December 13, 2024 Project No. CA00016184.7534

Tom Baumgarten, Senior Manager, Environmental Systems and Projects
Lafarge Canada Inc.
6509 Airport Road
Mississauga, ON
L4V 1S7

RE: LAFARGE MONITORING PROGRAM FOR THE POTENTIAL HYDROGEOLOGICAL IMPACTS OF THE 10-YEAR EXTRACTION FOOTPRINT OF LAFARGE WELLINGTON QUARRY ON THE CITY OF GUELPH MUNICIPAL WELLS

Dear Mr. Baumgarten,

This letter provides the monitoring program for assessing the potential dewatering impacts of the 10-year excavation footprint of the Lafarge Wellington Quarry on the City of Guelph municipals wells.

Introduction

This monitoring program has been developed based on the results of groundwater flow modeling by Matrix Solutions Inc. (Matrix) to assess future impacts of quarry dewatering of the 10-year excavation on the City of Guelph municipal water supply wells and modeling of injection wells as a contingency measure, and discussions with the City of Guelph. The components of the monitoring program are discussed below.

Offsite Monitoring Well Installations

Two deep multilevel monitoring wells will be installed by Lafarge between the quarry and the City of Guelph municipal wells. One of these multilevel monitoring wells will be installed between the quarry and the Downey Well to the east of the quarry and Speed River. The other monitoring multilevel well will be installed midway between the quarry and the Queensdale Well. The proposed approximate locations of the monitoring wells are shown on Figure 1. Both wells are located outside of current Lafarge quarry lands and their installation would require permission by the landowners or applicable government agencies.

The monitoring wells will be installed in cored boreholes that extend into the middle Gasport Formation. The rock core would be geologically logged for lithology, geotechnical indices (TCR, SCR, RQD) and fracturing. The boreholes will be geophysically logged, including caliper, natural gamma, conductivity, and acoustical and optical televiewer logs. Spinner logs will also be run to identify major zones of groundwater inflow to assist with the placement of the well intervals within flow zones.

The wells will be instrumented in the Guelph, Goat Island and Gasport hydrostratigraphic units. The monitoring wells will be constructed using a multilevel monitoring well system which will be designed based on the results of the geophysical logging of the borehole.

Groundwater Level Monitoring

Groundwater level monitoring will be conducted in the offsite multilevel monitoring wells and the existing network of onsite wells. The data from the onsite and offsite monitoring wells will be used to assess the potential impacts on the groundwater levels between the Lafarge Quarry and the City of Guelph. An annual report will be provided assessing the potential for impacts on the Guelph municipal wells based on the Lafarge monitoring results. The impacts will be assessed largely based on trends in the hydrographs of the offsite monitoring wells. The impact assessment will also include any publicly available data related to the City of Guelph groundwater levels from the City's municipal and monitoring wells and municipal pumping records.

Injection Well System

An injection well system would be designed and constructed if the results of the Lafarge monitoring well program and the results of the City of Guelph monitoring program both indicate that there were material impacts on the City of Guelph municipal wells.

Groundwater flow modeling of an injection well has been completed as part of the groundwater flow modeling by Matrix of the 10-year extraction footprint. The modeling indicated that one injection well completed in the Goat Island and Gasport aquifers and situated within the southeastern perimeter of the quarry, injecting at a rate of 300 to 500m^3/day, would be sufficient to offset potential impacts to the City of Guelph Downey and Queensdale municipal well flow rates.

The injection well would be situated at the approximate location shown on Figure 1. The injection well would extend into the upper Gasport Formation as simulated in the groundwater flow modeling. An injection well design would be developed, in conjunction with a drilling contractor, if the monitoring program results indicated that an injection well system is required at a future date.

A pilot test would be conducted including the monitoring of groundwater level responses in the surrounding Lafarge deep multilevel monitoring wells to determine the target flow rates. The injection rate could be increased or decreased as required to maintain the desired target groundwater levels which may include trigger levels at the offsite monitoring wells.

A design of the surface water source pond for the injection system for the injection system would also be developed. This would include the size and the depth of the pond and the water distribution system from the pond to the injection well. The requirements for treatment for suspended solids and drinking water parameters will be assessed based on discussions with the MECP. It is assumed that an ECA will be required for operation of the injection well system.

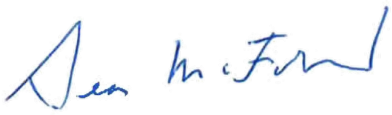
Meetings

It is recommended that this letter be submitted to the MECP for their review and a meeting scheduled to discuss the Lafarge monitoring program for potential impacts on the City of Guelph municipal wells.

Closure

We trust that this letter meets your requirements and if you have any questions please do not hesitate to contact the undersigned.

WSP Canada Inc.

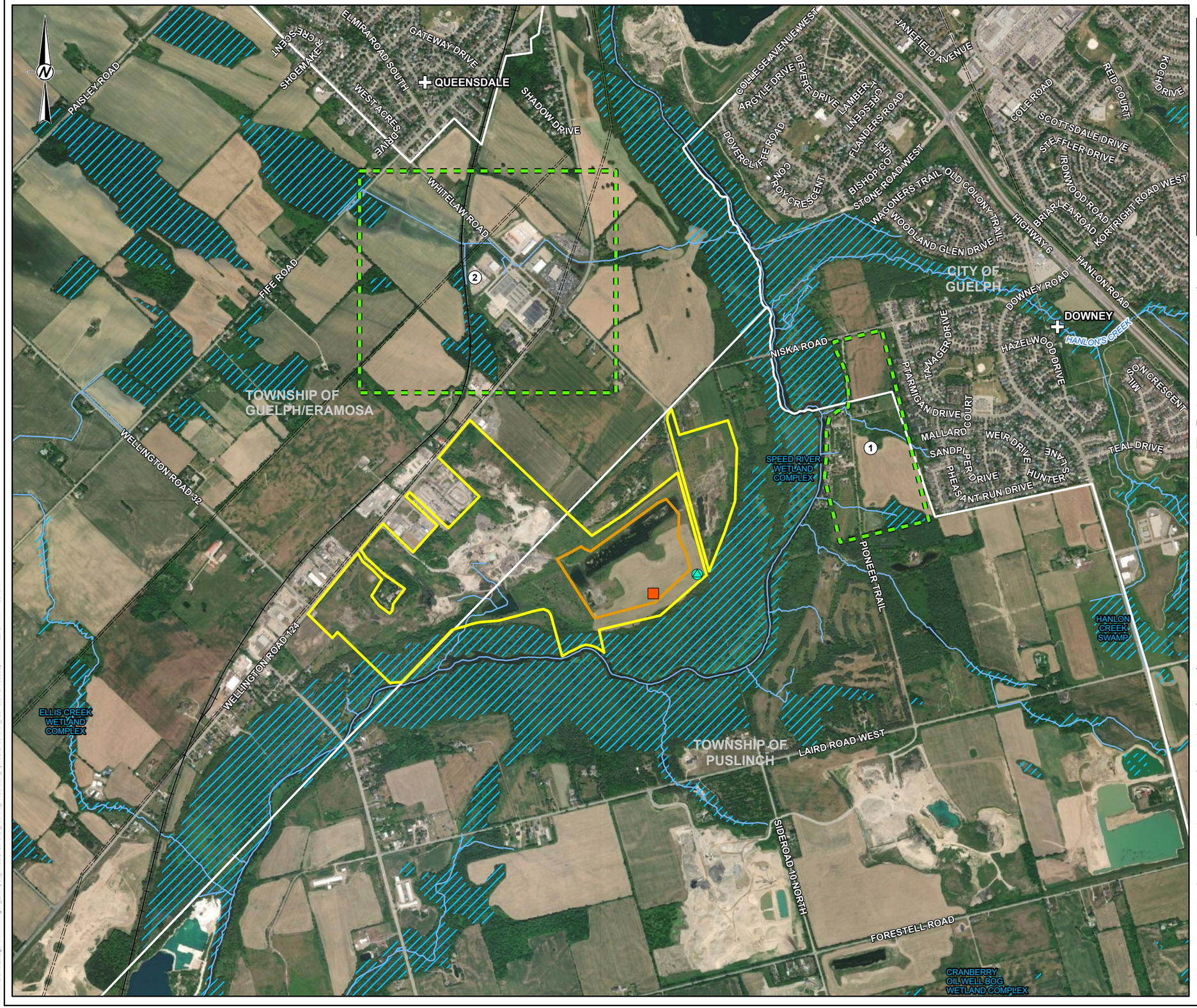


Sean McFarland, MSc, MBA, LLM, PhD, PGeo
Senior Hydrogeologist, Principal/Fellow

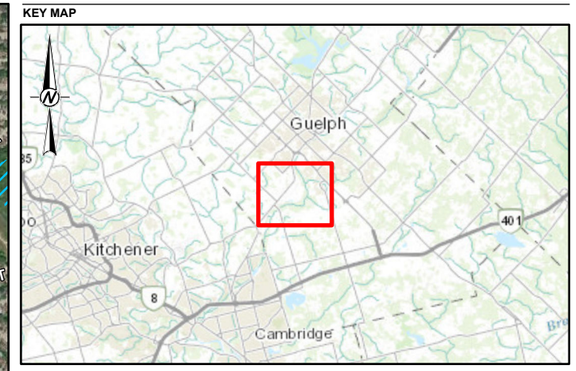
Kevin Mackenzie, MSc, PEng
Principal Senior Water Resources Engineer

Attachments: Figure 1 – Area for Installation of Offsite Monitoring Well Installations and Injection Well Location

SM/KM/rk



KEY MAP



SCALE 1:500,000

LEGEND

- SUMP LOCATION
- INJECTION WELL
- MUNICIPAL WELL
- UTILITY LINE
- RAILWAY
- WATERCOURSE
- POTENTIAL AREA FOR OFFSITE MONITORING WELL LOCATION
- LAFARGE EXCAVATION AREA - 10-YEAR FOOTPRINT
- LAFARGE PROPERTY BOUNDARY
- WETLAND

0 200 400 800

1:20,000 METRES

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. IMAGERY CREDITS: WORLD IMAGERY: CITY OF GUELPH, MAXAR
WORLD TOPOGRAPHIC MAP: CITY OF GUELPH, REGION OF WATERLOO, ONTARIO BASE MAP, PROVINCE OF ONTARIO, ONTARIO MNR, ESRI CANADA, ESRI, © OPENSTREETMAP CONTRIBUTORS, HERE, GARMIN, USGS, NGA, EPA, USDA, NPS, AAFC, NRCAN
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT

LAFARGE CANADA INC.

PROJECT

WELLINGTON QUARRY
PTTW APPLICATION

TITLE

AREA FOR INSTALLATION OF OFFSITE MONITORING WELL INSTALLATIONS AND INJECTION WELL LOCATION

CONSULTANT

wsp

YYYY-MM-DD	2024-04-08
DESIGNED	DB
PREPARED	DB
REVIEWED	----
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
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