TECHNICAL MEMORANDUM

DATE 25 January 2024 **Project No.** CA0020476.6818-MEL2024_005-R-Rev0

TO Colleen Prather
Agnico Eagle Mines Limited

CC

FROM Jennifer Levenick, P.Eng. and Don Chorley, P.Geo. **EMAIL** **Jennifer.Levenick@wsp.com; Don.Chorley@wsp.com**

MELIADINE PROJECT – PREDICTED GROUNDWATER-SURFACE WATER INTERATION AT POST CLOSURE VERSUS EXISTING CONDITIONS

1.0 INTRODUCTION

The Meliadine Gold Project (herein referred to as the Meliadine Mine or Project) is 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, which were components of the 2014 FEIS (Agnico Eagle 2014a).

Since completion of the EIS, supplemental hydrogeological data was collected to enhance the understanding of hydrogeological conditions, which formed the framework for an updated summary of hydrogeology existing conditions and updated groundwater modelling predictions to reflect the enhanced hydrogeological characterization. The updated model is described in WSP (2024c) and forms the framework for the closure predictions presented in this report. As documented (WSP 2024c), the groundwater model was calibrated to observed inflows and hydraulic heads near the existing Tiriganiaq underground and used to predict groundwater inflow (quantity and TDS quality) for the mine developments located below the permafrost or in open taliks during operations.

This technical memorandum presents a summary of predicted changes to pre-mining groundwater inflows and outflows to lakes with open taliks within the hydrogeology baseline study area, as well as a summary of groundwater inflow and outflows to pit lakes at post-closure. The predictions were made using the calibrated model presented in WSP (2024c).

2.0 SIMULATION OF POST-CLOSURE CONDITIONS

Post-closure groundwater flow conditions were simulated by making the changes outlined below in the groundwater model and then running the model in steady state. Predicted groundwater-surface water interaction at post-closure was then compared to pre-mining conditions to evaluate relative changes in flow rates based on advective flow. Density-dependent flow was not considered in this assessment for both pre-mining and post-closure simulations.

- Pit Lake levels in post-closure were assigned based on predicted levels in the water balance and water quality model for the Project provided by Lorax and Agnico Eagle along with final lake elevations at Lakes A6, A8 and B5 which intersect open pits. For all other lakes, the water levels were assumed to be unchanged from pre-mining conditions. Water levels assigned to the model for existing conditions and post-closure conditions are summarized in Table 1 and Table 2 of Section 3.0.
- The formation of pit lakes at closure will result in the degradation of permafrost below the pit lake. For post closure predictions, it was conservatively assumed that the permafrost would be fully degraded such that each pit lake would be connected to the regional groundwater flow system.
- The underground developments in the model were represented as linear discrete feature elements in the model, with an assigned hydraulic conductivity of one metre per second. This hydraulic conductivity was sufficiently high to allow for the equalization of hydraulic heads across the underground access ramps and drifts and the potential for preferential flow through the developed workings.

3.0 PREDICTED POST-CLOSURE CONDITIONS

Table 1 and Table 2 present a summary of the predicted groundwater-surface exchange for natural lakes and pit lakes within the model domain. Relative to the operation modelling presented in WSP (2024c), these predictions are for the Base Case Scenario, which represents the best estimate of groundwater flow based on the measured data and results of model calibration.

Lakes evaluated in this assessment included:

- Lakes predicted by thermal modelling to have open talik (Lake B5, B5, B7, A6, A8 and CH6) (WSP 2024a).
- Lake D4. Closed talik was interpreted below Lake D4 based on the 0-degree isotherm predicted by thermal modelling (WSP 2024a). 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 (WSP 2024a).
- 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 (WSP 2024b). These lakes are generally on the perimeter of the model.

Except for Lake A8, Lake B5 and Meliadine Lake, the predicted change in groundwater – surface water interaction was less than 2 m^3/day between pre-mining and post-closure conditions. The highest change in base flow was at Lake A8, which changed from a surface water discharge rate of approximately 5 m^3/day prior to mining to a predicted surface water discharge of 60 m^3/day at post closure Lake A8 is situated adjacent to several pit lakes (Pump02, Pump04 and Wes03), with enhanced connection through the underground workings. The higher discharge at Lake A8 in post-closure is primarily attributed to flow towards Pump02, which has a lower lake surface elevation than Lake A8 (60.3 masl versus 62.2 masl).

In general, pit lake discharges are predicted to be low, with most rates predicted to be less than 5 m³/day. Where predicted rates are higher, the pit is generally located in proximity to another lake or pit with enhanced connection through underground workings. This includes:

- Pump02 located to the west of Lake A8 and near Pump04 and Pump03.
- Tiri01, Tiri03, and Wes01 located to the east of WN01.
- Pump-04 which is adjacent to Pump-02, Pump-03 and Lake A8.

Table 1: Predicted Groundwater-Surface Water Interaction at Pre-mining and Post-closure - Lakes

Location	Pre-Mining Water Level (masl)	Post-Closure Water Level (masl)	Predicted Flow Rate (m^3/day)		
			Pre-mining	Post-closure	Change
A6	59.6	59.6	1.4	0.7	-0.7
A8 East	62.2	62.2	0.5	0.2	-0.3
A8 West	62.2	62.2	4.6	60.2	55.6
B4	56.5	56.5	-0.7	-1.8	-1.1
B5	57.8	58.3	1.3	-7.7	-9.0
B6	61.9	61.9	0.5	0.3	-0.1
B7	62.7	62.7	2.1	1.6	-0.6
CH1	53.5	53.5	-2.0	-2.3	-0.2
CH5	58.8	58.8	-0.3	-0.6	-0.3
CH6	63.5	63.5	4.6	3.7	-0.9
Control	54.6	54.6	0.8	0.8	0.0
D4	55.5	55.5	0.5	0.4	-0.1
D7	57.0	57.0	1.4	-0.4	-1.8
Meliadine	51.8	51.8	-24.7	-32.8	-8.1
UN01	51.0	51.0	-7.0	-7.3	-0.2
UN02	57.0	57.0	2.0	2.1	0.1
UN03	58.0	58.0	0.3	0.2	-0.1
UN04	56.5	56.5	0.5	0.3	-0.2
UN06	60.0	60.0	0.8	0.0	0.0
UN07	61.0	61.0	-1.3	0.7	-0.1
UN09	64.0	64.0	1.9	-1.5	-0.2
UN10	69.0	69.0	7.1	1.8	0.0
UN11	79.0	79.0	5.9	7.0	-0.2

Note: Positive flow rates indicate surface water discharge to groundwater (outflow). Negative flow values indicate groundwater discharge to surface water (inflow).

Table 2: Predicted Groundwater-Surface Water Interaction at Pre-mining and Post-closure – Pit Lakes

Location	Post-closure Water Level (masl)	Predicted Post-closure Flow Rate (m^3/day)
Disc01	67	2.6
FZO01	59.6	0.3
FZO02	59.6	0.4
FZO03	59.6	0.7
PUM01	58.7	0.1
PUM02	60.3	-66.2
PUM03	60.3	0.1
PUM04	62.2	29.7
TIRI01, TIRI-03 and WES01	62.5	97.5
TIRI02-04	65	13.2
WES02	62.2	1.9
WES03	62.2	0.4
WES04	63	0.4
WN01	58.3	-96.2

4.0 CLOSURE

We trust the above meets your present requirements. If you have any questions or require addition information, please contact the undersigned.

WSP Canada Inc.

PROFESSIONAL
PROVINCE OF
J. L. LEVENICK
35959
BRITISH COLUMBIA
ENGINEER

Jennifer Levenick, M.Sc., P.Eng.
Principal, Senior Hydrogeologist

Don Chorley, M.Sc., P.Geo.
Senior Hydrogeology Specialist

JL/DC/pls

https://wsponlinecan.sharepoint.com/sites/ca-ca00204766818/shared documents/05. technical/2_gw model closure report/ca0020476.6818-mel2024_005-r-rev0 gw model closure_24_jan2024.docx

PERMIT TO PRACTICE
WSP Canada Inc.
Signature
Date 2024-01-25
PERMIT NUMBER: P407
NT/NU Association of Professional Engineers and Geoscientists

5.0 REFERENCES

WSP (WSP Canada Inc.). 2024a. Meliadine Mine – 2022 Thermal Assessment. WSP Doc. 20136436-938-R-Rev1. January 2024.

WSP. 2024b. Updated Summary of Existing Conditions Meliadine Mine. WSP Doc. 22513890-942-R-Rev1-2000. January 2024

WPS. 2024c. Updated Hydrogeology Modelling. WSP Doc. CA0020476.6818-MWL2024_004-R-Rev0. January 2024.