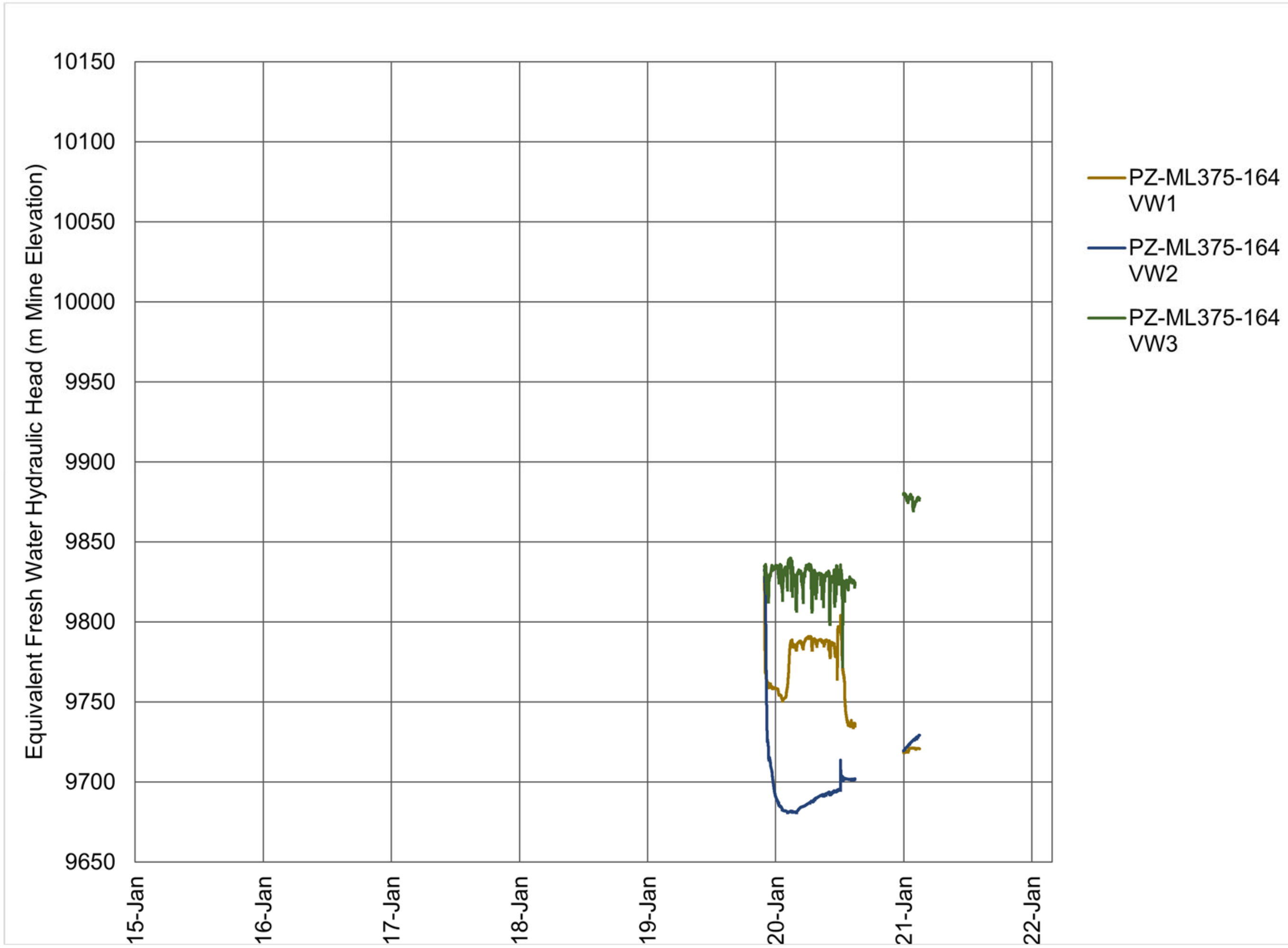
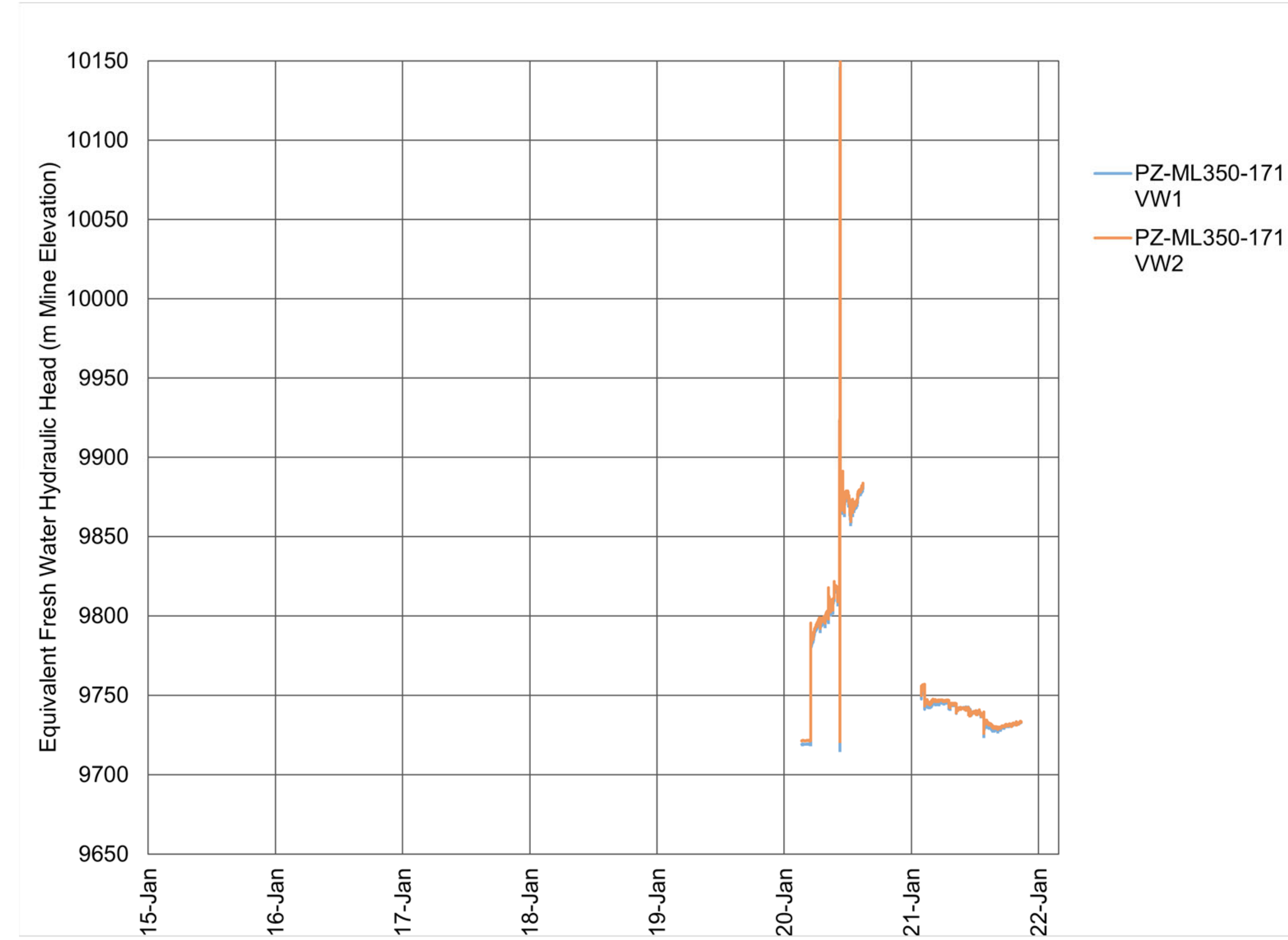




Piezometer	Borehole ID	Node	Sensor Elevation (m Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)	Hydrostratigraphic Unit
PZ-ML375-164	ML376-164-D1	VW1	9694	-306	361	Lower Fault/KMS Corridor
		VW2	9683	-317	372	Lower Fault/KMS Corridor
		VW3	9681	-319	374	Lower Fault/KMS Corridor
PZ-ML350-171	ML350-171-D1	VW1	9714	-286	341	Lower Fault/KMS Corridor
		VW2	9712	-288	343	Lower Fault/KMS Corridor

Note: Mine Grid Elevation is 10,000 m higher than Geodetic Elevation (masl).

As-Built Stage	Deepest Elevation of Mine (masl)	Deepest Elevation of Mine (m Mine Grid)
Q4 2015	-235	9765
Jun-16	-280	9720
Jun-17	-325	9675
Nov-18	-355	9645
Jan-19	-355	9645
Apr-20	-375	9625
Mar-22	-430	9570

CLIENT
AGNICO EAGLE

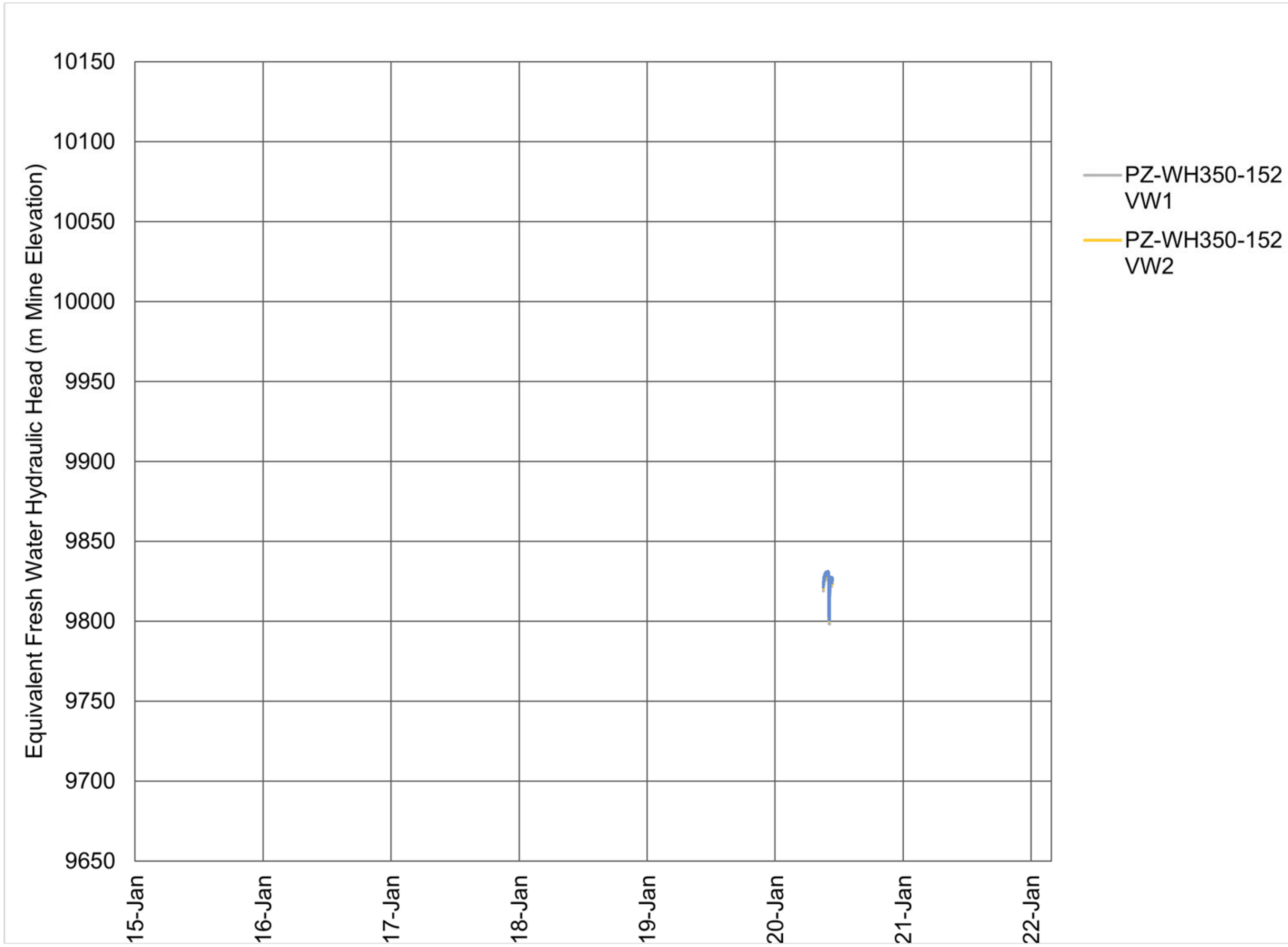
CONSULTANT
wsp GOLDER

YYYY-MM-DD 2021-11-04
PREPARED HG
DESIGNED HG
REVIEWED JL
APPROVED DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
PRESSURE MONITORING DATA – TIRIGANIAQ UNDERGROUND – PART 3

PROJECT NO. 20136436 | PHASE 2000 | REV. 0 | FIGURE 18



Piezometer	Borehole ID	Node	Sensor Elevation (m Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)	Hydrostratigraphic Unit
PZ-WH350-152	WH350-152-D1	VW1	9724	-276	331	Lower Fault/KMS Corridor
		VW2	9720	-280	335	Lower Fault/KMS Corridor
		VW3	9715	-285	340	Sedimentary Rock Formations

Note: Mine Grid Elevation is 10,000 m higher than Geodetic Elevation (masl).

As-Built Stage	Deepest Elevation of Mine (masl)	Deepest Elevation of Mine (m Mine Grid)
Q4 2015	-235	9765
Jun-16	-280	9720
Jun-17	-325	9675
Nov-18	-355	9645
Jan-19	-355	9645
Apr-20	-375	9625
Mar-22	-430	9570

CLIENT
AGNICO EAGLE

CONSULTANT
WSP GOLDER

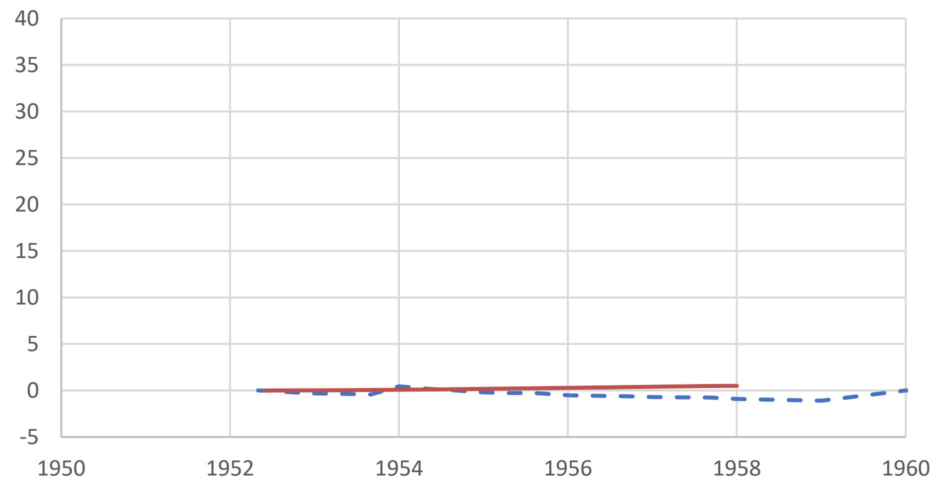
YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

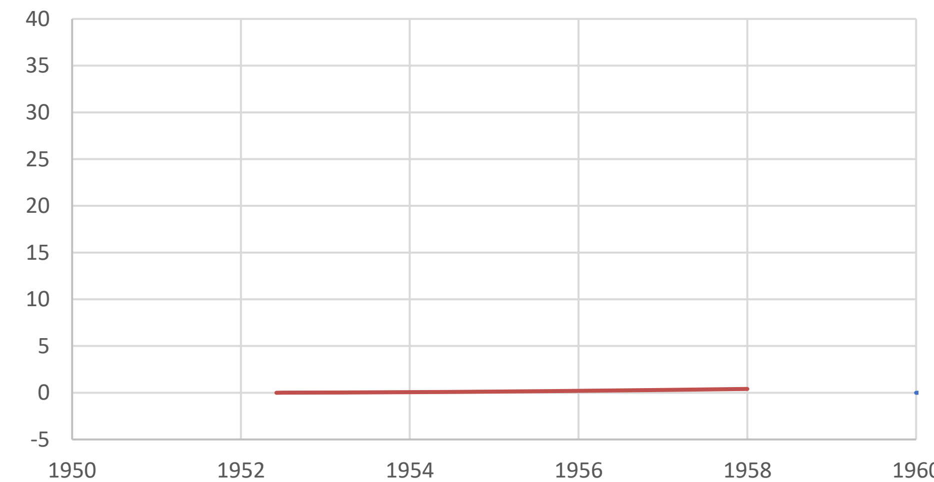
TITLE
PRESSURE MONITORING DATA – TIRIGANIAQ UNDERGROUND – PART 4

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	19

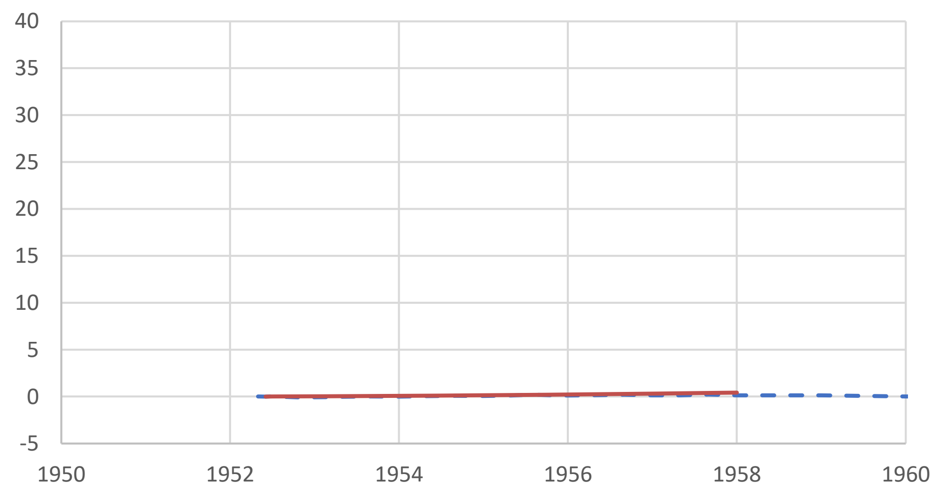
PZ-RF200-01-VW1



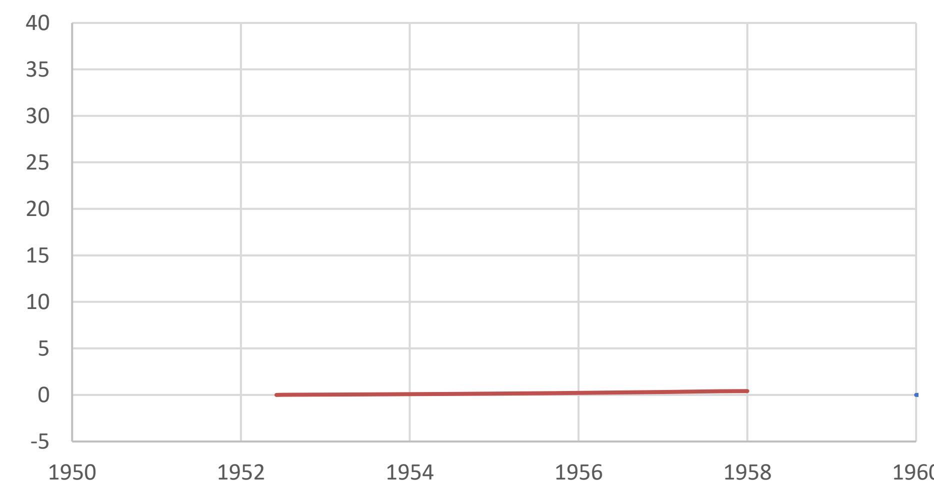
PZ-ES225-02-VW1



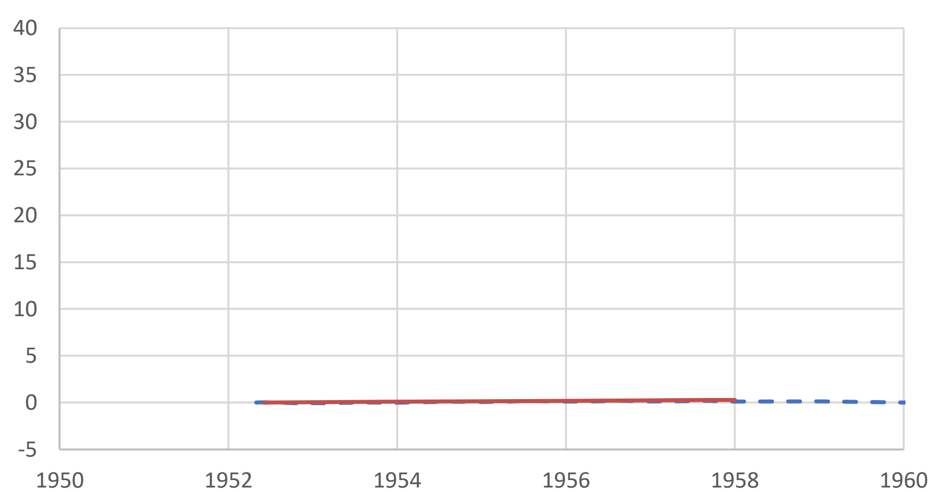
PZ-RF200-01-VW2



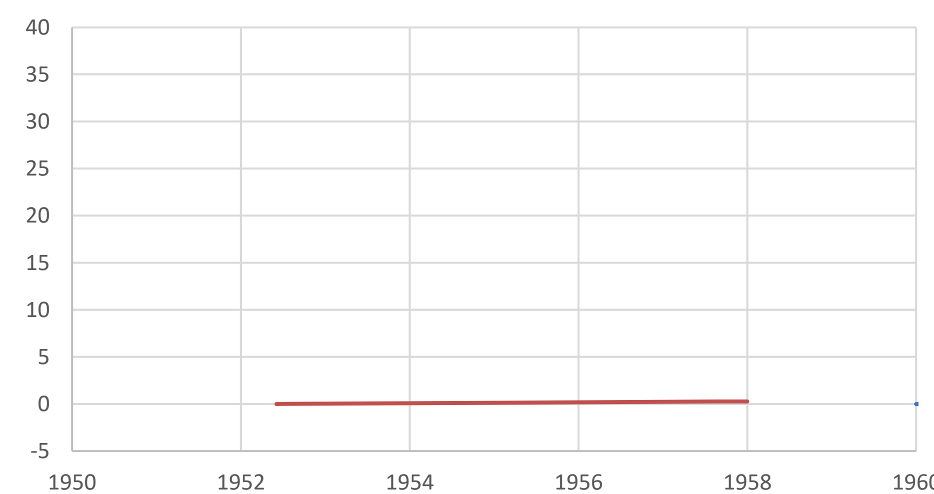
PZ-ES225-02-VW2



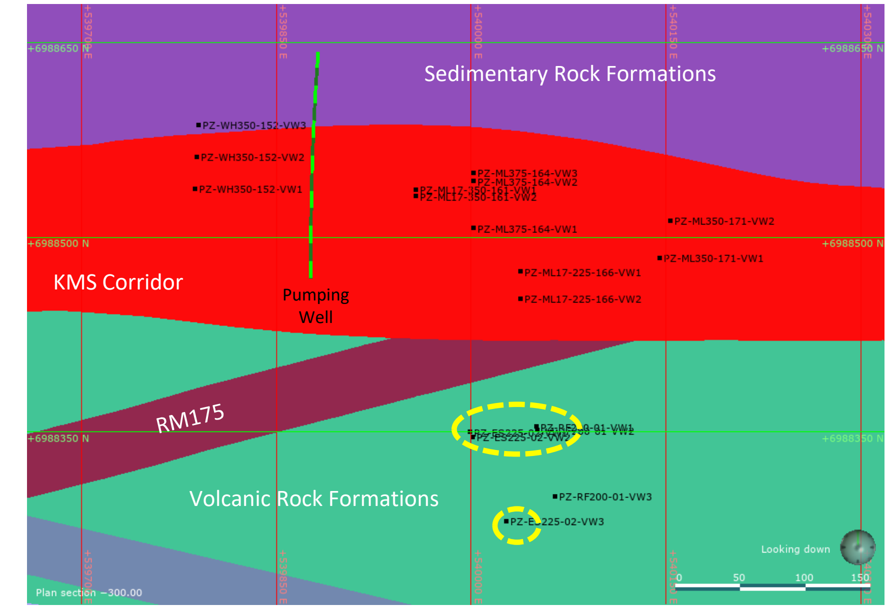
PZ-RF200-01-VW3



PZ-ES225-02-VW3



Conceptual Hydrostratigraphy (-300 mals)



Legend

- - - - Observed

——— Predicted

Notes:
X-axis on plots are model simulation time in days. Day zero corresponds to the start of Year 2015.
Y-axis on plots are predicted / measured changed in hydraulic head (masl).

Piezometer	Borehole ID	Node	Sensor Elevatin (Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)
PZ-RF200-01	TIS-200-001	VW1	9729.3	270.70	325.7
		VW2	9680.9	319.10	374.1
		VW3	9435.3	564.70	619.7
PZ-ES225-02	TIS-225-001	VW1	9726.8	273.20	328.2
		VW2	9678.5	321.50	376.5

CLIENT
AGNICO EAGLE

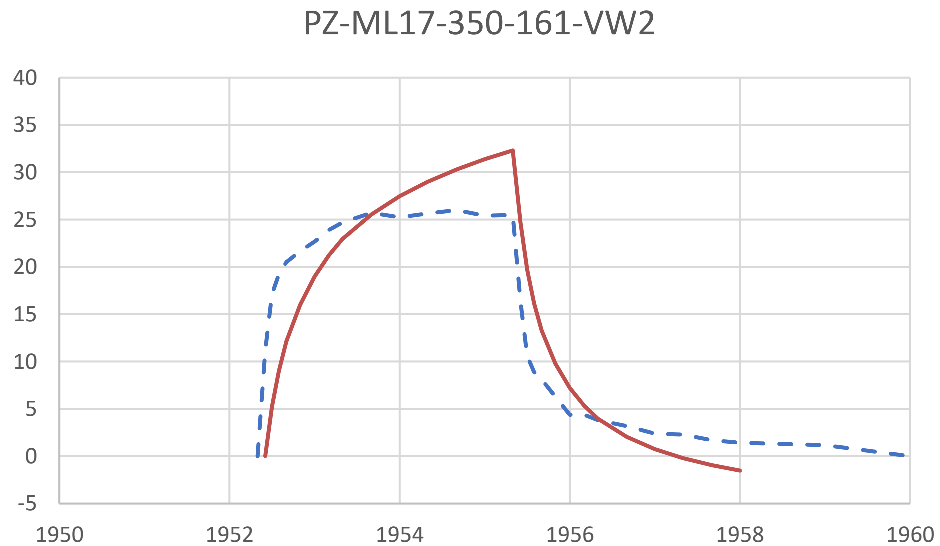
CONSULTANT
WSP GOLDER

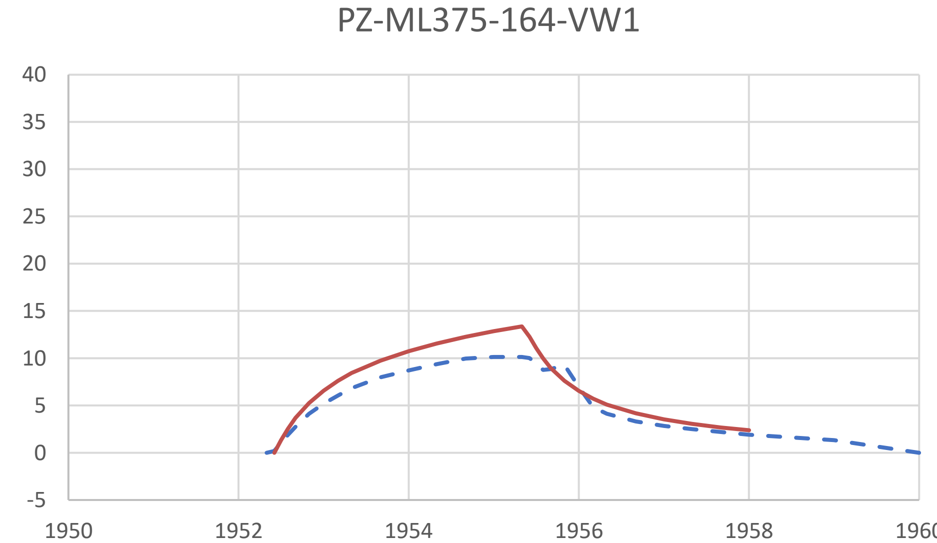
YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

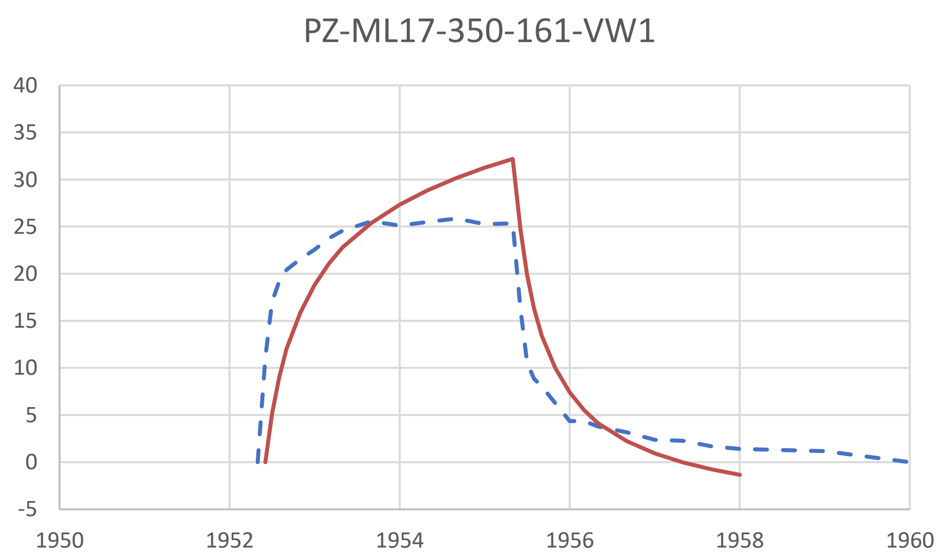
PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

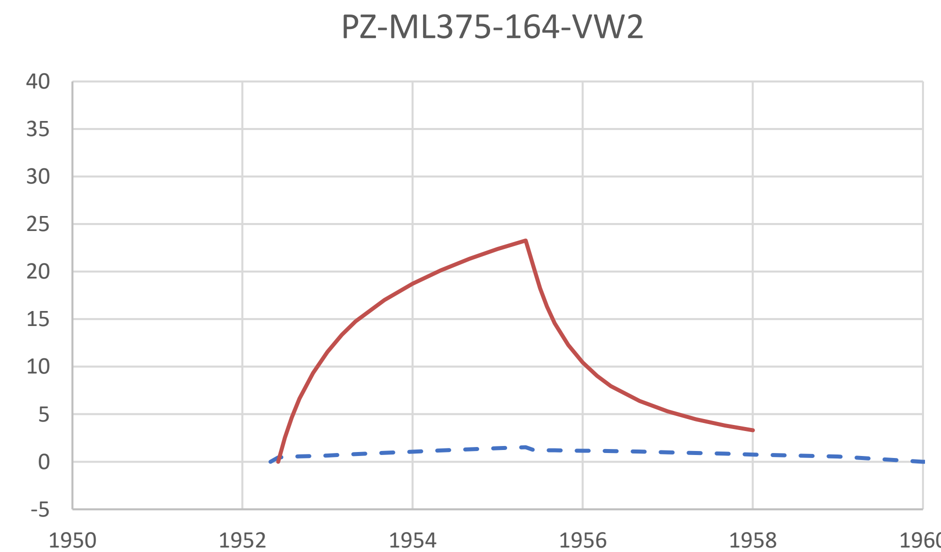
TITLE
RECESSION TEST CALIBRATION RESULTS
PZ-RF200-01 AND PZ-ES225-02

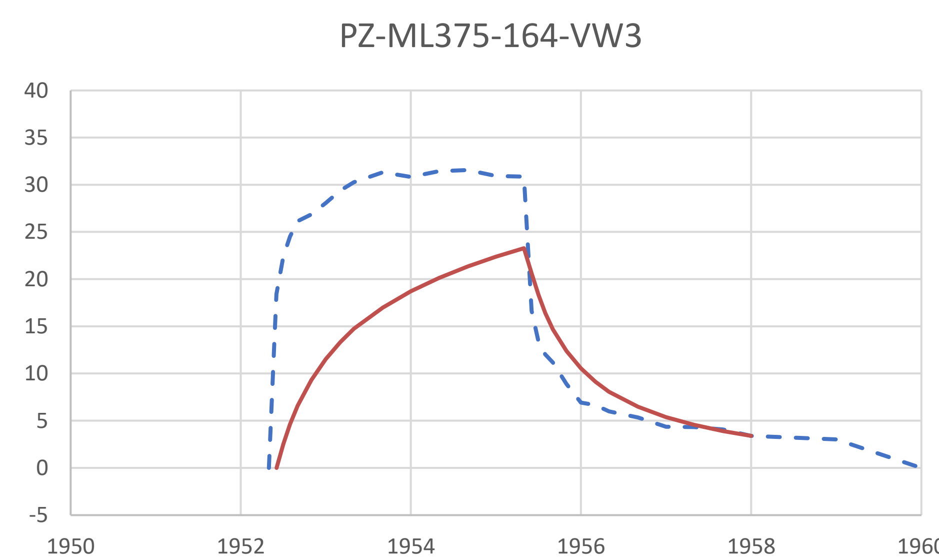
PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	**20**



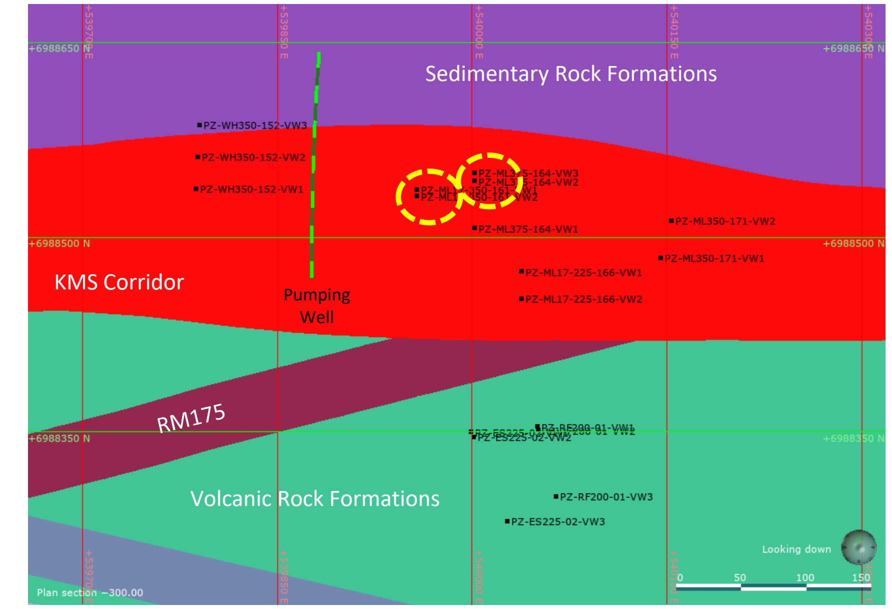








Conceptual Hydrostratigraphy (-300 mals)



Legend

- - - - Observed

—— Predicted

Notes:
X-axis on plots are model simulation time in days. Day zero corresponds to the start of Year 2015.
Y-axis on plots are predicted / measured change in hydraulic head (masl).

Piezometer	Borehole ID	Node	Sensor Elevatin (Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)
PZ-ML17-350-161	ML17-350-161-001	VW1	9732	268.40	323.4
		VW2	9732	268.20	323.2
PZ-ML375-164	ML376-164-D1	VW1	9694	306.00	361.0
		VW2	9683	317.00	372.0
		VW3	9681	319.00	374.0

CLIENT
AGNICO EAGLE

CONSULTANT
wsp GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
RECESSION TEST CALIBRATION RESULTS
PZ-ML177-350-161 AND PZ-ML375-164

PROJECT NO.	PHASE	REV.	FIGURE
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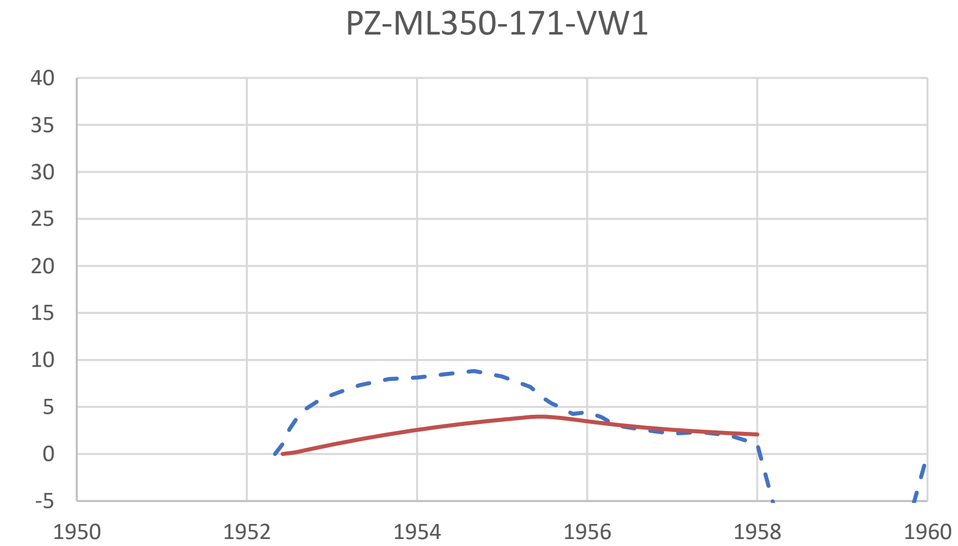
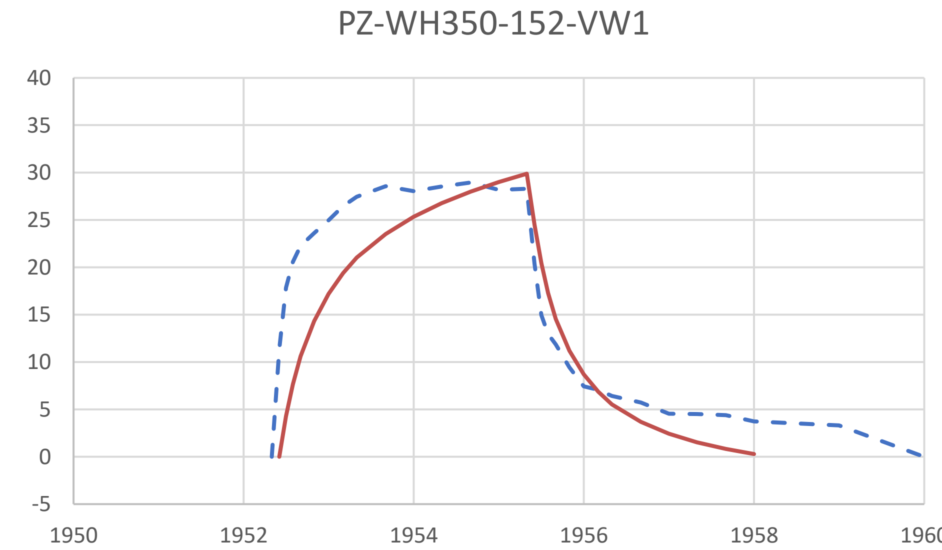
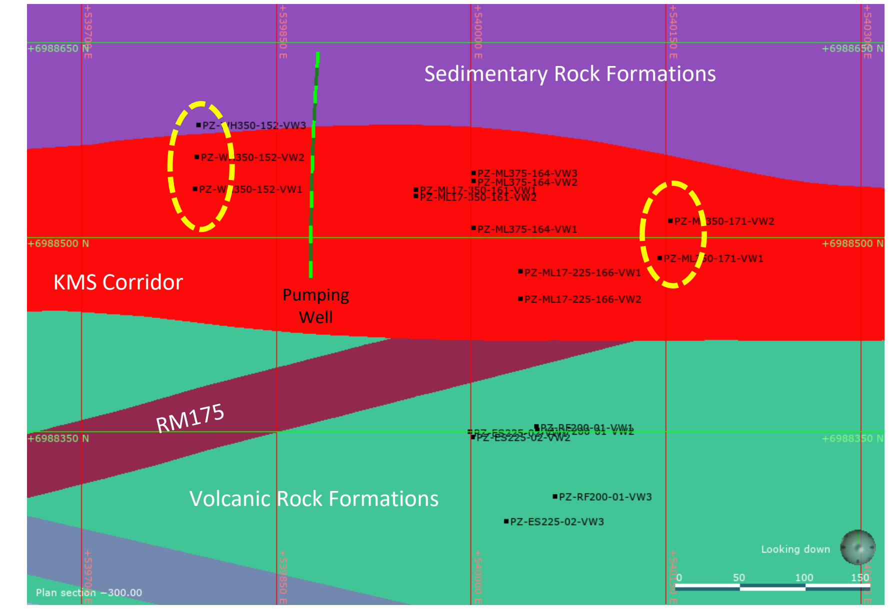
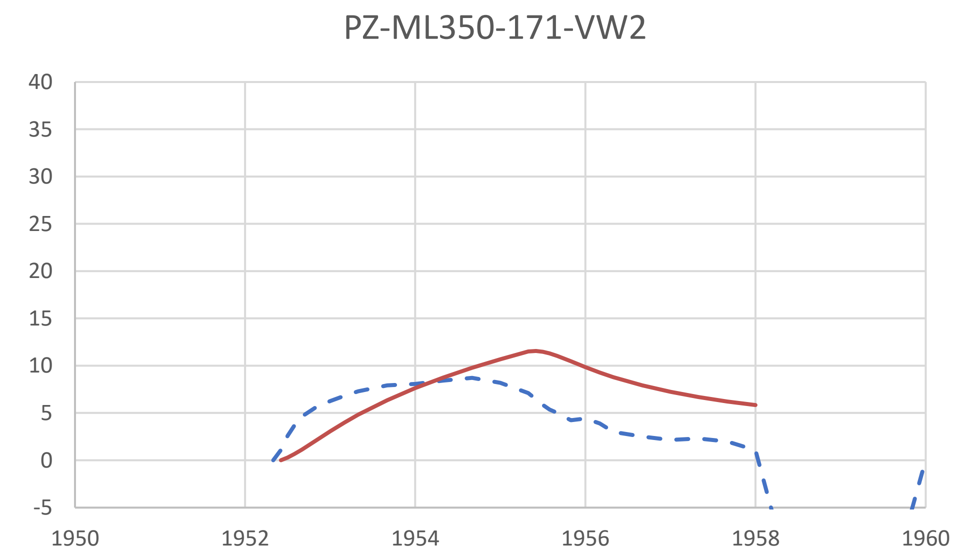
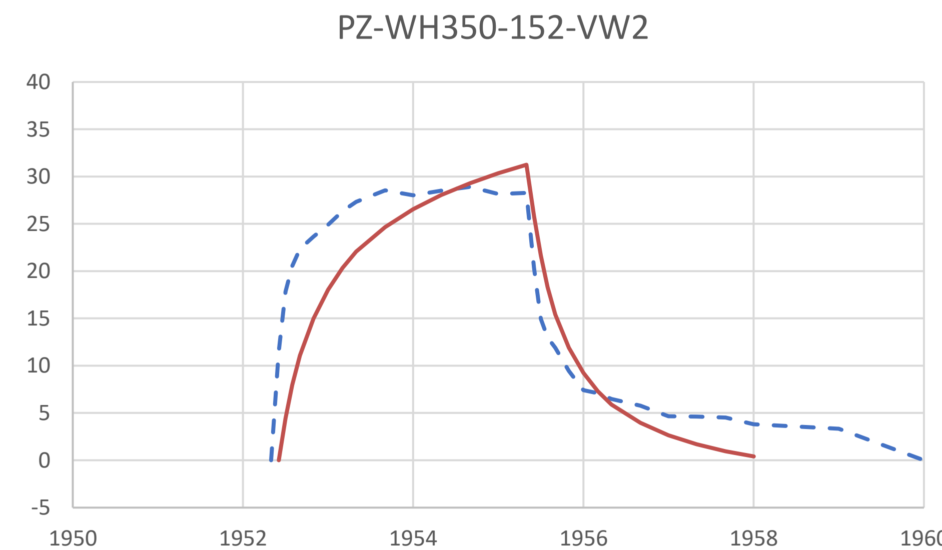


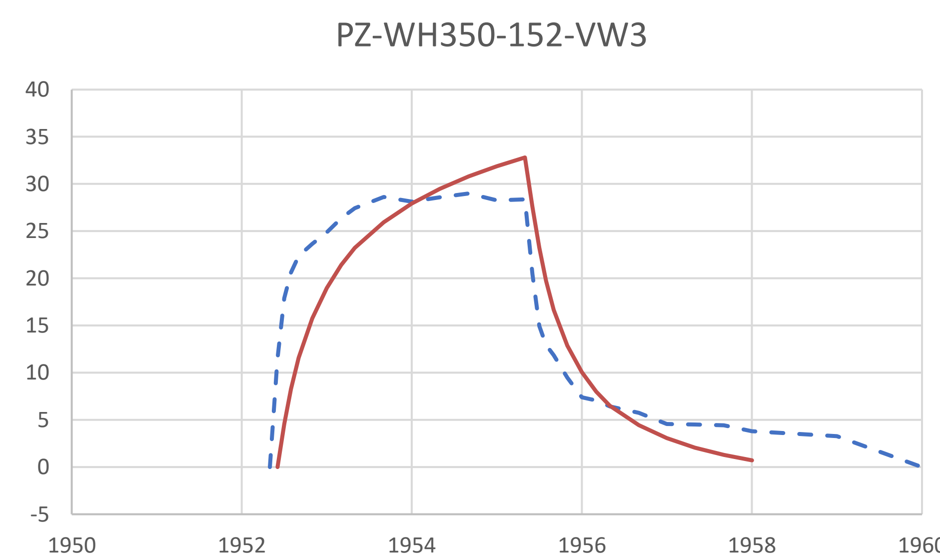


Conceptual Hydrostratigraphy (-300 mals)









Legend

Observed

Predicted

Notes:
X-axis on plots are model simulation time in days. Day zero corresponds to the start of Year 2015.
Y-axis on plots are predicted / measured change in hydraulic head (masl).

Piezometer	Borehole ID	Node	Sensor Elevatin (Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)
PZ-ML350-171	ML350-171-D1	VW1	9714	286.00	341.0
		VW2	9712	288.00	343.0
PZ-WH350-152	WH350-152-D1	VW1	9724	276.00	331
		VW2	9720	280.00	335
		VW3	9715	285.00	340

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PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
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CONSULTANT

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YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

TITLE
RECESSION TEST CALIBRATION RESULTS
PZ-ML350-171 AND PZ-WH350-152

PROJECT NO.	PHASE	REV.	FIGURE
[illegible]	2000	0	**22**

5.3.2.2 Long-term Hydraulic Head Monitoring

Figure 23 to Figure 25 presents the predicted versus observed hydraulic head in the piezometers installed near Tiriganiaq. The observed data in these figures has been smoothed to reflect the average trend of the data and to facilitate easier comparison to model predictions. The observed data is responsive to the actual progress of the Tiriganiaq Underground for the period of record available for the transducers. The longest data set is available for the PZ-RF200-01 and PZ-ES225, followed by PZ-ML-360-161, which was installed in the 2015 Underground Program (Golder 2016). The remaining piezometers have shorter records, having been recently installed at the Tiriganiaq Underground in support of the 2020 flow recession testing.

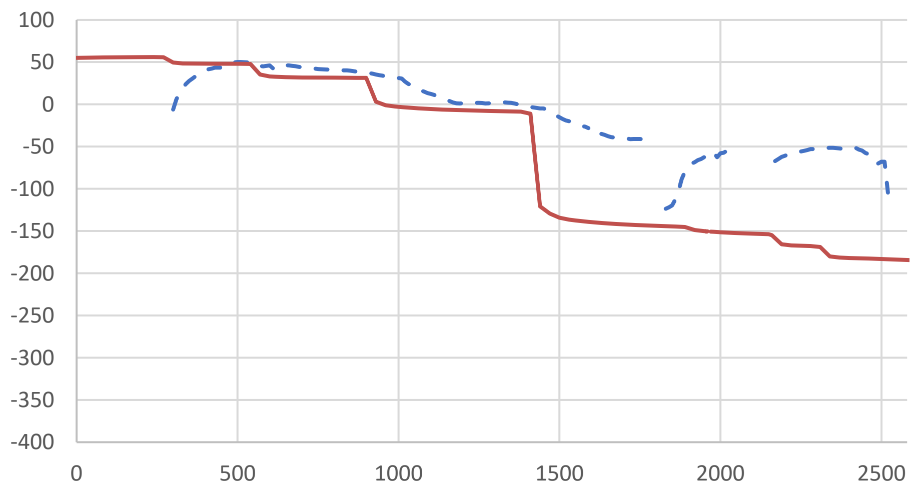
The predicted data presented on Figure 23 to Figure 25 is representative of the progression of the underground through the ten as-built development stages included in the transient calibration model. Despite this simplification of the mine plan, the trend of the predicted data reasonably matches the trend of the observed data, indicating a good calibration has been achieved. A precise fit was never considered reasonable to achieve given the simplifications of the mine plan, faults and representation of grouting in the model, however given the model reproduces the general trend of these data, the model is considered capable of reproducing groundwater flow conditions in the area of the underground for the objectives of the model.

5.3.3 Measured versus Predicted Groundwater Inflow

Figure 26 presents a summary of measured versus predicted groundwater flow to the Tiriganiaq underground at the end of calibration. Predicted inflows are generally within a factor of 1.5 of measured inflows, and in general are similar to, or above the estimated inflows. Exceptions are the peak monthly flows measured in 2019 and 2020 during periods where boreholes were allowed to free drain into the underground as part of recession testing. Model calibration does not simulate this condition and therefore underestimates this period of flows.

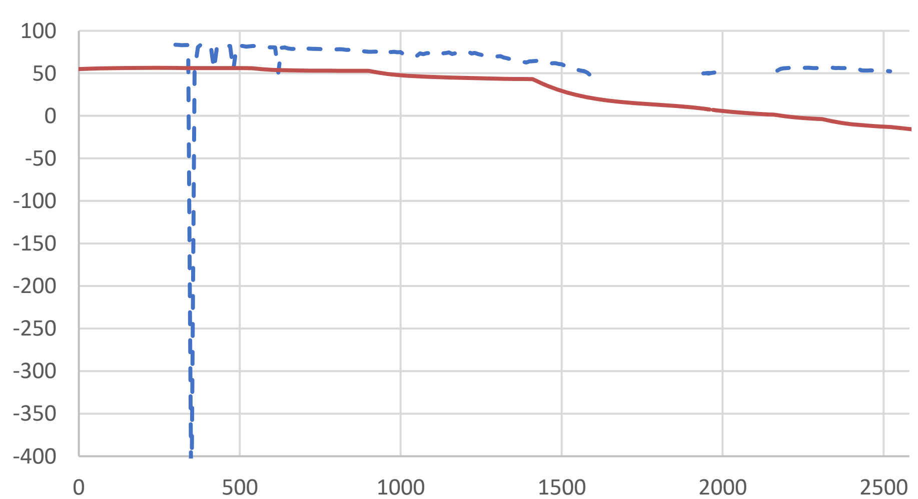
Overall mass balance error in the model domain was less than 0.1%, indicating numerical stability in the predicted inflows. A mass balance error of less than 0.1% indicates the total inflow to the model domain was within 0.1% of outflow to the model domain.

PZ-RF200-01-VW1

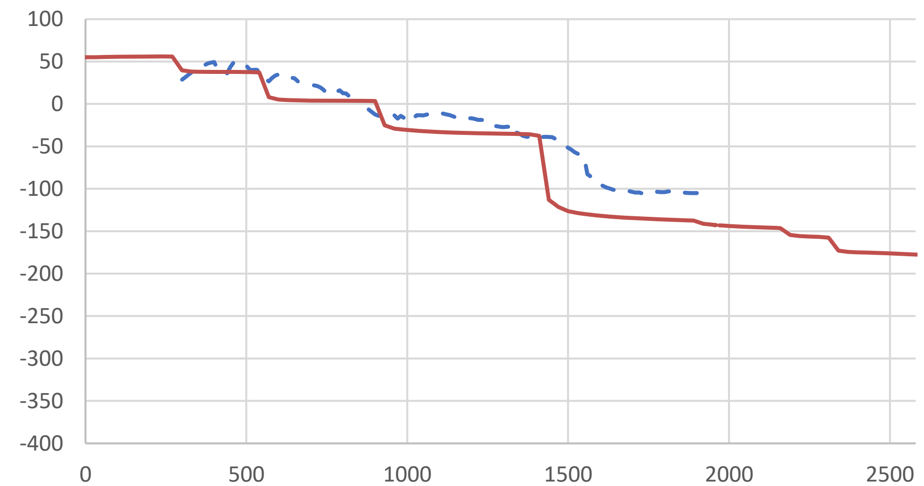


PZ-RF200-01-VW2

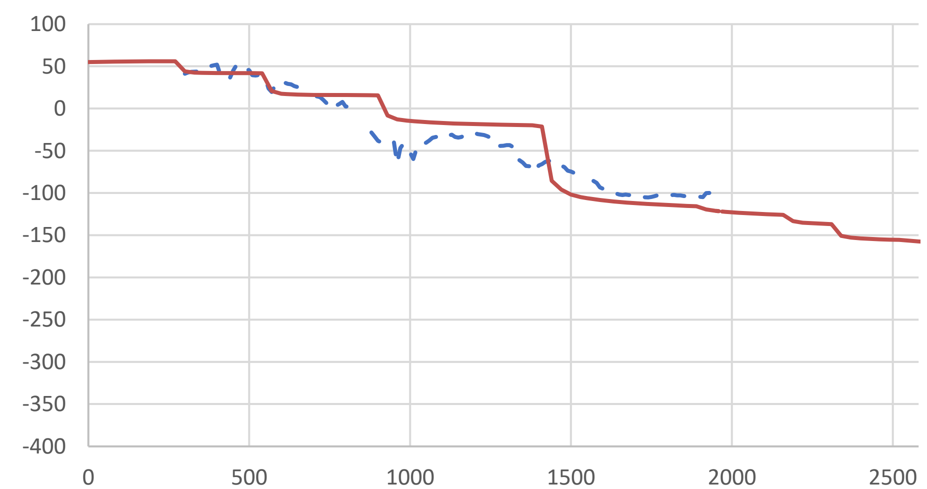
PZ-RF200-01-VW3



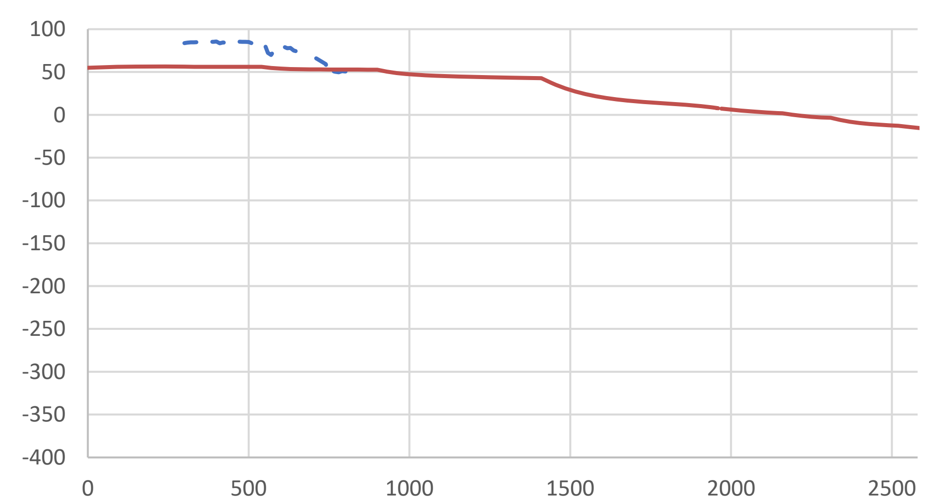
PZ-ES225-02-VW1



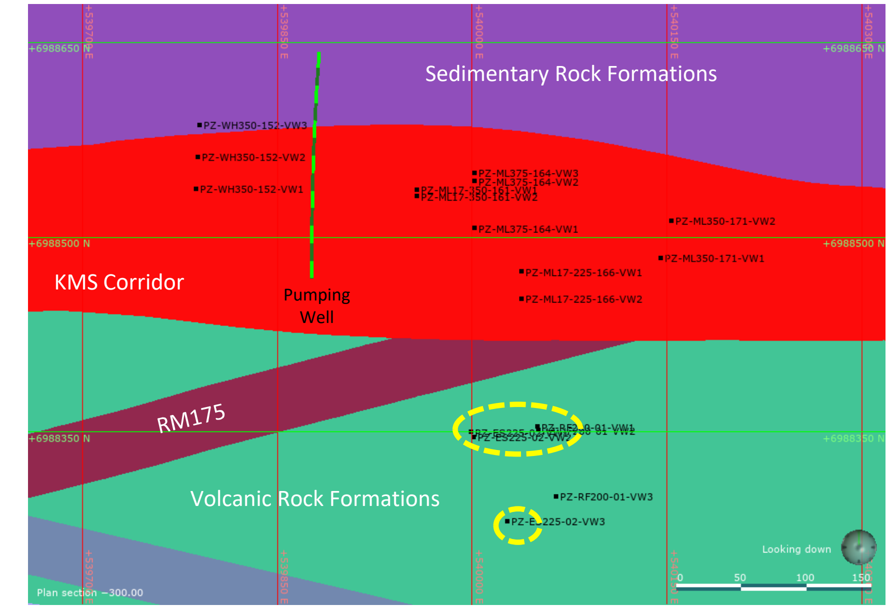
PZ-ES225-02-VW2



PZ-ES225-02-VW3



Conceptual Hydrostratigraphy (-300 mals)



Legend

Observed

Predicted

Notes:
X-axis on plots are model simulation time in days. Day zero corresponds to the start of Year 2015.
Y-axis on plots are predicted / measured hydraulic head (masl).

Piezometer	Borehole ID	Node	Sensor Elevatin (Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)
PZ-RF200-01	TIS-200-001	VW1	9729.3	270.70	325.7
		VW2	9680.9	319.10	374.1
		VW3	9435.3	564.70	619.7
PZ-ES225-02	TIS-225-001	VW1	9726.8	273.20	328.2
		VW2	9678.5	321.50	376.5

CLIENT

AGNICO EAGLE

CONSULTANT

WSP GOLDER

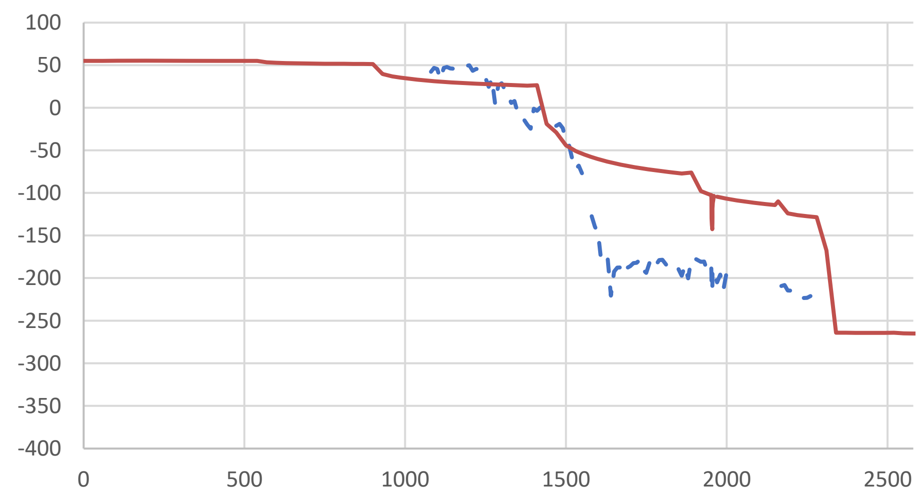
YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

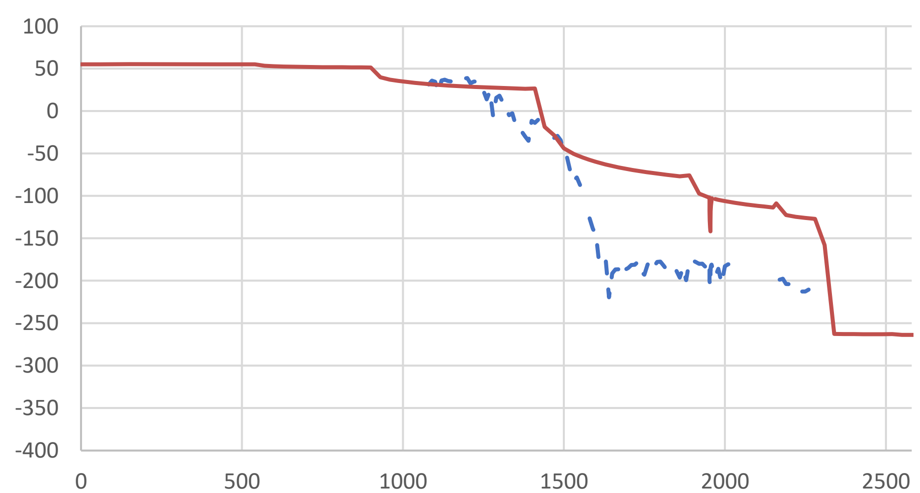
TITLE
HYDRAULIC HEAD MONITORING CALIBRATION RESULTS - PZ-RF200-01 AND PZ-ES225-02

PROJECT NO.	PHASE	REV.	FIGURE
[illegible]	2000	0	**23**

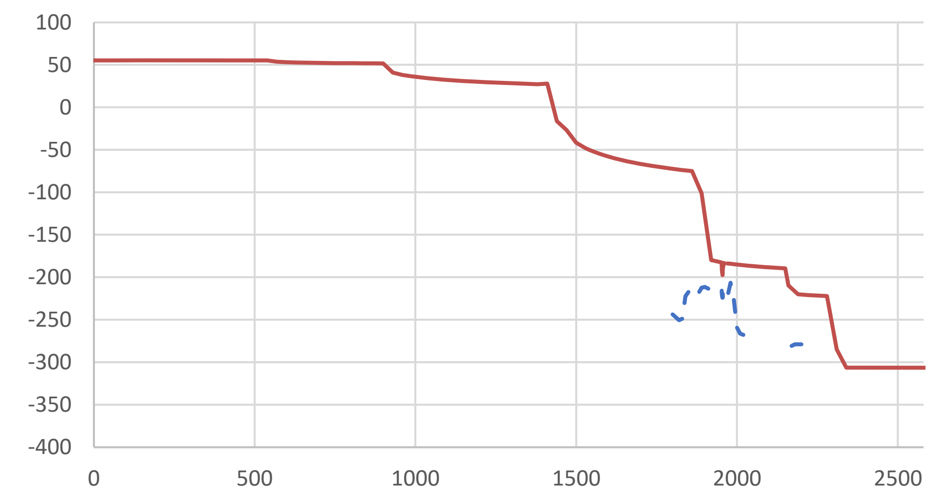
PZ-ML17-350-161-VW2



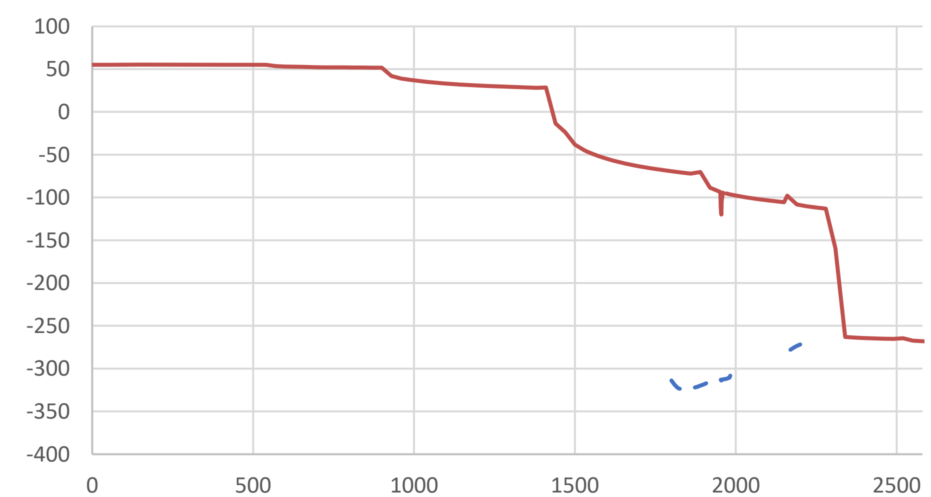
PZ-ML17-350-161-VW1



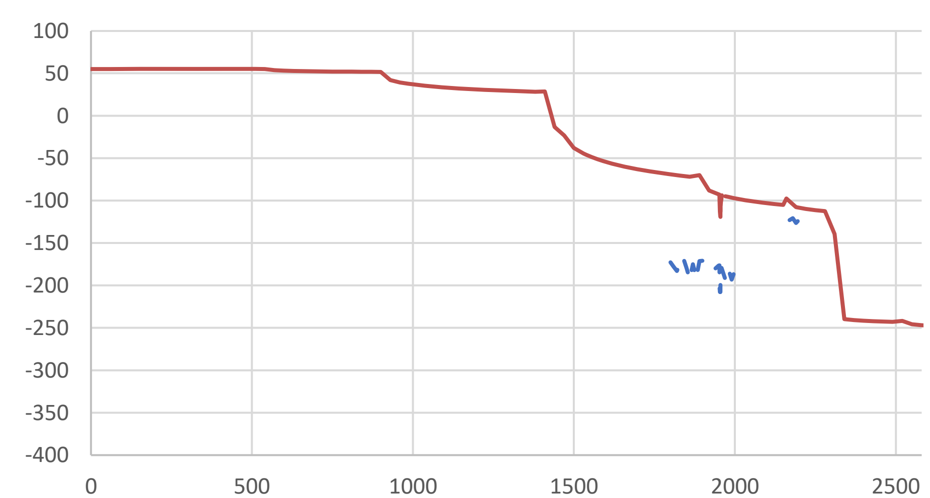
PZ-ML375-164-VW1



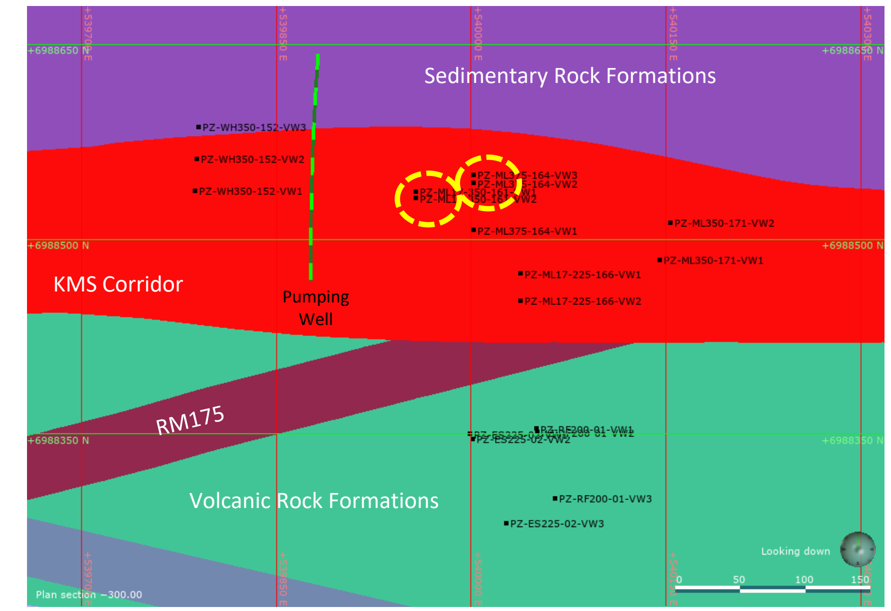
PZ-ML375-164-VW2



PZ-ML375-164-VW3



Conceptual Hydrostratigraphy (-300 mals)



Legend

- - - - Observed

—— Predicted

Notes:
X-axis on plots are model simulation time in days. Day zero corresponds to the start of Year 2015.
Y-axis on plots are predicted / measured hydraulic head (masl).

Piezometer	Borehole ID	Node	Sensor Elevatin (Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)
PZ-ML17-350-161	ML17-350-161-001	VW1	9732	268.40	323.4
		VW2	9732	268.20	323.2
PZ-ML375-164	ML376-164-D1	VW1	9694	306.00	361.0
		VW2	9683	317.00	372.0
		VW3	9681	319.00	374.0

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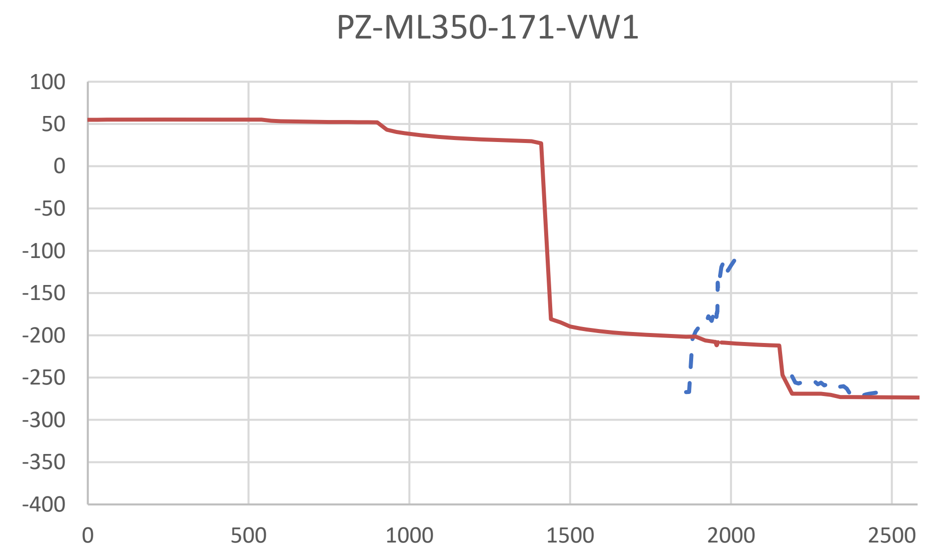
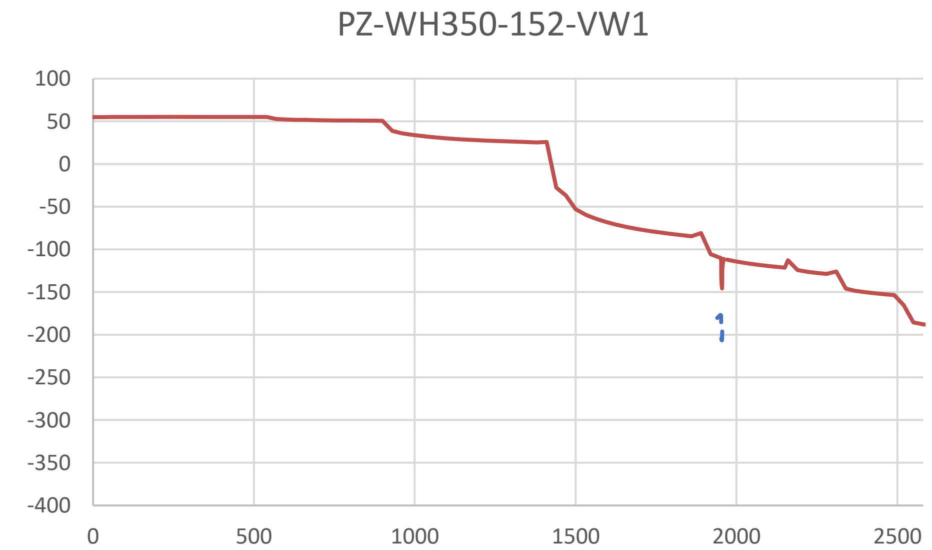
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

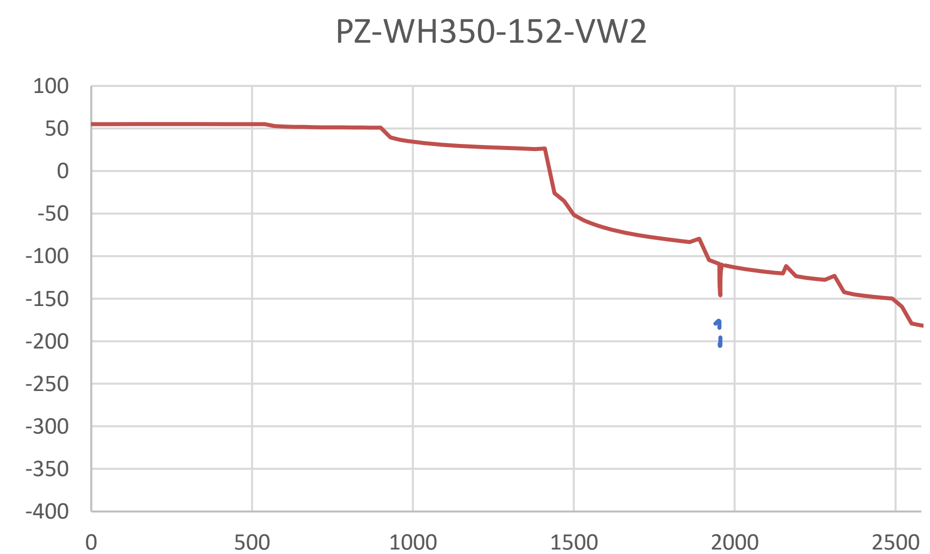
PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
HYDRAULIC HEAD MONITORING CALIBRATION RESULTS - PZ-ML177-350-161 AND PZ-ML375-164

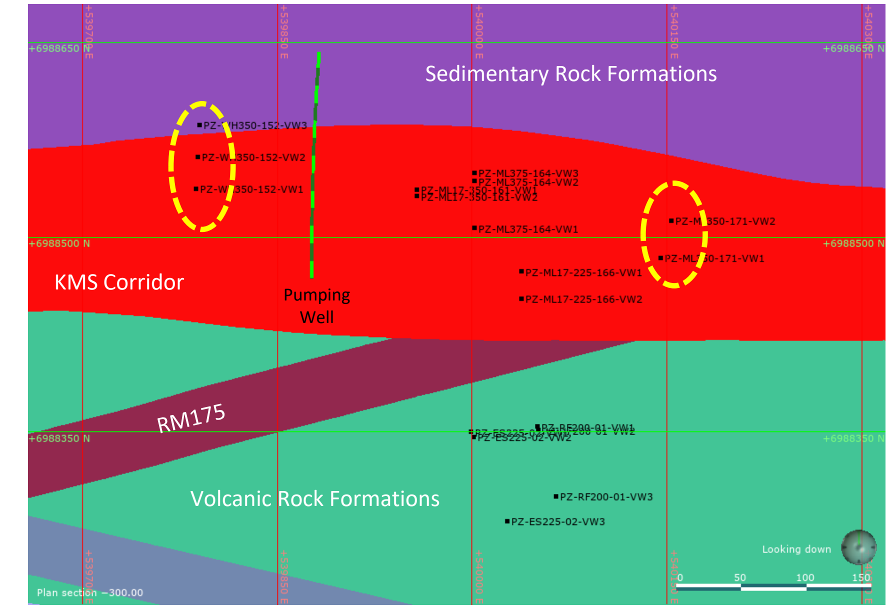
PROJECT NO.	PHASE	REV.	FIGURE
20136896	2000	0	**24**







Conceptual Hydrostratigraphy (-300 mals)



Legend

- - - - Observed
—— Predicted

Notes:
X-axis on plots are model simulation time in days. Day zero corresponds to the start of Year 2015.
Y-axis on plots are predicted / measured hydraulic head (masl).

Piezometer	Borehole ID	Node	Sensor Elevatin (Mine Grid)	Sensor Elevation (masl)	Approximate Sensor Depth (mbgs)
PZ-ML350-171	ML350-171-D1	VW1	9714	286.00	341.0
		VW2	9712	288.00	343.0
PZ-WH350-152	WH350-152-D1	VW1	9724	276.00	331
		VW2	9720	280.00	335
		VW3	9715	285.00	340

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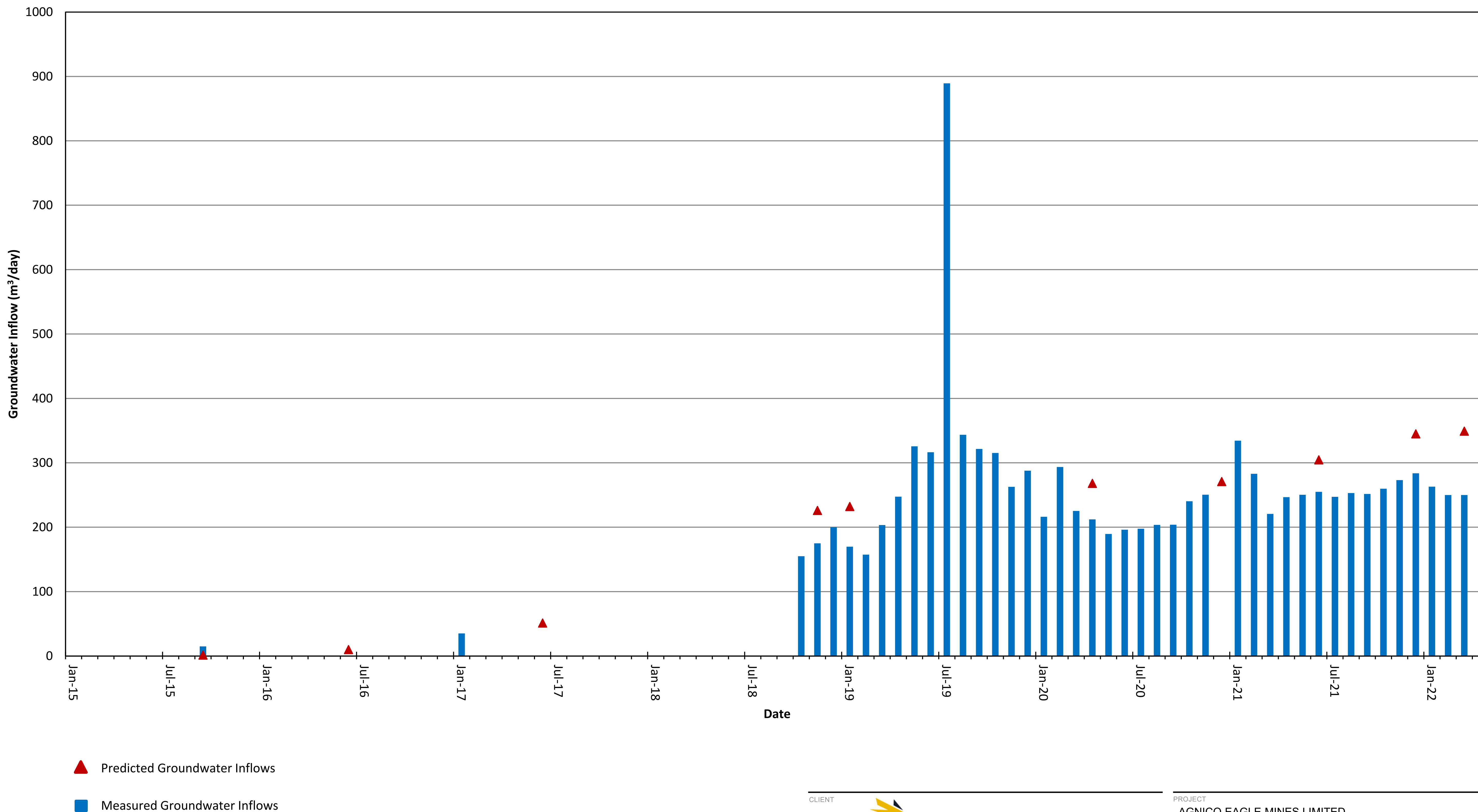
YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

TITLE
HYDRAULIC HEAD MONITORING CALIBRATION RESULTS - PZ-ML350-171 AND PZ-WH350-152

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	**25**



CLIENT

AGNICO EAGLE

PROJECT

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MELIADINE EXTENSION
NUNAVUT

CONSULTANT

WSP GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

TITLE

MEASURED VERSUS PREDICTED GROUNDWATER INFLOW TO TIRIGANIAQ UNDERGROUND

PROJECT NO.	PHASE	REV.	FIGURE
2051368496	2000	0	**26**

6.0 BASE CASE MODEL PREDICTIONS

The Base Case Scenario represents the best estimate of groundwater inflow and groundwater TDS based on the measured data and the results of the model calibration. Model predictions were therefore undertaken using the base case calibrated model. Agnico Eagle is successfully implementing grouting, and it is a planned mitigation approach going forward. On this basis, grouting of the underground development is assumed to continue as part of future inflow predictions.

6.1 Base Case – Predicted Groundwater Inflow

Based on interpreted permafrost limits (Golder 2022a), three pits will intersect open taliks below lakes.

- Wesmeg-North Pit is planned to be about 130 m deep with the ultimate base of the pit at -65 masl and is under a portion of Lake B5.
- Pump Pit PUM04pit is planned to be about 40 m deep with the ultimate pit at -20 masl and is under the southern portion of Lake A8 West.
- Wesmeg Pit Wes05 pit is planned to be about 120 m deep with the ultimate base of the pit at -55 masl and is partially under the north side of Lake A8 West.

Open pit mining commences after the dewatering of adjacent lakes, and the model predicts that with this dewatering and the underlying depressurization of the bedrock from mining at the Wesmeg-North, Wesmeg and Pump undergrounds, groundwater inflow to the open pits will not occur (zero flux). These predictions assume that any water reporting to the dewatered lake footprint would report as runoff to the open pit or dewatering system, which is not a predicted component of the groundwater flow model. This water would be relatively fresh in comparison to the saline groundwater being intercepted by the underground.

Table 8 presents a summary of the predicted groundwater inflow to the underground developments during operations for the Base Case, along with the predicted TDS and lake water contribution in the groundwater inflow. The predicted TDS and lake water contribution will be used in the site Wide Water Quality Model to account for salinity loading from the groundwater, surface water, and other sources from the Project area.

Figure 27 through Figure 30 presents the predicted hydraulic heads over the operations period. The predicted groundwater inflows incorporate the effects of grouting. Like the model set-up for calibration, an effective hydraulic conductivity of 1×10^{-9} was assigned to elements representative of grouted faults within 30 m of the Tiriganiaq underground, where the element size was approximately 10 m. In other areas of the model near the underground, the element size increases from 10 m to approximately 25 m. In these areas with larger elements, the assigned effective hydraulic conductivity was increased to approximately 3×10^{-9} m/s to reflect the larger element size.

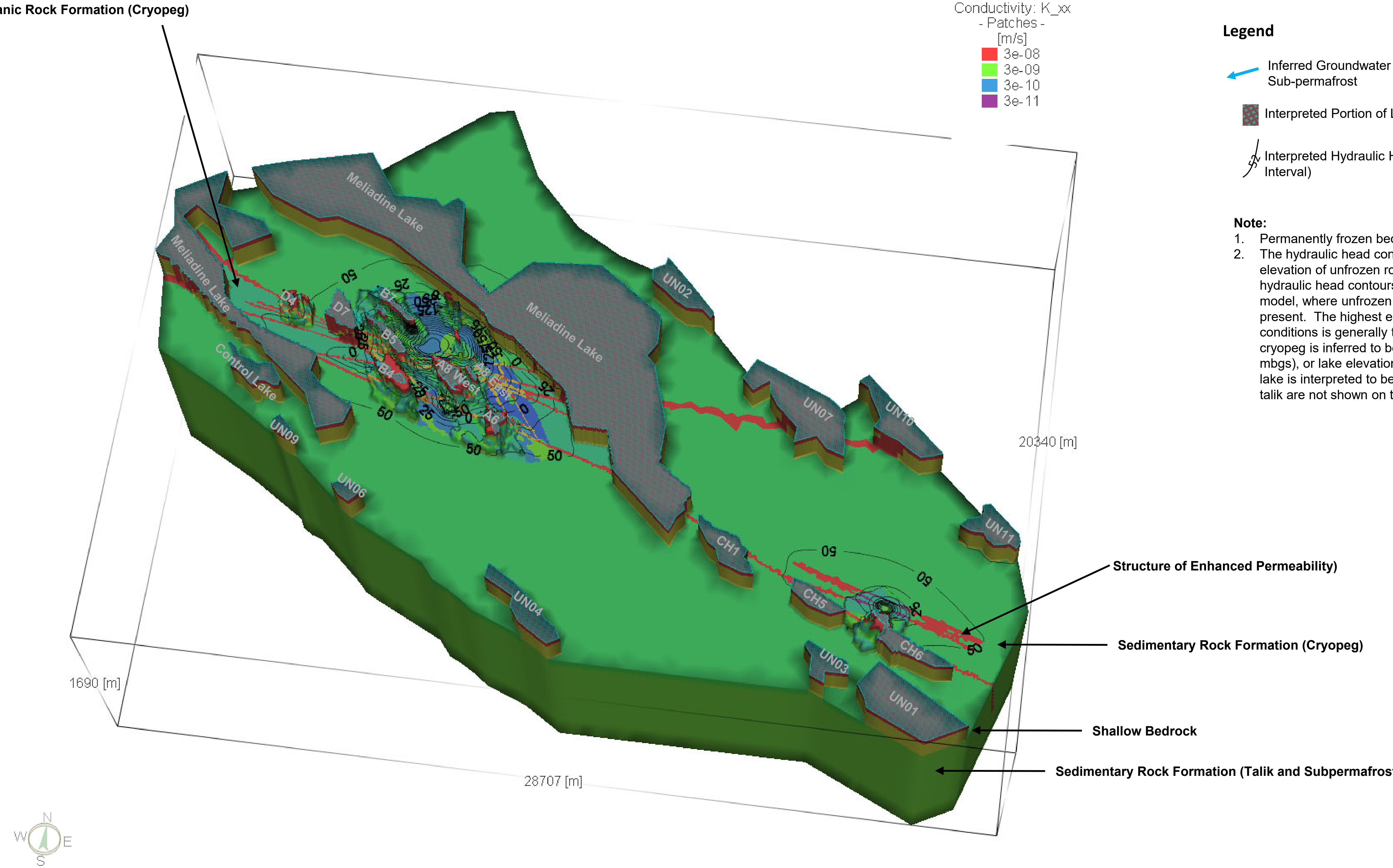
Groundwater Inflow to the Tiriganiaq Underground were predicted to increase from 375 m^3/day in 2022 to a peak inflow of 1,500 m^3/day in 2027 (Table 9). Inflows then decrease as storage effects diminish from 2027 to 2037, where the predicted inflow to the underground is 1,100 m^3/day. These inflows are within 200 m^3/day (lower) of the EIS predictions for the Project (Table 1).

Groundwater inflows to the other underground developments are lower than Tiriganiaq, reflecting the shallower mine depth (Table 4), greater proportion of the development in permafrost, and overall smaller mine footprint. Peak inflows at the other developments range from 25 m^3/day at Wesmeg-North, up to 200 m^3/day at Tiriganiaq-Wolf and Discovery. Inflows are within 100 m^3/day of the EIS predictions for the Project (Table 1). Flows to Wesmeg, Wesmeg-North and Pump are mitigated by lake dewatering; in the absence this dewatering, higher inflows to the underground would be expected. Inflow to Wesmeg and Wesmeg-North are also affected by depressurization from the adjacent mining at Tiriganiaq, which acts a stronger hydraulic sink given its greater depth of mining (maximum base elevation of -845 masl versus -590 at Wesmeg and -395 at Wesmeg-North).

Predicted TDS at the Tiriganiaq underground is relatively stable between 50,500 and 60,500 mg/L, reflecting the low intersection of freshwater from the lakes and from shallow groundwater in the open taliks below these lakes. Predicted TDS at Wesmeg, is similar to slightly lower than the TDS at Tiriganiaq and ranges from approximately 59,000 mg/L at the start of mining to approximately 46,000 at the end of mining. TDS concentrations at Wesmeg-North drop in response to the expansion of the underground below Lake A8 and interception of fresh water from Lake A8 and from less saline groundwater in its underlying talik. For reference, Figure 31 to Figure 34 present the changes in TDS concentrations in groundwater near Tiriganiaq Underground over the life of the Project.

TDS at F Zone is predicted to remain between 56,000 to 59,000 mg/L through its six-year mine life, which reflects that the underground does not extend into open taliks. At Pump underground, which is west of F Zone, the TDS ranges from 58,000 mg/L in the first year of mining, down to approximately 51,500 in the final years of mining.

Predicted TDS at Discovery remains stable at approximately 57,000 to 58,500 mg/L and is not predicted to intercept fresh water from Lake CH6 which is 600 m to the southwest. At Tiriganiaq-Wolf, predicted TDS ranged between 59,000 mg/L at the start of mining in year 2035 and gradually decreased to 39,500 in the final year of mining in Year 2043. The decrease in TDS reflects the progressive interception of fresh water from Lake D4 and the less saline groundwater in its underlying talik.



Legend

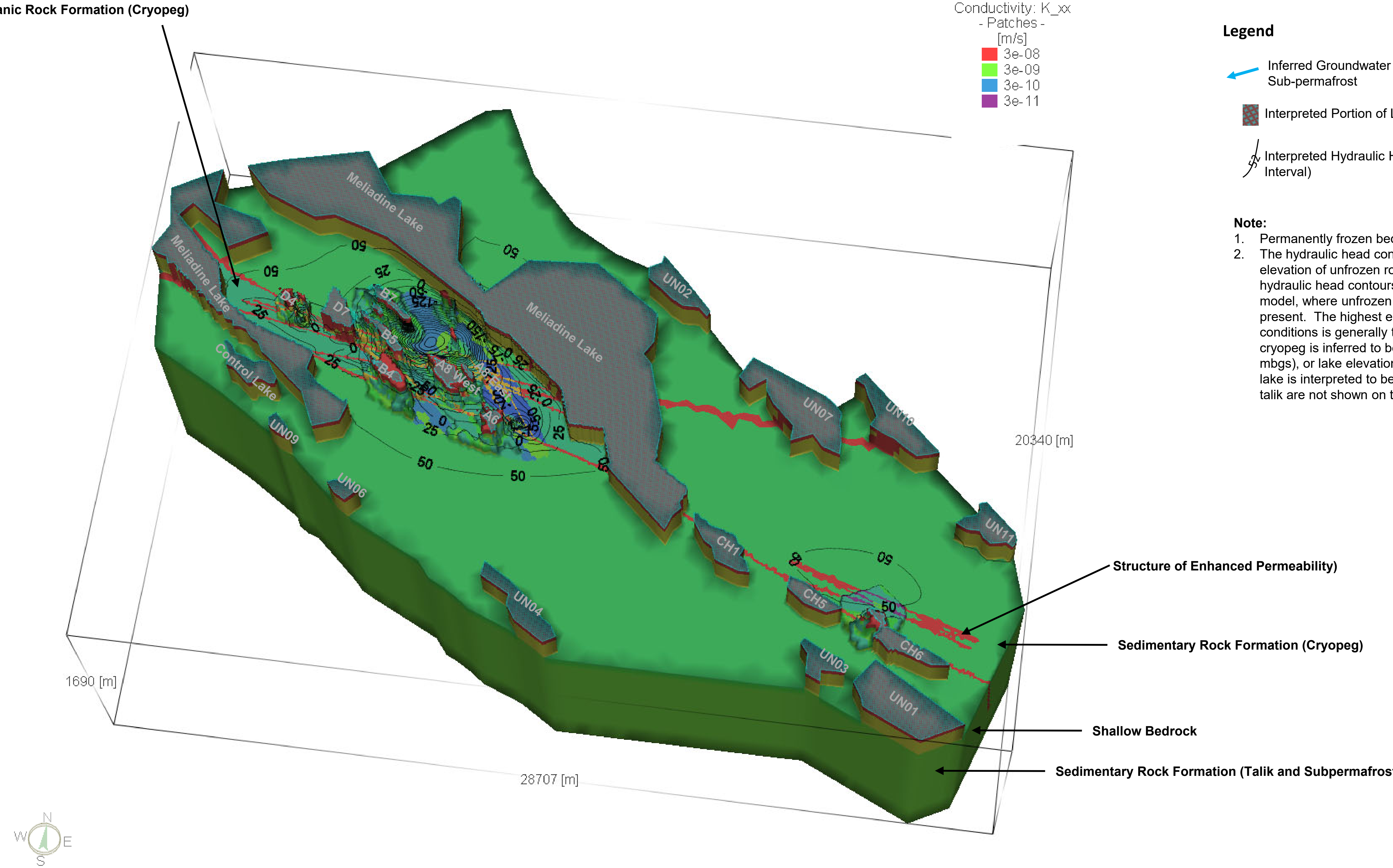
- Inferred Groundwater Flow Direction in Sub-permafrost
- Interpreted Portion of Lake Footprint with Open Talik
- Interpreted Hydraulic Head Contour (masl; 25 m Contour Interval)

Note:

1. Permanently frozen bedrock not shown.
2. The hydraulic head contours are shown for the highest elevation of unfrozen rock conditions, along with the hydraulic head contours on the perimeter of the model, where unfrozen rock conditions are present. The highest elevation of unfrozen rock conditions is generally the top of cryopeg where cryopeg is inferred to be present (approximately 280 mbgs), or lake elevation, where open talik below the lake is interpreted to be present. Lakes without open talik are not shown on these figures.

5x Vertical Exaggeration

CLIENT: AGNICO EAGLE		PROJECT: AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT	
CONSULTANT: WSP GOLDER	YYYY-MM-DD: 2021-11-04	TITLE:	
	PREPARED: HG	**PREDICTED HYDRAULIC HEADS**	
	DESIGNED: HG	**END OF YEAR 2031**	
	REVIEWED: JL	**FINAL YEAR OF MINING AT DISCOVERY UNDERGROUND**	
	APPROVED: DC	PROJECT NO. 20136890 PHASE 2000 REV. 0	FIGURE 27



Legend

Inferred Groundwater Flow Direction in Sub-permafrost

Interpreted Portion of Lake Footprint with Open Talik

Interpreted Hydraulic Head Contour (masl; 25 m Contour Interval)

Note:

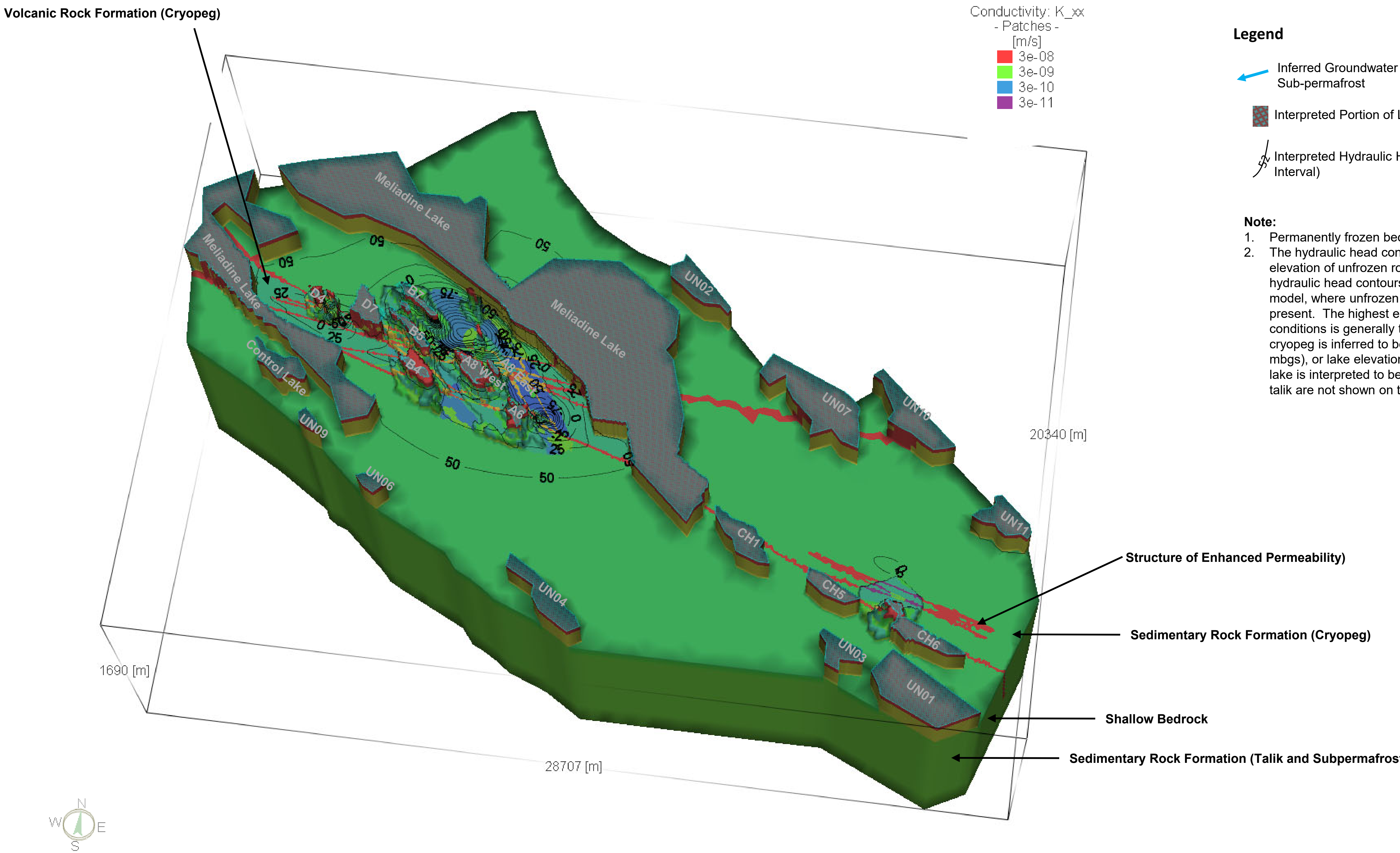
1. Permanently frozen bedrock not shown.
2. The hydraulic head contours are shown for the highest elevation of unfrozen rock conditions, along with the hydraulic head contours on the perimeter of the model, where unfrozen rock conditions are present. The highest elevation of unfrozen rock conditions is generally the top of cryopeg where cryopeg is inferred to be present (approximately 280 mbgs), or lake elevation, where open talik below the lake is interpreted to be present. Lakes without open talik are not shown on these figures.

CLIENT	AGNICO EAGLE	PROJECT	AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT
CONSULTANT	WSP GOLDER	YYYY-MM-DD	2021-11-04
		PREPARED	HG
		DESIGNED	HG
		REVIEWED	JL
		APPROVED	DC

TITLE

PREDICTED HYDRAULIC HEADS END OF YEAR 2037 - FINAL YEAR OF MINING AT TIRIGANIAQ, WESMEG AND WESTMEG-NORTH UNDERGROUNDS

PROJECT NO.	PHASE	REV.	FIGURE
[illegible]	2000	0	**28**



Legend

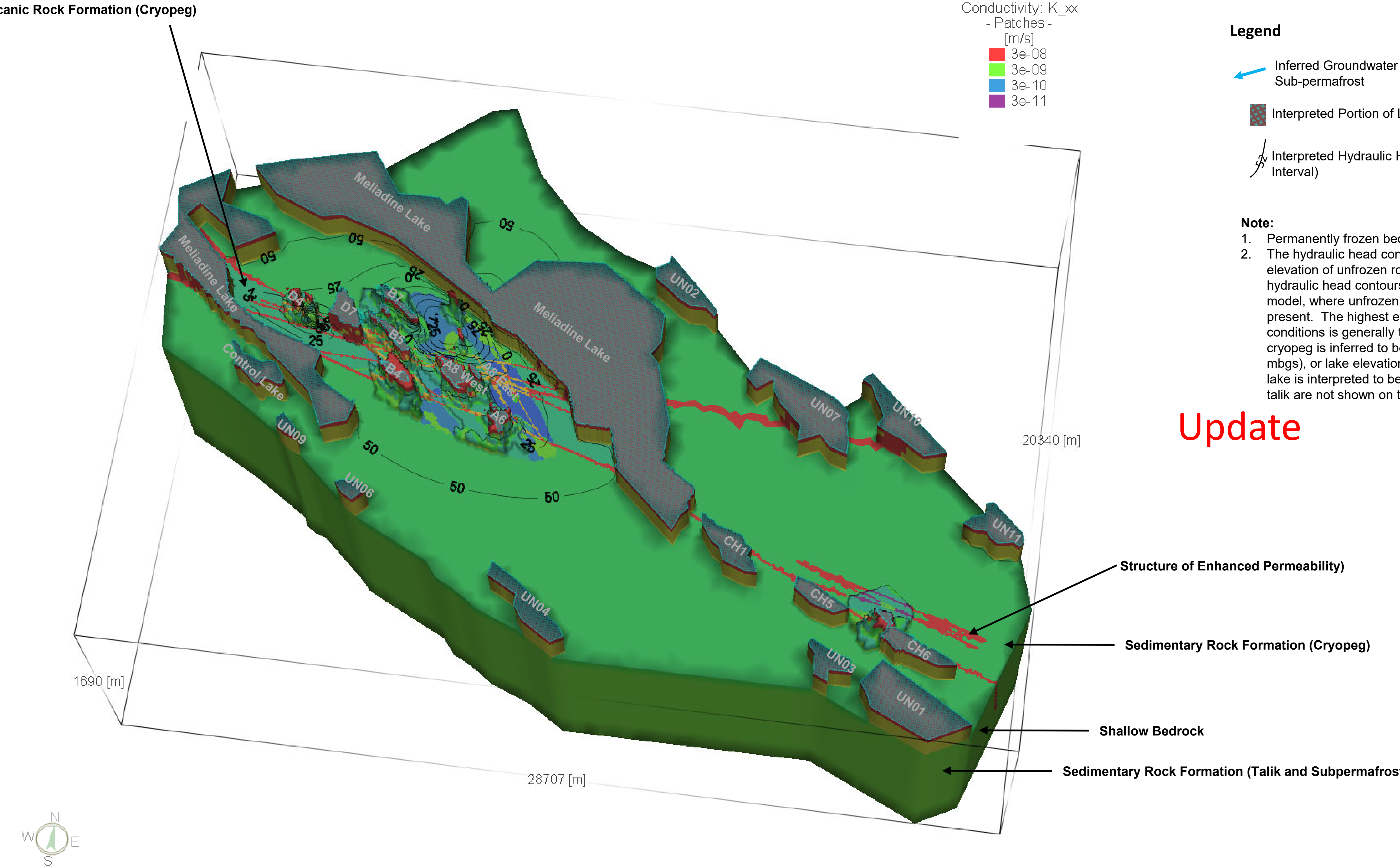
- Inferred Groundwater Flow Direction in Sub-permafrost
- Interpreted Portion of Lake Footprint with Open Talik
- Interpreted Hydraulic Head Contour (masl; 25 m Contour Interval)

Note:

1. Permanently frozen bedrock not shown.
2. The hydraulic head contours are shown for the highest elevation of unfrozen rock conditions, along with the hydraulic head contours on the perimeter of the model, where unfrozen rock conditions are present. The highest elevation of unfrozen rock conditions is generally the top of cryopeg where cryopeg is inferred to be present (approximately 280 mbgs), or lake elevation, where open talik below the lake is interpreted to be present. Lakes without open talik are not shown on these figures.

5x Vertical Exaggeration

CLIENT	AGNICO EAGLE	PROJECT	AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT
CONSULTANT	YYYY-MM-DD: 2021-11-04	TITLE	**PREDICTED HYDRAULIC HEADS** **END OF YEAR 2039** **FINAL YEAR OF MINING AT FZONE**
WSP GOLDER	PREPARED: HG		
	DESIGNED: HG		
	REVIEWED: JL		
	APPROVED: DC	PROJECT NO. [illegible] PHASE 2000 REV. 0	FIGURE **29**



5x Vertical Exaggeration

Legend

Inferred Groundwater Flow Direction in Sub-permafrost

Interpreted Portion of Lake Footprint with Open Talik

Interpreted Hydraulic Head Contour (masl; 25 m Contour Interval)

Note:

1. Permanently frozen bedrock not shown.
2. The hydraulic head contours are shown for the highest elevation of unfrozen rock conditions, along with the hydraulic head contours on the perimeter of the model, where unfrozen rock conditions are present. The highest elevation of unfrozen rock conditions is generally the top of cryopeg where cryopeg is inferred to be present (approximately 280 mbgs), or lake elevation, where open talik below the lake is interpreted to be present. Lakes without open talik are not shown on these figures.

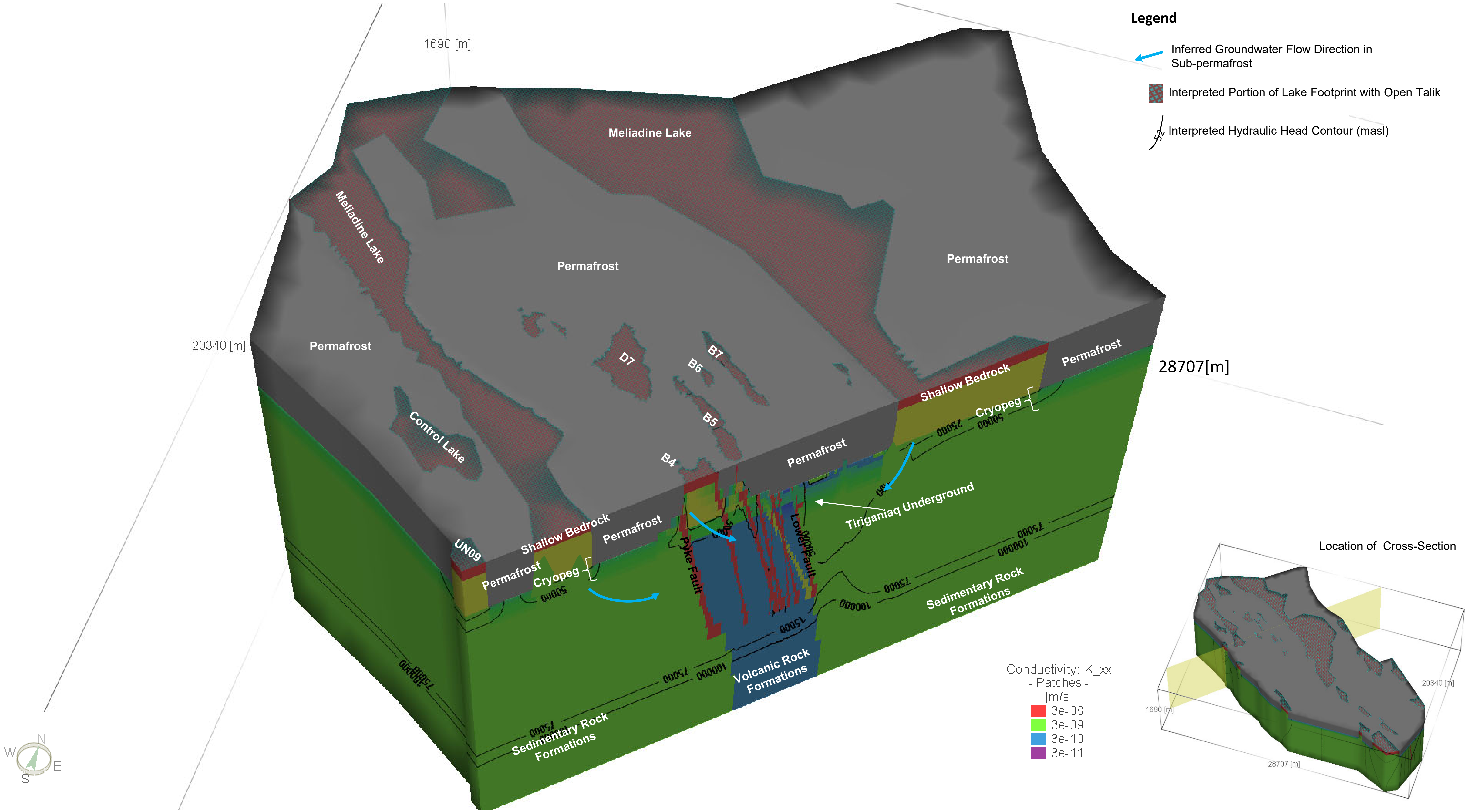
Update

CLIENT	AGNICO EAGLE
CONSULTANT	WSP GOLDER
YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
PREDICTED HYDRAULIC HEADS
END OF YEAR 2043
FINAL YEAR OF MINING AT TIRIGANIAQ-WOLF

PROJECT NO.	PHASE	REV.	FIGURE
20536890	2000	0	30



5x Vertical Exaggeration

CLIENT

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PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

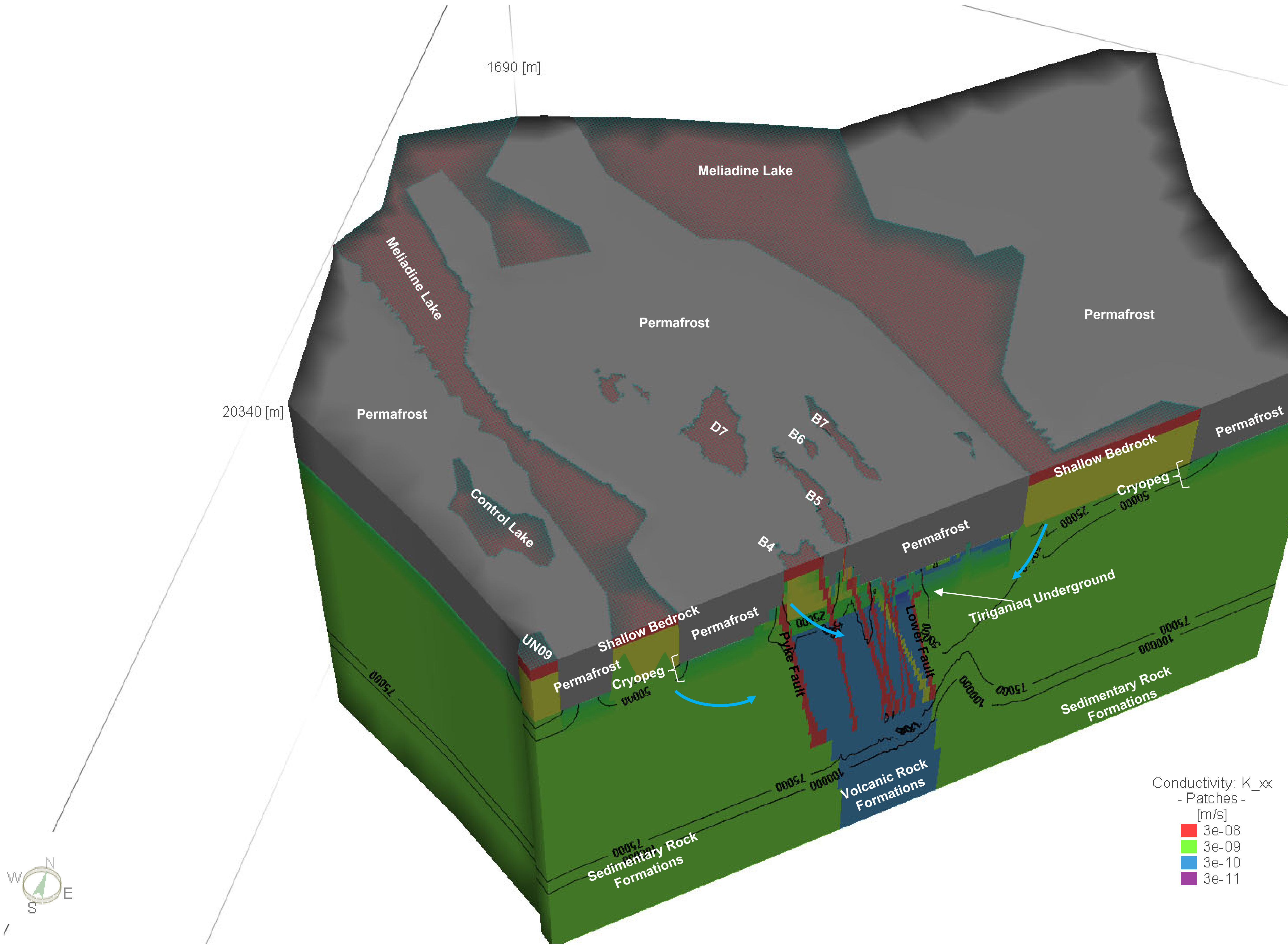
PROJECT

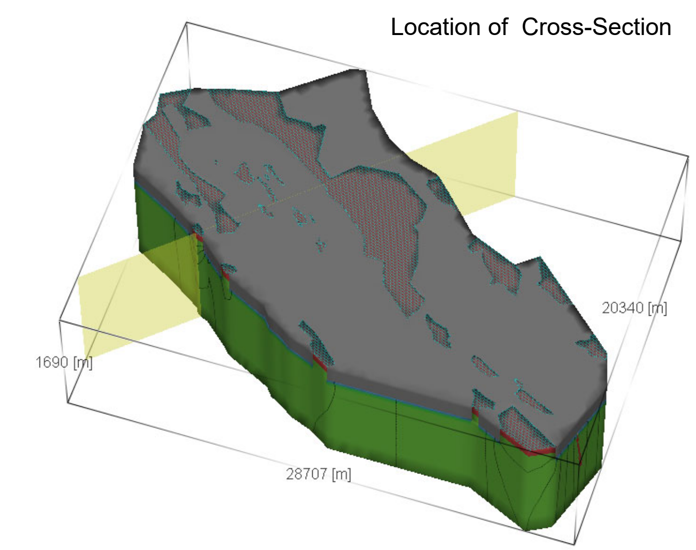
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE

CROSS-SECTION VIEW OF PREDICTED TDS CONCENTRATIONS - END OF YEAR 2031 – FINAL YEAR OF MINING AT DISCOVERY UNDERGROUND

PROJECT NO.	PHASE	REV.	FIGURE
20136890	2000	0	**31**





CLIENT
AGNICO EAGLE

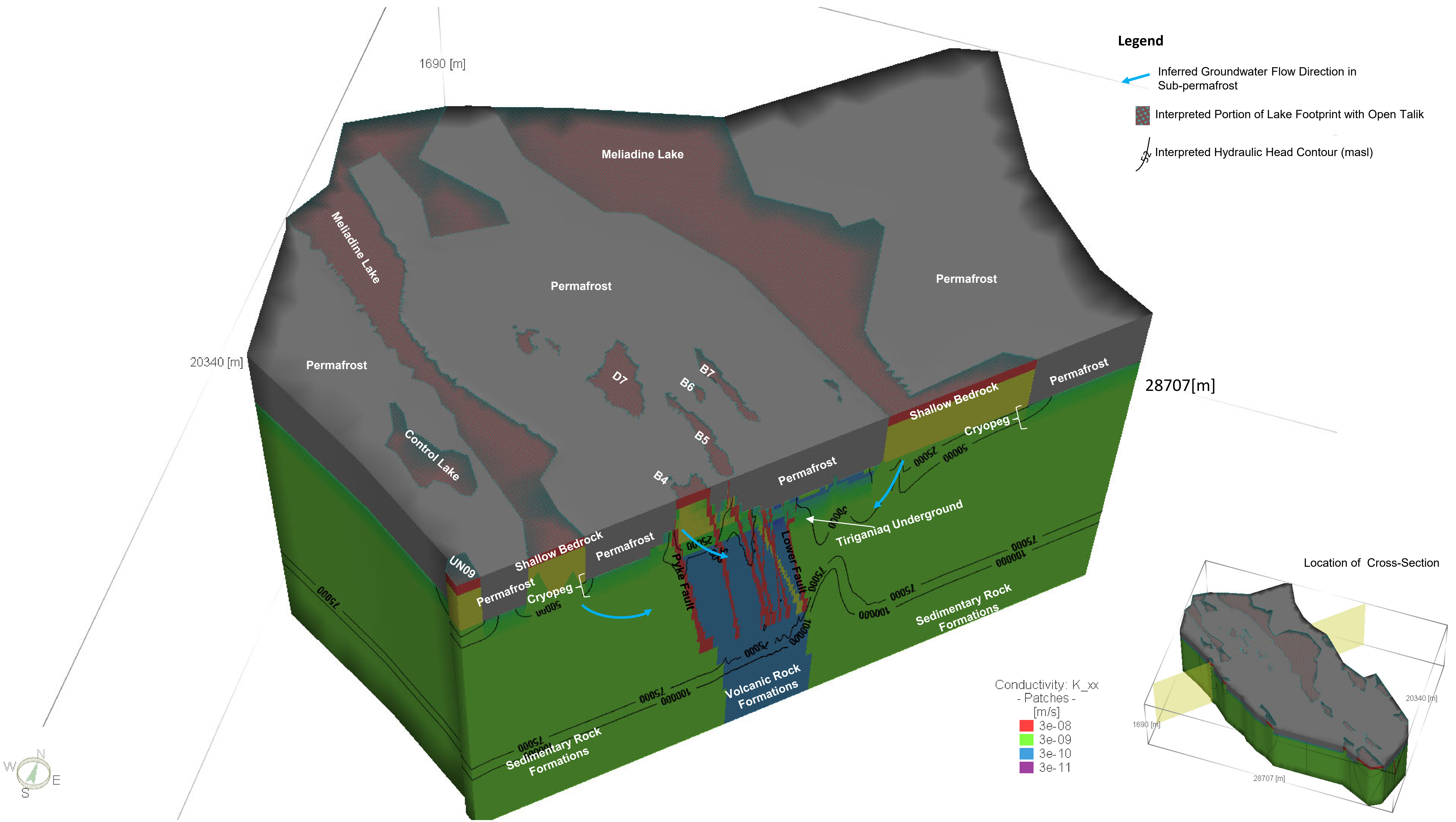
CONSULTANT
wsp GOLDER

YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

TITLE
CROSS-SECTION VIEW OF PREDICTED TDS CONCENTRATIONS - END OF YEAR 2037 – FINAL YEAR OF MINING AT TIRIGANIAQ, WESMEG AND WESTMEG-NORTH UNDERGROUNDS

PROJECT NO.	PHASE	REV.	FIGURE
[illegible]	2000	0	32



5x Vertical Exaggeration

CLIENT

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YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

PROJECT

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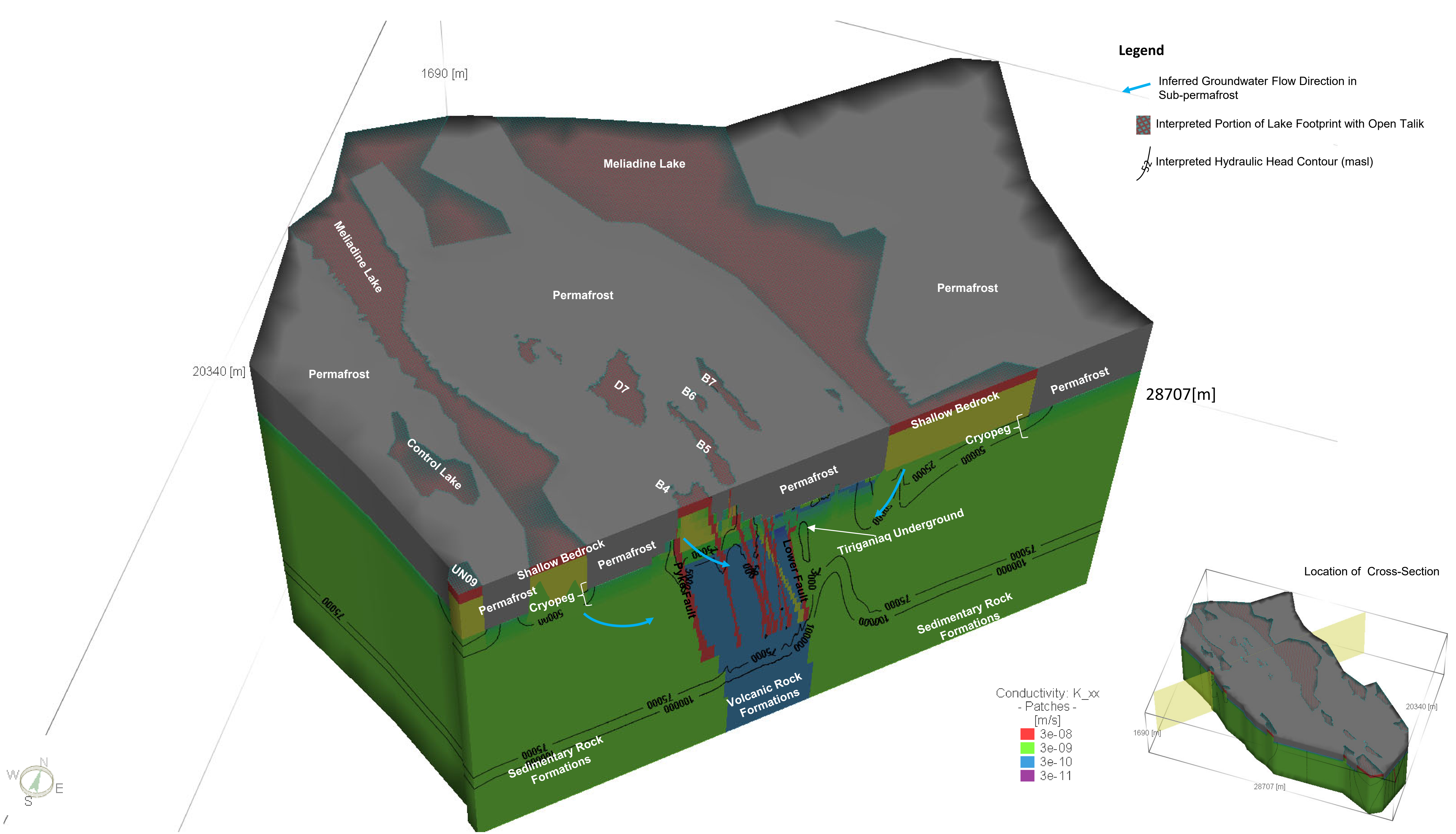
MELIADINE EXTENSION
NUNAVUT

TITLE

CROSS-SECTION VIEW OF PREDICTED TDS CONCENTRATIONS - END OF YEAR 2039 – FINAL YEAR OF MINING AT FZONE

PROJECT NO.	PHASE	REV.	FIGURE
2053136890	2000	0	33



5x Vertical Exaggeration

CLIENT	AGNICO EAGLE	PROJECT	AGNICO EAGLE MINES LIMITED MELIADINE EXTENSION NUNAVUT
CONSULTANT	WSP GOLDER	TITLE	**CROSS-SECTION VIEW OF PREDICTED TDS CONCENTRATIONS - END OF YEAR 2043 – FINAL YEAR OF MINING AT TIRIGANIAQ WOLF**
YYYY-MM-DD	2021-11-04	PROJECT NO.	[illegible]
PREPARED	HG	PHASE	2000
DESIGNED	HG	REV.	0
REVIEWED	JL	FIGURE	**34**
APPROVED	DC		

Table 8: Predicted Base Case Scenario Groundwater Inflows from 2022 Model – Groundwater Inflow, TDS Quality and Fresh Lake Water Contributions

Base Case Predictions																					
Year	Predicted Groundwater Inflow (m^3/day)							Predicted TDS in Groundwater Inflow (mg/L)							Lake Water Contribution (%)						
	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery
	Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf			
2022	375	<25	-	-	-	-	-	58,500	59,000	-	-	-	-	-	<1	<1	-	-	-	-	-
2023	500	50	25	-	-	-	-	58,000	58,500	49,000	-	-	-	-	<1	<1	<1	-	-	-	-
2024	600	75	25	-	-	-	-	57,500	59,000	34,500	-	-	-	-	<1	<1	8	-	-	-	-
2025	900	50	25	-	-	-	-	53,500	59,000	27,000	-	-	-	-	<1	<1	18	-	-	-	-
2026	1,350	75	25	-	-	-	50	50,500	58,500	26,500	-	-	-	57,000	<1	<1	19	-	-	-	<1
2027	1,500	100	25	-	-	-	100	50,500	57,000	24,000	-	-	-	58,000	<1	<1	23	-	-	-	<1
2028	1,325	125	<25	-	-	-	200	52,500	57,500	24,000	-	-	-	57,500	<1	<1	24	-	-	-	<1
2029	1,250	100	<25	-	-	<25	200	54,000	57,500	24,500	-	-	58,000	58,000	<1	<1	24	-	-	<1	<1
2030	1,225	100	<25	-	-	100	200	55,000	56,500	24,500	-	-	56,500	58,500	<1	1	24	-	-	<1	<1
2031	1,200	150	<25	-	-	125	-	56,500	50,000	25,000	-	-	56,000	-	<1	2	25	-	-	<1	-
2032	1,200	125	<25	-	-	125	-	57,000	50,000	29,000	-	-	55,000	-	<1	2	21	-	-	<1	-
2033	1,175	125	<25	-	-	150	-	58,000	50,000	29,500	-	-	52,500	-	<1	2	21	-	-	1	-
2034	1,150	125	<25	<25	50	150	-	59,000	49,500	29,500	59,000	56,000	51,500	-	<1	2	21	<1	4	3	-
2035	1,125	125	<25	50	125	150	-	59,500	49,000	30,000	48,000	58,000	51,500	-	<1	2	21	<1	1	2	-
2036	1,100	125	<25	125	125	-	-	60,500	47,500	30,000	47,000	58,500	-	-	<1	2	21	4	<1	-	-
2037	1,100	125	<25	150	125	-	-	60,500	46,000	29,500	44,500	58,000	-	-	<1	2	21	11	<1	-	-
2038	-	-	-	150	150	-	-	-	-	-	44,000	59,000	-	-	-	-	-	17	<1	-	-
2039	-	-	-	175	150	-	-	-	-	-	45,500	59,000	-	-	-	-	-	18	<1	-	-
2040	-	-	-	175	-	-	-	-	-	-	43,500	-	-	-	-	-	-	22	-	-	-
2041	-	-	-	200	-	-	-	-	-	-	43,000	-	-	-	-	-	-	23	-	-	-
2042	-	-	-	200	-	-	-	-	-	-	41,000	-	-	-	-	-	-	26	-	-	-
2043	-	-	-	200	-	-	-	-	-	-	39,500	-	-	-	-	-	-	28	-	-	-

Table 9: Predicted Base Case Scenario – B4 Contact Water and B7 Saline Water Contribution

Year	Base Case Predictions													
	B4 Contact Water Contribution (%)							B7 Saline Water Contribution (%)						
	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery
	Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf			
2022	<1	<1	-	-	-	-	-	<1	<1	-	-	-	-	-
2023	<1	<1	<1	-	-	-	-	<1	<1	<1	-	-	-	-
2024	<1	<1	<1	-	-	-	-	<1	<1	<1	-	-	-	-
2025	<1	<1	<1	-	-	-	-	<1	<1	<1	-	-	-	-
2026	<1	<1	<1	-	-	-	<1	<1	<1	<1	-	-	-	<1
2027	<1	<1	<1	-	-	-	<1	<1	<1	<1	-	-	-	<1
2028	<1	<1	<1	-	-	-	<1	<1	<1	<1	-	-	-	<1
2029	<1	<1	<1	-	-	<1	<1	<1	<1	<1	-	-	<1	<1
2030	<1	<1	<1	-	-	<1	<1	<1	<1	<1	-	-	<1	<1
2031	<1	<1	<1	-	-	<1	-	<1	<1	<1	-	-	<1	-
2032	<1	<1	<1	-	-	<1	-	<1	<1	<1	-	-	<1	-
2033	<1	<1	<1	-	-	<1	-	<1	<1	<1	-	-	<1	-
2034	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	-
2035	<1	<1	1	<1	<1	<1	-	<1	<1	<1	<1	<1	<1	-
2036	<1	<1	2	<1	<1	-	-	<1	<1	<1	<1	<1	-	-
2037	<1	<1	3	<1	<1	-	-	<1	<1	<1	<1	<1	-	-
2038	-	-	-	<1	<1	-	-	-	-	-	<1	<1	-	-
2039	-	-	-	<1	<1	-	-	-	-	-	<1	<1	-	-
2040	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-
2041	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-
2042	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-
2043	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-

6.2 Base Case – Predicted Surface Water – Groundwater Interaction

Table 12 presents a summary of the predicted fluxes between lakes and the underlying groundwater flow system for pre-mining conditions to the end of operations. Predicted fluxes at post closure are reported on under separate cover (Golder 2022c). Lakes evaluated in this assessment include:

- Lakes predicted by thermal modelling to have open talik (Lake B5, B5, B7, A6, A8 and CH6) (Golder 2022a).
- Lake D4. Closed talik was interpreted below Lake D4 based on the 0-degree isotherm predicted by thermal modelling (Golder 2022a). Predicted temperatures, however, suggest that the ground below the lake may not be fully frozen in consideration of the groundwater salinity and that the lake may be connected to the regional groundwater flow system through the cryopeg zone.
- Lakes outside of the thermal modelling domain but within the groundwater modelling domain that were interpreted to be potentially wide enough to support open talik (Golder 2022b). These lakes are presented on Figure 4.

To facilitate conservative predictions of inflow to the underground workings, it is assumed that when dewatering of a lake ceases (such as at A6, A8, B5 and B6), the lake is instantly refilled.

Except for lakes near the underground workings (Lakes A6, A8, B4, B5, B7, CH6, D4, D7 and Meliadine Lake), the predicted changes in groundwater-surface water interaction are within 1 m^3/day of pre-mining conditions. Of these lakes, CH6, D4, D7 and Meliadine Lake are not planned to be dewatered. The largest change in baseflow for these four lakes is Meliadine Lake (reduction of 373 m^3/day), located to the east, north and west of the underground workings, followed by D7 (reduction of 228 m^3/day), D4 (reduction of 85 m^3/day) and CH6 (reduction of 21 m^3/day). In general, groundwater discharges to surface water in the Project area are expected to be a small component of the annual surface water budget. It is understood from AEM that this will be evaluated under separate cover using the surface water balance and water quality model.

Table 10: Predicted Groundwater - Surface Water Interaction

Simulated Period	Predicted Groundwater-Surface Water Exchange (m^3/day); Positive Values = Surface Water Loss to Groundwater Flow System (Outflow); Negative Values = Groundwater Discharge to Surface Water (Inflow)																													
	Pre-Mining	Operations																												
		2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
A6	1.4	1.3	1.3	1.3	1.4	1.5	1.6	1.7	2.2	2.5	2.9	3.8	5.2	6.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A8 East	0.5	0.5	0.6	0.7	0.9	1.7	2.3	2.6	3.9	4.9	6.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A8 West	4.6	4.6	4.8	5.7	7.5	12.6	16.1	18.0	27.5	38.2	51.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B4	-0.7	-0.7	-0.7	-0.5	-0.1	1.0	2.0	2.5	5.9	10.4	35.1	52.3	64.0	73.5	80.4	85.9	92.5	100.4	107.2	112.9	117.4	121.1	121.6	120.2	69.3	49.2	41.7	36.5	32.5	29.2
B5	1.3	1.3	1.5	3.1	6.8	19.1	27.0	31.7	67.4	122.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B6	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.8	0.0	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B7	2.1	2.1	2.1	2.2	2.3	2.7	3.4	4.1	7.8	10.8	15.6	23.9	36.6	52.8	64.9	72.9	78.7	83.1	86.7	89.8	92.4	94.7	96.6	98.3	96.2	80.6	65.7	55.3	47.8	42.1
CH1	-2.0	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.1	-2.0	-2.0	-1.9	-1.8	-1.7	-1.6	-1.5	-1.4	-1.3	-1.3	-1.2	-1.2	-1.2	-1.2	-1.1
CH5	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	0.1	0.6	1.3	2.0	2.6	3.0	2.9	2.8	2.6	2.5	2.4	2.2	2.1	2.0	1.9	1.8
CH6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.6	5.4	8.2	12.5	17.9	22.1	25.3	25.9	21.0	17.6	15.7	14.5	13.6	12.9	12.3	11.8	11.3	10.9	10.6
Control	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
D4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.9	1.3	2.0	2.6	3.3	3.8	4.3	4.7	5.1	5.5	5.9	7.9	28.6	58.9	70.7	74.1	79.2	80.6	83.8	84.8	85.2
D7	1.4	1.4	1.4	1.6	2.2	4.1	6.2	7.4	14.9	23.4	55.3	89.4	114.6	137.1	152.5	163.3	171.7	178.8	185.0	190.2	195.2	206.2	220.1	229.7	179.4	146.3	132.1	123.7	117.2	111.6
Meliadine	-24.7	25.0	25.0	24.8	23.9	21.6	17.9	15.0	-1.9	6.6	16.8	28.8	42.1	58.4	86.3	118.5	149.4	179.1	207.5	233.6	258.2	283.7	309.5	332.1	348.2	348.3	337.3	319.4	302.7	286.6
UN01	-7.0	-7.2	-7.2	-7.2	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.0	-7.0	-6.9	-6.8	-6.7	-6.5	-6.4	-6.2	-6.1	-5.9	-5.8	-5.7	-5.6	-5.5
UN02	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2
UN03	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.1
UN04	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
UN05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UN06	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9
UN07	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3	-1.2	-1.2	-1.2	-1.1	-1.1	-1.0	-1.0
UN09	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	2.1
UN10	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2	7.2	7.2	7.2	7.3	7.3	7.4	7.4
UN11	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	6.0	6.1	6.2	6.3	6.5	6.6	6.7	6.8	6.9	7.0	7.1

Note: Lake A6, A8, B6, B6 are dewatered during operations. Flows are only provided for these lakes up the start of dewatering.

6.3 Sensitivity Analysis

6.3.1 Sensitivity Scenarios

Due to the inherent uncertainty in the subsurface conditions and parameters controlling groundwater flow, uncertainty exists in the model predictions such that the actual inflow could be higher or lower than the Base Case values. This uncertainty was evaluated using sensitivity analysis. As part of this analysis, selected model parameters were systematically varied from the Base Case values, and the results were used to identify the parameters to which predicted groundwater inflow is most sensitive. These included:

- **Bedrock Hydraulic Conductivity** – Hydraulic conductivity of shallow and deep competent bedrock were increased by a factor of two and three from Base Case Values.
- **Specific Storage** – Specific storage of the bedrock was increased by a factor of three from Base Case Values.
- **Presence of Enhanced Permeability Zones** – Hydraulic conductivity of the faults within the model were increased and decreased by a factor of two from Base Case Values.

Model Boundaries – Specified head boundaries assigned beneath the permafrost along the perimeter of the model were removed to verify the model limits are set sufficient far enough from the mine developments to not influence model predicted inflow.

6.3.2 Sensitivity Results and Selection of Upper Bound Scenario

Figure 35 and Figure 36 presents a summary of the sensitivity results and Table 11 presents a comparison of the total saline groundwater inflow for the peak year of total groundwater inflow (2027). Based on this analysis the following observations are noted:

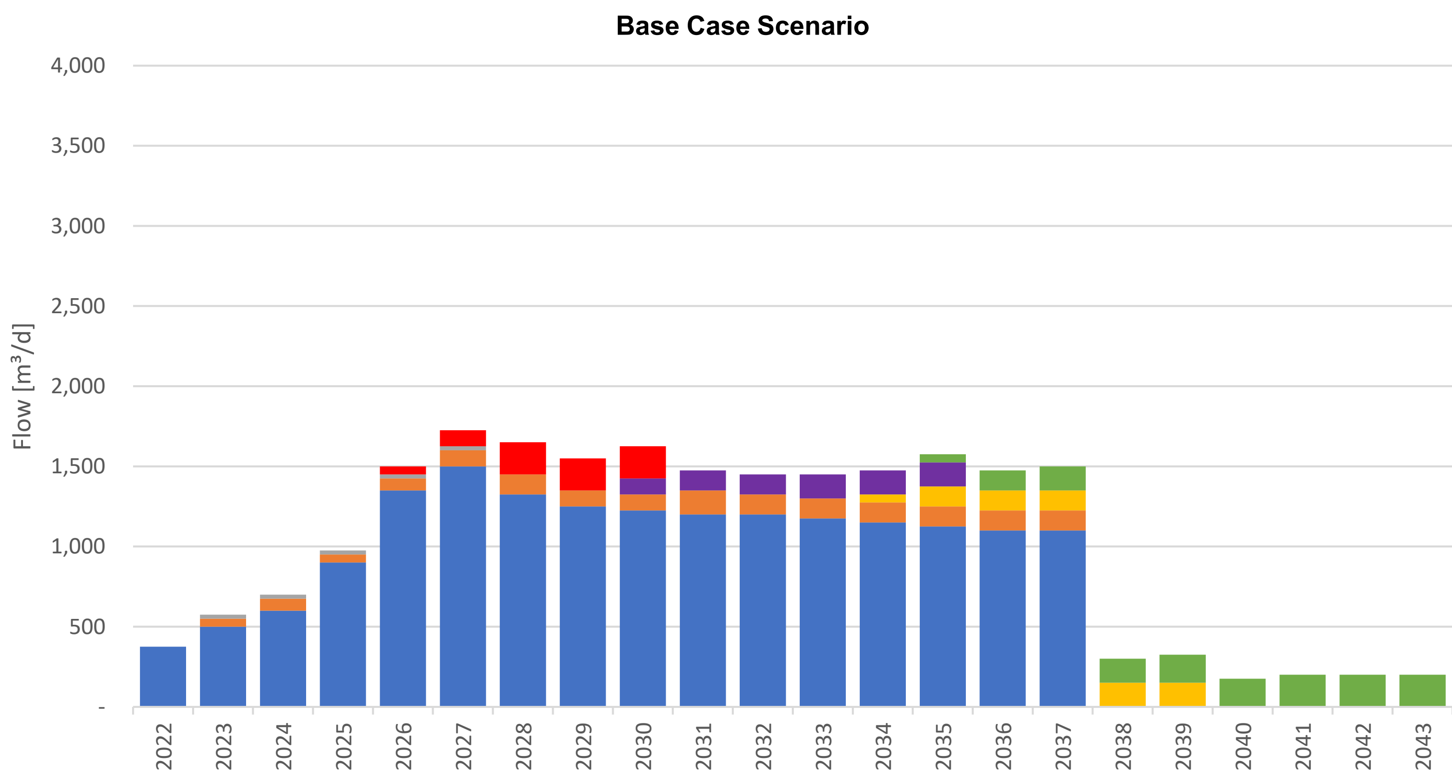
- Removal of the specified head boundaries from the model perimeter did not alter the groundwater inflow predictions to the mine developments indicating the model boundaries are set sufficiently far enough from the mine developments.
- Groundwater inflow is somewhat sensitive to the assumed properties of the faults. For the peak year of inflow (2027), total saline groundwater inflow was approximately 23% higher than the Base Case assuming a factor of 2 increase in fault hydraulic conductivity. This sensitivity would be higher if grouting of the faults intersected by the underground did not occur. Changes in the fault properties are not recommended for development of an Upper Bound Scenario as the fault properties are already considered to be conservative based on supplemental testing in 2021 (Golder 2022a) and conceptual assumptions of their lateral extents and depths. The faults were also assumed to have enhanced permeability up to 2.5 km away from the underground developments, and the width of the Lower Fault was increased to between 15 to 20 m to account for potential additional low RQD corridors along its length. These assumptions are considered conservative since the permeability and width of a fault zone can be heterogeneous along strike (Gleeson and Novakowski 2009) resulting potentially in zones of greater hydraulic conductivity along strike over short distances; whereas over longer distances the presence of zones infilled with fault gouge will act to decrease hydraulic connectivity along strike.
- Groundwater inflows are somewhat sensitive to the specific storage of the bedrock. For the peak year of inflow (2027) and assuming a specific storage three times higher than the base case, total saline groundwater inflow was approximately 14% higher than the Base Case predictions. The majority of the development is located within the Mafic Volcanic Rock, for which specific storage has been set in consideration of site-specific testing (flow recession testing in 2015 and 2020; Golder 2022b).

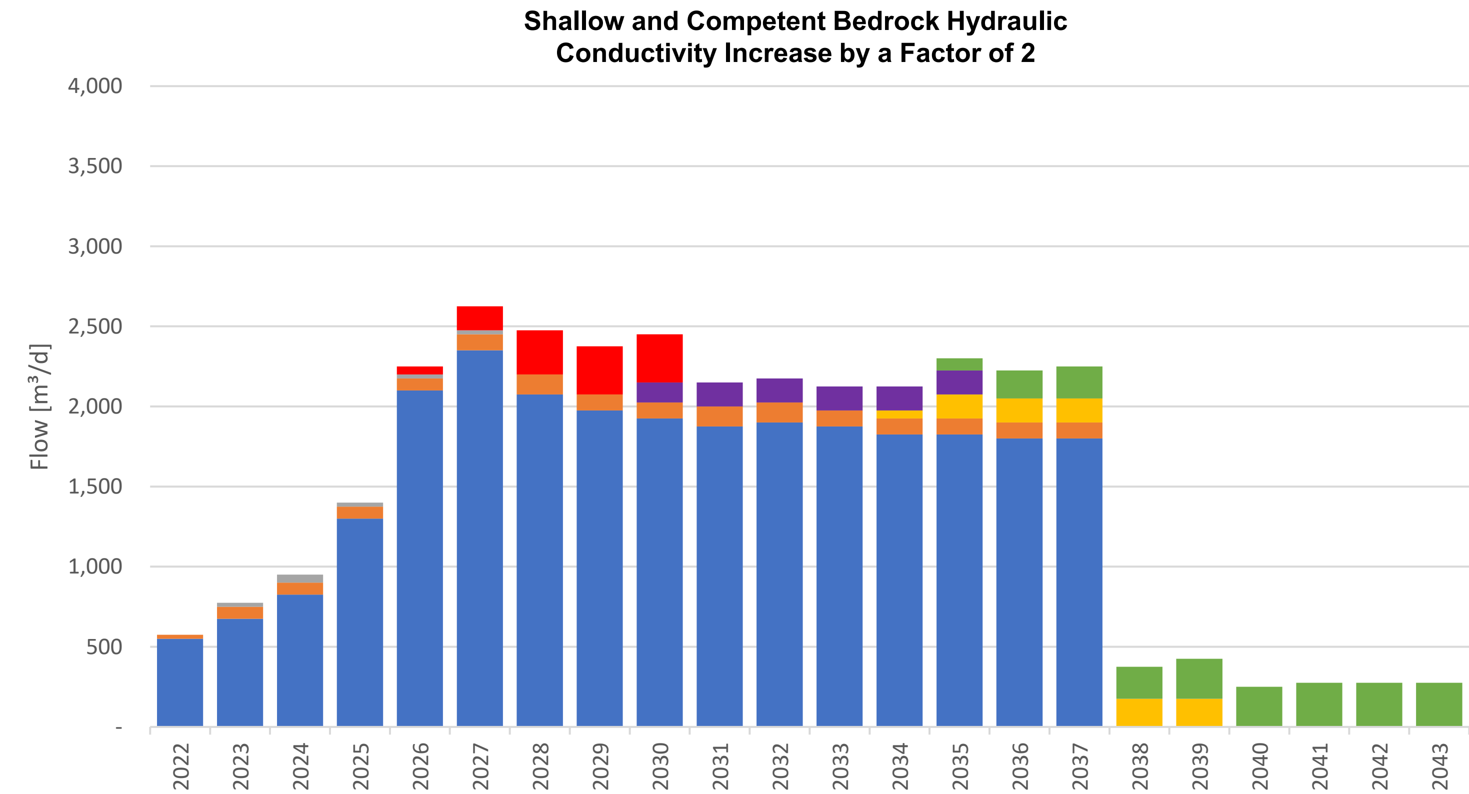
- Total groundwater inflow is most sensitive to the hydraulic properties of the bedrock. For the peak year of inflow (2027) and a factor of 2 increase in bedrock hydraulic conductivity, total saline groundwater inflow was approximately 54% higher than the Base Case. For the peak year of inflow (2027) and a factor of 3 increase in bedrock hydraulic conductivity, total saline groundwater inflow was approximately 106% higher than the Base Case. Groundwater inflows in 2021 for the Tiriganiaq underground were predicted to be 560 m^3/day for a factor of 3 increase in bedrock hydraulic conductivity (Figure 37). This flow is unrealistically high in comparison to observed groundwater inflow in 2021 (220 to 335 m^3/day). This suggests that a factor of 3 increase in bedrock hydraulic conductivity near Tiriganiaq is not reasonable, and that a factor of 2 increase in bedrock hydraulic conductivity would be a more reasonable Upper Bound Prediction. For this sensitivity scenario, Tiriganiaq underground inflows were predicted to be 460 m^3/day, relative to a measured inflow of between 220 to 335 m^3/day.
- Like the base case, zero groundwater inflow was predicted to NOR01, PUM04 and Wes05 in each sensitivity scenario. Open pit mining commences after the dewatering of the nearby Lakes, and the model predicts that with this dewatering and the underlying depressurization of the bedrock from mining at the Wesmeg-North, Wesmeg and Pump undergrounds, groundwater inflow to the open pits will not occur (i.e., the predicted water table is below the pit base). These predictions assume that any water reporting to the dewatered lake footprint would report as runoff to the open pit or dewatering system, which is not a predicted component of the groundwater flow model. This water would be relatively fresh in comparison to the saline groundwater being intercepted by the underground.

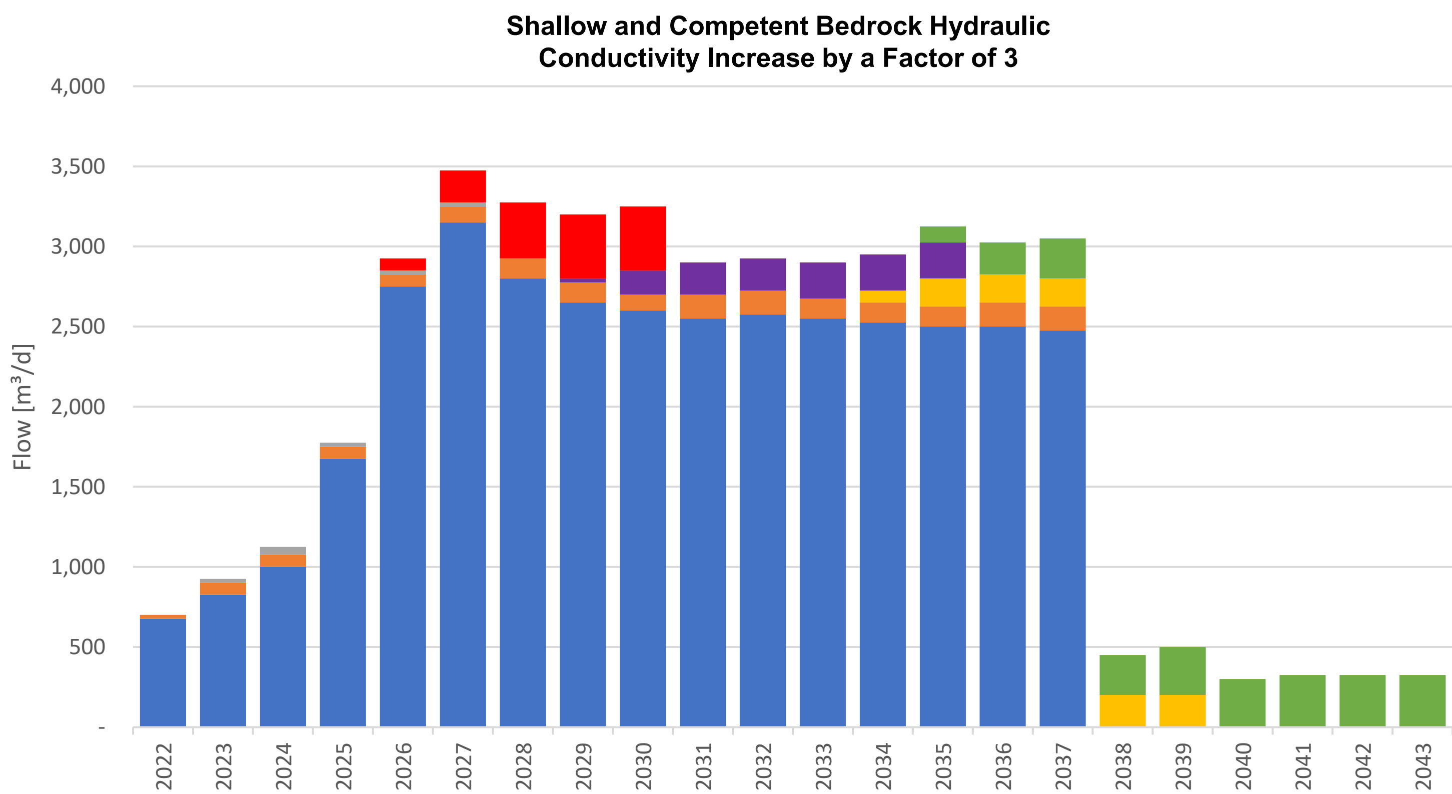
Table 11: Comparison of Predicted Inflow to Combined Undergrounds in Year 2027

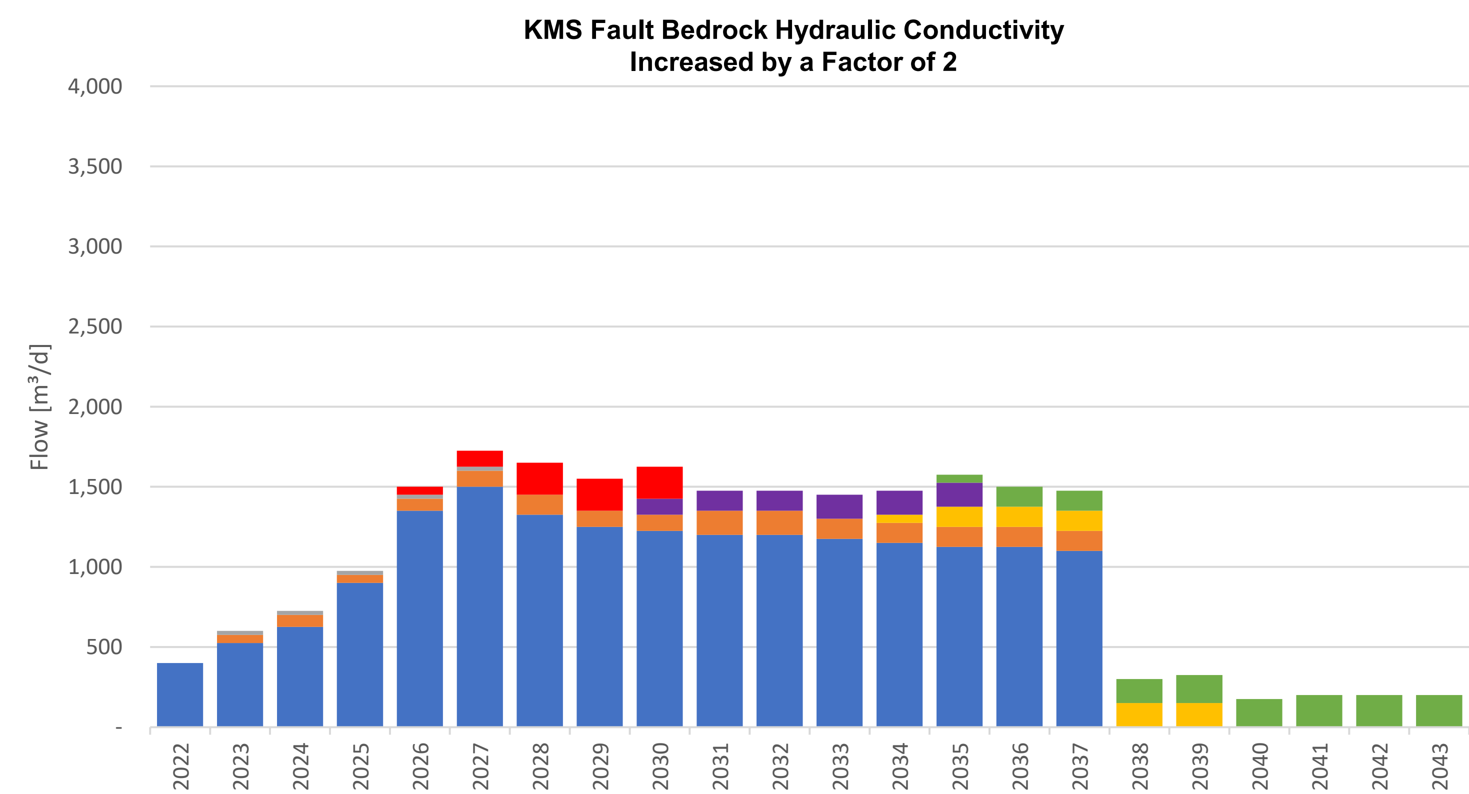
Scenario	Change in Hydraulic Conductivity Relative to Base Case	Predicted Inflow Year 2027 (m^3/day)	% Change from Base Case
Base Case	-	1625	-
Bedrock Hydraulic Conductivity	Factor of 2 Higher	2500	54
	Factor of 3 Higher	3350	106
KMS Fault Hydraulic Conductivity	Factor of 2 Higher	1625	No Change*
Fault Hydraulic Conductivity	Factor of 2 Higher	2000	23
	Factor of 2 Lower	1375	15
Specific Storage	Factor of 5 Higher	1850	14

* Model predictions during the calibration period and in Years 2022 and 2024 had measurable changes in groundwater inflow relative to the Base Case.









- Discovery
- Tiriganiaq-Wolf
- Pump
- F Zone
- Wesmeg-North
- Wesmeg
- Tiriganiaq

CLIENT
AGNICO EAGLE

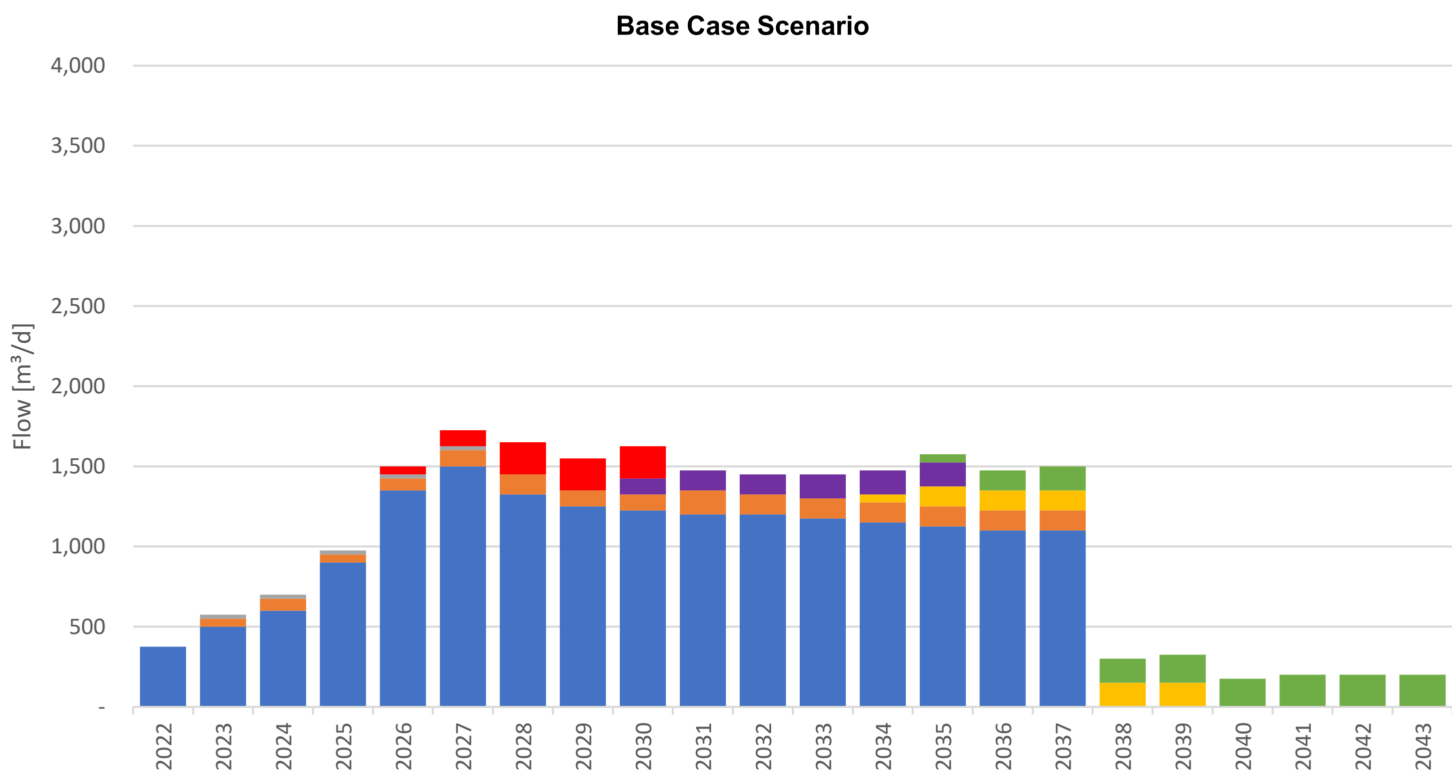
CONSULTANT
WSP GOLDER

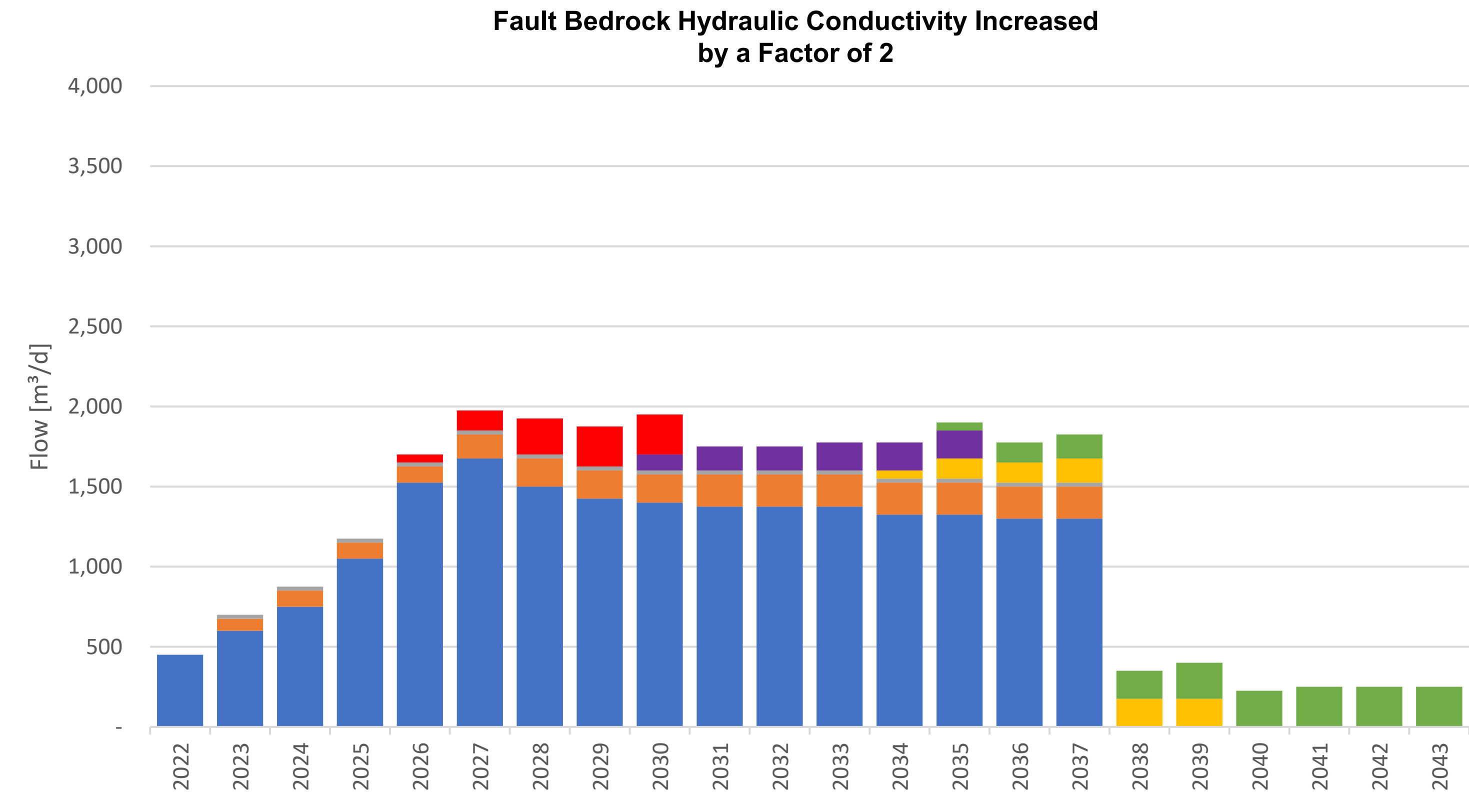
YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

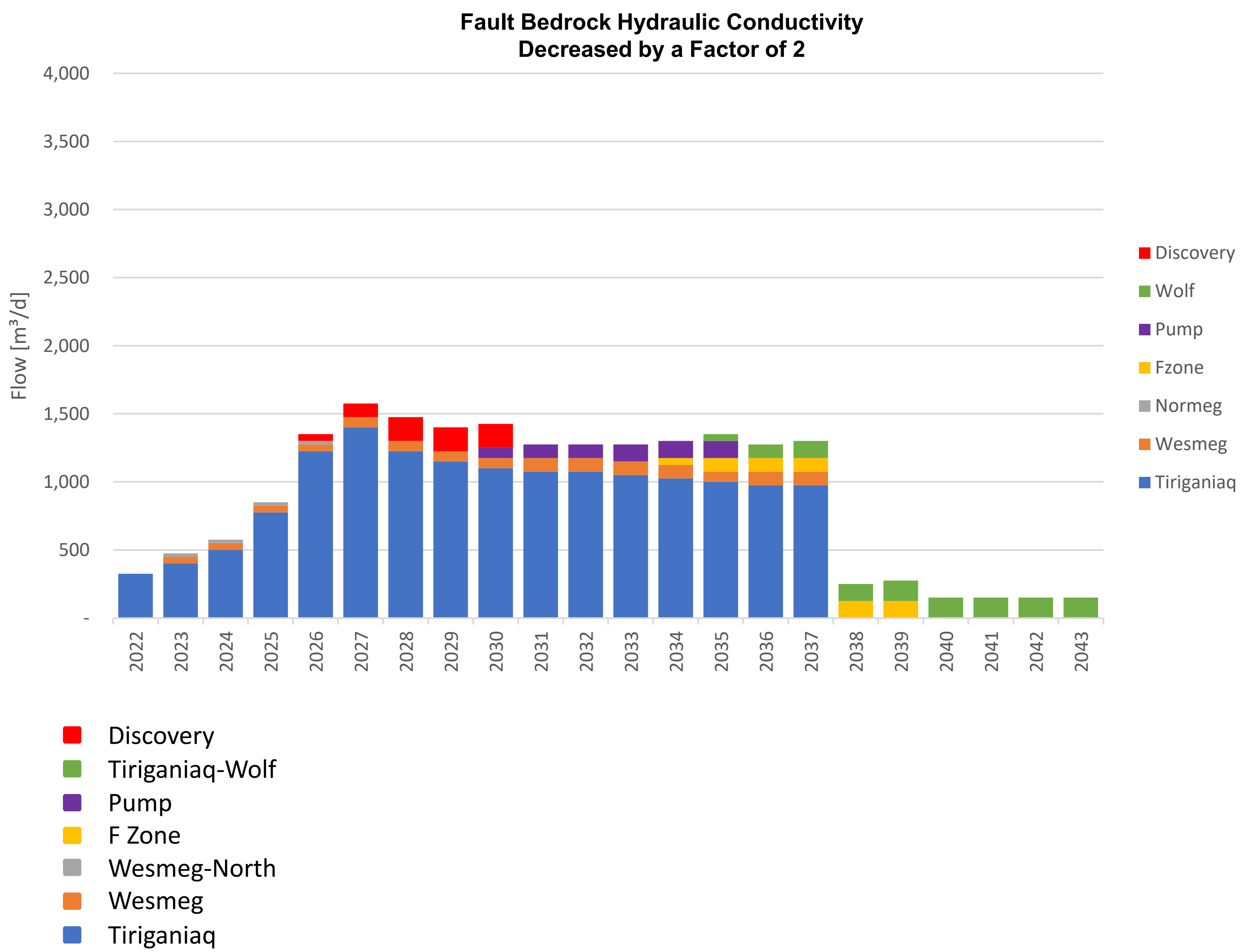
PROJECT
AGNICO EAGLE MINES LIMITED
MELIADINE EXTENSION
NUNAVUT

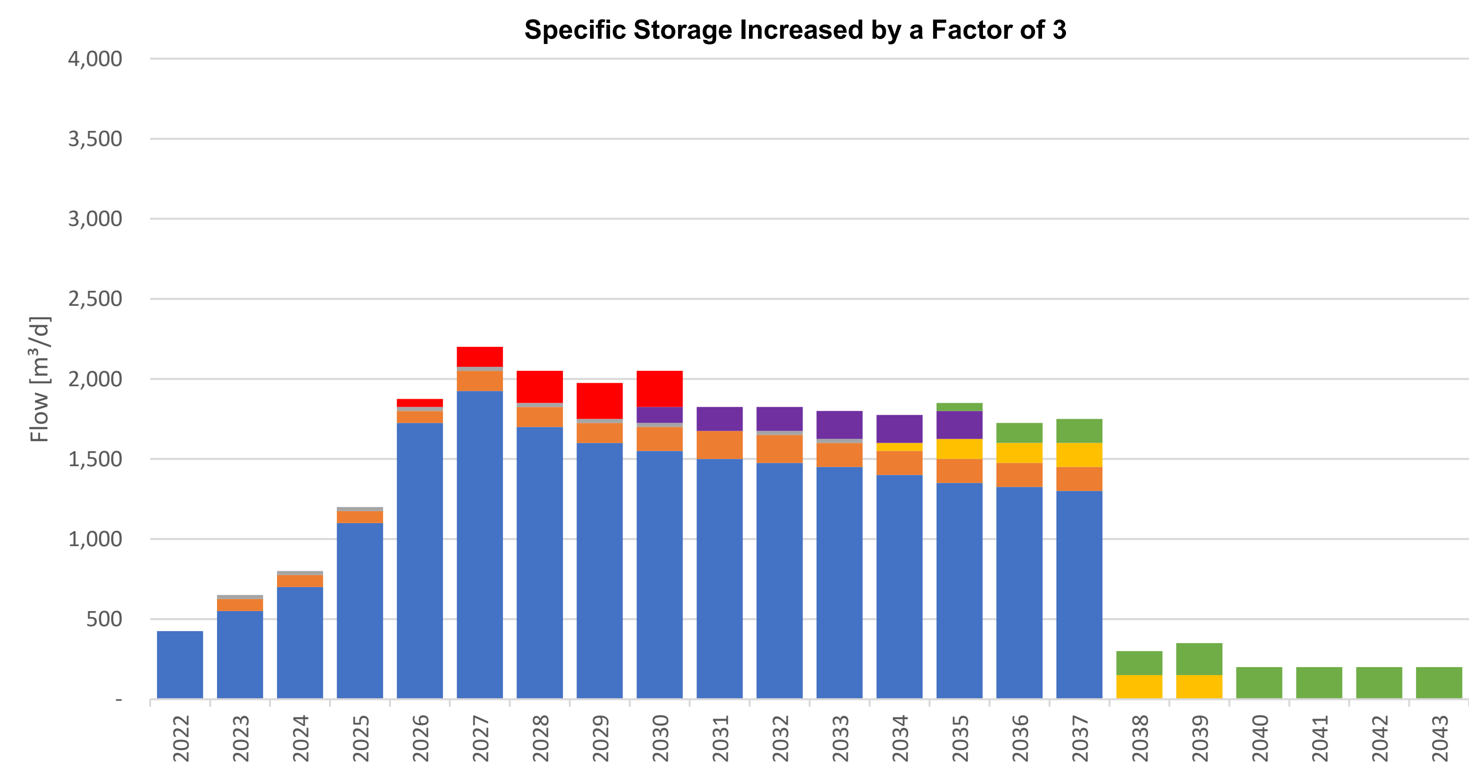
TITLE
SENSITIVITY ANALYSIS RESULTS – PART 1

PROJECT NO.	PHASE	REV.	FIGURE
20136896	2000	0	35









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YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

TITLE

SENSITIVITY ANALYSIS RESULTS - PART 2

PROJECT NO.	PHASE	REV.	FIGURE
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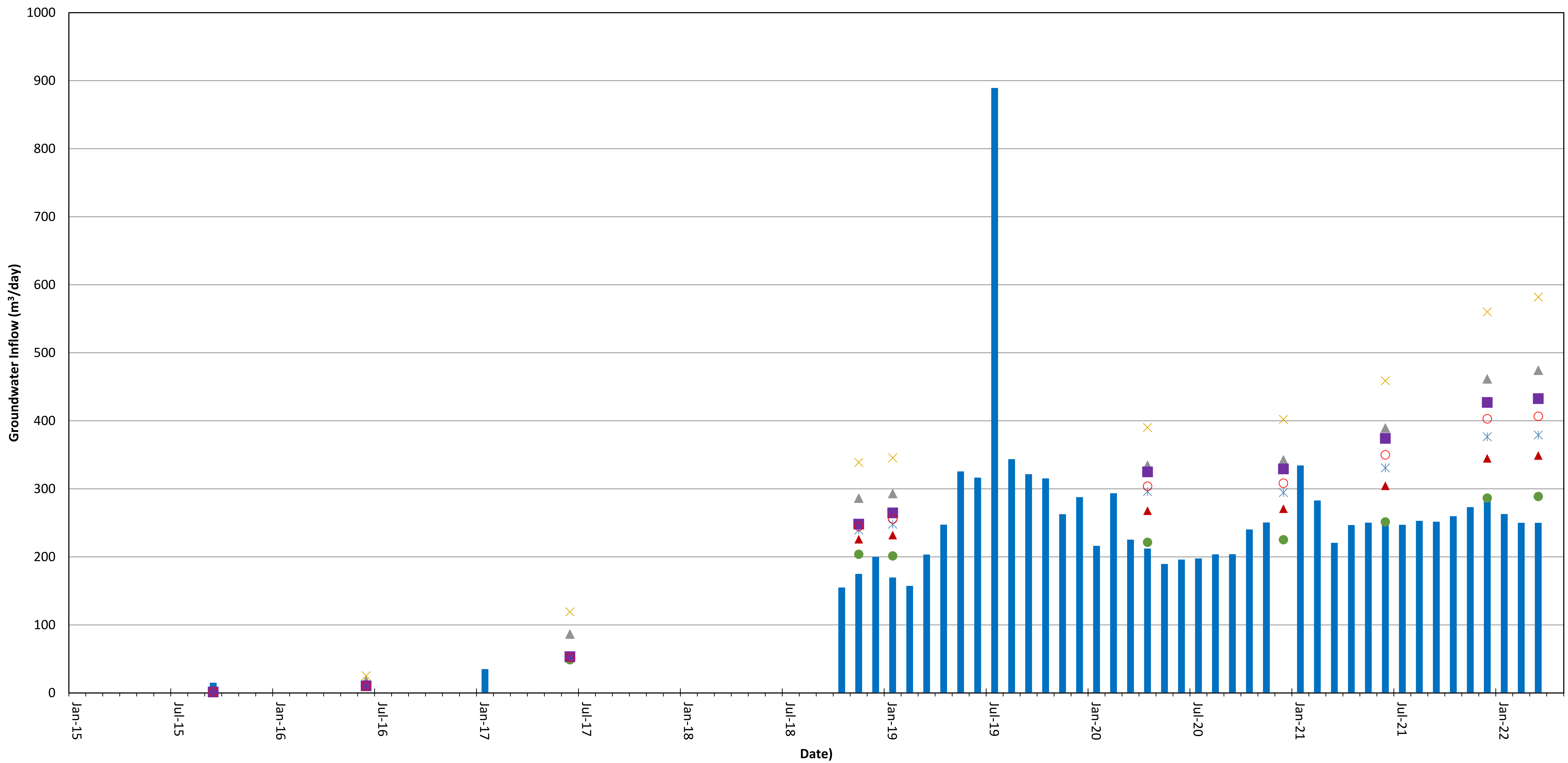

Measured Groundwater Inflows

Predicted Groundwater Inflows

- Base Case Scenario
- Shallow and Competent Bedrock Hydraulic Conductivity Increase by a Factor of 2
- Shallow and Competent Bedrock Hydraulic Conductivity Increase by a Factor of 3
- KMS Fault Bedrock Hydraulic Conductivity Increased by a Factor of 2
- Fault Bedrock Hydraulic Conductivity Increased by a Factor of 2
- Fault Bedrock Hydraulic Conductivity Decreased by a Factor of 2
- Specific Storage Increased by a Factor of 3

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YYYY-MM-DD	2021-11-04
PREPARED	HG
DESIGNED	HG
REVIEWED	JL
APPROVED	DC

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MEASURED VERSUS PREDICTED GROUNDWATER INFLOW TO TIRIGANIAQ UNDERGROUND – SENSITIVITY SCENARIOS

PROJECT NO.	PHASE	REV.	FIGURE
20136896	2000	0	**37**

In consideration of the sensitivity results which indicate the most sensitive parameter is the bedrock hydraulic conductivity, the following inflow predictions were considered appropriate for selection of an Upper Bound Scenario for evaluation of water management at the Project.

- Tiriganiaq Underground: Groundwater inflows predicted to the Tiriganiaq Underground for a factor of 2 increase in shallow and deep competent bedrock.
- Other Undergrounds: Groundwater inflows predicted to the remaining underground areas for a factor of 3 increase in shallow and deep competent bedrock. This reflects that operational data is not yet able for the new Project undergrounds and that these undergrounds may be subject to higher uncertainty in the predicted inflows.

The Upper Bound Scenario is designed to be a reasonable, yet more conservative, assessment of potential groundwater inflow quantity and TDS quality than values that might be adopted for mine operation planning (i.e., Base Case Scenario).

7.0 UPPER BOUND PREDICTIONS OF GROUNDWATER INFLOW

Table 12 presents a summary of the predicted groundwater inflow to the underground developments during operations for the Upper Bound Scenario. The predicted groundwater inflows incorporate the effects of grouting.

Groundwater Inflow to the Tiriganiaq Underground were predicted to increase from 550 m^3/day in 2021 to a peak inflow of 2,350 m^3/day in 2027 (Table 12). Inflows then decrease from 2027 to 2037, where the predicted inflow to the underground is 1,800 m^3/day. These inflows are within 275 m^3/day (lower) of the EIS predictions for the Project (Table 2).

Similar to the Base Case Scenario, groundwater inflows to the other underground developments are lower than Tiriganiaq, reflecting the shallower planned mine depth (Table 4), greater proportion of the development in permafrost, and overall smaller footprint of these developments. Peak inflows at the other developments ranged from 50 m^3/day at Wesmeg-North, up to 400 m^3/day at Discovery. Flows to Wesmeg, Wesmeg-North and Pump undergrounds are mitigated by dewatering of nearby lakes adjacent to the pits. In the absence of this dewatering, higher inflows to the underground would be expected as the mine development extends below these lakes.

Predicted TDS concentrations at the Tiriganiaq range from 58,000 mg/L at the start of mining, down to a low of 51,500 mg/L in Year 2026 and then increase to a high of 67,500 mg/L. The increase in the later years of mining is from upwelling of deep saline ground. Predicted TDS at Wesmeg, ranges from 59,000 mg/L at the start of mining down to 39,000 mg/L. TDS concentrations at Wesmeg drop in response to the expansion of the underground below Lake A8 and interception of less saline groundwater from its underlying talik. Relative to the base case the TDS is slightly higher for both Tiriganiaq and Wesmeg, which reflects the greater inflow of saline groundwater because of the higher bedrock hydraulic conductivity.

TDS at F Zone is predicted to be between 57,500 and 58,500 mg/L. At Pump underground to the west of F Zone, TDS is predicted to remain relatively stable between 51,500 and 58,000.

Predicted TDS at Discovery remains stable at approximately 57,500 to 58,000 mg/L and is not predicted to intercept fresh water from Lake CH6 located 600 m to the southwest. At Tiriganiaq-Wolf, predicted TDS ranged between 58,500 mg/L at the start of mining in year 2035 and gradually decreased to 34,500 in the final year of mining in Year 2043. The decrease in TDS reflects the progressive interception of fresh water from Lake D4 and the less saline groundwater in its underlying talik.

Table 12: Predicted Upper Bound Groundwater Inflows – Groundwater Inflow, TDS Quality and Lake Water Contributions

Year	Upper Bound Scenario Predictions																				
	Predicted Groundwater Inflow (m^3/day)							Predicted TDS in Groundwater Inflow (mg/L)							Lake Water Contribution (%)						
	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery
	Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf			
2022	550	25	-	-	-	-	-	58,000	59,000	-	-	-	-	-	<1	<1	-	-	-	-	-
2023	675	75	25	-	-	-	-	58,000	56,500	41,500	-	-	-	-	<1	<1	4	-	-	-	-
2024	825	75	50	-	-	-	-	57,000	57,500	25,000	-	-	-	-	<1	<1	22	-	-	-	-
2025	1,300	75	25	-	-	-	-	53,500	58,000	20,000	-	-	-	-	<1	<1	35	-	-	-	-
2026	2,100	75	25	-	-	-	75	51,500	58,000	20,500	-	-	-	57,500	<1	<1	35	-	-	-	<1
2027	2,350	100	25	-	-	-	200	53,000	55,500	20,000	-	-	-	58,000	<1	2	35	-	-	-	<1
2028	2,075	125	<25	-	-	-	350	56,500	56,000	21,000	-	-	-	57,500	<1	2	34	-	-	-	<1
2029	1,975	125	<25	-	-	25	400	58,500	56,000	23,000	-	-	58,000	57,500	<1	3	32	-	-	<1	<1
2030	1,925	100	<25	-	-	150	400	60,500	50,000	22,000	-	-	51,500	53,000	<1	4	31	-	-	<1	<1
2031	1,875	150	<25	-	-	200	-	62,000	45,000	25,000	-	-	56,500	-	1	16	30	-	-	<1	-
2032	1,900	150	<25	-	-	200	-	57,500	44,500	29,000	-	-	55,000	-	1	18	25	-	-	<1	-
2033	1,875	125	<25	-	-	225	-	64,000	44,000	29,000	-	-	53,000	-	1	18	24	-	-	2	-
2034	1,825	125	<25	<25	75	225	-	65,000	43,500	29,000	58,500	57,500	52,000	-	1	19	23	<1	3	5	-
2035	1,825	125	<25	100	175	225	-	66,000	43,000	28,500	47,000	58,500	52,000	-	2	20	22	2	<1	6	-
2036	1,800	150	<25	200	175	-	-	67,000	40,000	28,000	43,000	58,500	-	-	2	24	21	13	<1	-	-
2037	1,800	150	<25	250	175	-	-	67,500	39,000	27,000	40,500	58,500	-	-	2	26	19	22	<1	-	-
2038	-	-	-	250	200	-	-	-	-	-	40,000	58,500	-	-	-	-	-	27	<1	-	-
2039	-	-	-	300	200	-	-	-	-	-	40,500	58,500	-	-	-	-	-	27	<1	-	-
2040	-	-	-	300	-	-	-	-	-	-	38,500	-	-	-	-	-	-	30	-	-	-
2041	-	-	-	325	-	-	-	-	-	-	37,500	-	-	-	-	-	-	32	-	-	-
2042	-	-	-	325	-	-	-	-	-	-	36,000	-	-	-	-	-	-	35	-	-	-
2043	-	-	-	325	-	-	-	-	-	-	34,500	-	-	-	-	-	-	38	-	-	-

Table 13: Predicted Upper Bound Scenario – B4 Contact Water and B7 Saline Water Contribution

Base Case Predictions														
Year	B4 Contact Water Contribution (%)							B7 Saline Water Contribution (%)						
	Tiriganiaq Deposit				F Zone	Pump	Discovery	Tiriganiaq Deposit				F Zone	Pump	Discovery
	Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf				Tiriganiaq	Wesmeg	Wesmeg-North	Tiriganiaq-Wolf			
2022	<1	<1	-	-	-	-	-	<1	<1	-	-	-	-	-
2023	<1	<1	<1	-	-	-	-	<1	<1	<1	-	-	-	-
2024	<1	<1	<1	-	-	-	-	<1	<1	<1	-	-	-	-
2025	<1	<1	<1	-	-	-	-	<1	<1	<1	-	-	-	-
2026	<1	<1	<1	-	-	-	<1	<1	<1	<1	-	-	-	<1
2027	<1	<1	<1	-	-	-	<1	<1	<1	<1	-	-	-	<1
2028	<1	<1	<1	-	-	-	<1	<1	<1	<1	-	-	-	<1
2029	<1	<1	<1	-	-	<1	<1	<1	<1	<1	-	-	<1	<1
2030	<1	<1	<1	-	-	<1	<1	<1	<1	<1	-	-	<1	<1
2031	<1	<1	1	-	-	<1	-	<1	<1	<1	-	-	<1	-
2032	<1	<1	2	-	-	<1	-	2	<1	<1	-	-	<1	-
2033	<1	<1	3	-	-	<1	-	3	<1	<1	-	-	<1	-
2034	<1	<1	5	<1	<1	<1	-	4	<1	<1	<1	<1	<1	-
2035	<1	<1	8	<1	<1	<1	-	4	<1	<1	<1	<1	<1	-
2036	<1	<1	12	<1	<1	-	-	5	<1	<1	<1	<1	-	-
2037	<1	<1	16	<1	<1	-	-	6	<1	<1	<1	<1	-	-
2038	-	-	-	<1	<1	-	-	-	-	-	<1	<1	-	-
2039	-	-	-	<1	<1	-	-	-	-	-	<1	<1	-	-
2040	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-
2041	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-
2042	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-
2043	-	-	-	<1	-	-	-	-	-	-	<1	-	-	-

8.0 SUMMARY AND CONCLUSIONS

This report presents the development and calibration of an updated groundwater model for the Project, along with the prediction of groundwater inflow (quantity and TDS quality) for the mine developments located below the permafrost or in open taliks during operations. Relative to the model developed for the Project EIS in 2021, the model incorporates supplemental data collection and thermal modelling completed in 2021 and 2022 to reduce uncertainty in model predictions. The model was calibrated to observed conditions since the completion of the FEIS (2015 – early 2022) and to pressure responses observed during a 72-hr flow recession test in 2020.

Comparison of updated predicted groundwater inflows to the underground developments relative to the previous results from 2021 modelling (Golder 2021b) indicate predicted groundwater inflows are within 175 m^3/day of previous predictions. In general, predicted inflows to Tiriganiaq, which contributes the most significant volumes of groundwater inflow are lower than previously predicted, where as inflow to the shallower developments (excluding Wesmeg) are slightly higher.

Base case predictions of total saline groundwater inflow to be managed from the combined underground developments range from 375 m^3/day at the Tiriganiaq Underground in Year 2022, up to a peak inflow of 1,725 m^3/day in Year 2027, with inflow at the Tiriganiaq Underground contributing up to 90% of this total inflow. For the Upper Bound predictions, the peak inflow is estimated to be up to 55% higher, with a predicted combined saline groundwater inflow of 2,675 m^3/day. These values are similar to values previously predicted in 2021 (1,900 m^3/day for the Base Case and 2,900 m^3/day for the Upper Bound).

Except for lakes near the underground workings (Lakes A6, A8, B4, B5, B7, CH6, D4, D7 and Meliadine Lake), the predicted changes in groundwater-surface water interaction are within 1 m^3/day of pre-mining conditions. Of these lakes, CH6, D4, D7 and Meliadine Lake are not planned to be dewatered. The largest change in baseflow for these four lakes is Meliadine Lake (reduction of 373 m^3/day), located to the east, north and west of the underground workings, followed by D7 (reduction of 228 m^3/day), D4 (reduction of 85 m^3/day) and CH6 (reduction of 21 m^3/day).

Sensitivity analysis indicates that predicted inflows are most sensitive to the hydraulic conductivity of the bulk bedrock, and the upper bound scenario was selected in consideration of these results and model calibration. Conservative assumptions were made with respect to the fault extents and each fault was assumed to have enhanced permeability. Overall, groundwater inflow for Tiriganiaq is the largest contributor of saline groundwater inflow to the Project, and uncertainty in these inflows will have the largest effect on water management planning.

The predictions presented in this report represent the best estimate of the potential range of saline groundwater inflow to be managed based on the conceptual model and data presented in the Updated Existing Conditions Report (Golder 2022b), which includes data up to early 2022. Groundwater inflow predictions should be reviewed as new hydraulic data is collected and as additional operational data is collected against which the model predictions can be verified.

9.0 CLOSURE

The reader is referred to the Study Limitations, which follows the text and forms an integral part of this report. We trust the above meets your present requirements. If you have any questions or require addition information, please contact the undersigned.

Golder Associates Ltd.

REGISTERED PROFESSIONAL ENGINEER
J.L. LEVENICK
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https://golderassociates.sharepoint.com/sites/158318/project files/6 deliverables/01_issued/22513890-941-r-rev0-groundwatermodel/22513890-941-r-rev0-2000-groundwatermodel 19dec_22.docx

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