

August 15th, 2011
Project Number W-B8202-00

Mr. Jeremy Vink
Senior Planner
Township of Woolwich
24 Church Street West
PO Box 158
Elmira, ON N3B 2Z6

**Re: Hunder Development Ltd.
Hydrogeological Assessment Report
Addendum #1
Technical Review**

Dear Mr. Vink:

WESA Inc. (WESA) has received and reviewed the captioned information and subsequent revisions (updated Table 2 and revised Figures 3A, 3B and 3C) associated with the Hunder Developments Ltd., Hunsberger Pit application. Our comments are provided using the same numbering scheme in the addendum.

RMOW COMMENTS

1. Nitrate Presence

The nitrate concentrations did decrease in April 2010 in MW5-08, MW7-08 and MW8-08. This is not unexpected and may be related to the spring melt and seasonal variation. This is evident in other parameters as well. The two sets of monitoring data for these wells still highlights the potential for nitrate concentrations in excess of the Ontario Drinking Water Standard (ODWS).

The use of the well at 107 Golf Course Road may be representative of deeper background conditions but is unlikely representative of the shallow groundwater. The well is completed deeper than the municipal wells C5/C6 and there appears to be another clay unit between the municipal aquifer and the unit where the private well is located. There is no borehole log for the private well.

The private well has also a different geochemical signature with high concentrations of calcium, magnesium, sulphate and iron than what is seen in the monitoring wells sampled. Other private, deeper wells along Golf Course Road may have this same signature since most of the drilled wells are completed at similar or deeper depths. The use of the shallow dug wells would be better suited for long term monitoring since they have a greater potential for any detrimental impacts as a results of extraction activities.

2. Silt Till Aquitard Presence

Agreed.

3. Page 9 Revision – Groundwater Analytical Data

Completed.

4. Page 11 Revision – MOE Water Well Search Area

Completed.

5. Background Groundwater Quality/Door to Door Survey

Sampling additional wells only after an approval of the application has been granted does not ensure that sufficient background data will be collected prior to the start of excavation. A draft condition of approval should stipulate that excavation cannot commence until the required baseline information has been collected.

6. Groundwater Quality

7. Municipal Well Screen Depths Relative to Proposed Depth of Aggregate Extraction

8. Dust Suppression Details

9. Cross-Section Figures/RMOW Well Screens

Points 6 to 9 all completed. Adding the details of the well at 107 Golf Course Road would be helpful.

10. Monitoring Well Purging/Development

WESA is satisfied that the wells are sufficiently developed.

11. Minimum Monitoring Period Required

WESA is in agreement that there is sufficient water level information. Additional chemistry data for private homes is required to meet the minimum requirements.

12. Groundwater Flow Direction Figures

WESA is not in agreement with the revised groundwater flow figures. Groundwater elevation figures should be a snap shot in time that is representative of a specific time period (i.e. spring or fall). Using a combination of specific water levels on a specific date and averages based on high or low readings is not good geoscience. The effect of doing so does not change the overall groundwater patterns with the obvious exception around MW3. There is a significant change around MW3 which also significantly changes the depth of excavation for Phases 1, 4, 7 and 8. The fact that MW3 is dry so much is more of an indication that it is not appropriate for long term use and a deeper monitor at this location is required.

13. Additional Groundwater Sampling

Completed with the exception that temperature was not included.

14. Seep Sampling

There is sufficient water level information for the seeps but additional chemistry data is required. Chemistry data has only been collected from the seeps on one occasion.

15. Silt Till Aquitard Presence

Completed.

16. Groundwater Model

WESA has provided AMEC with comments directly on the updating modeling aspects of the addendum. We have assumed that the memo that was to be included in Attachment A of the addendum is the same as that previously reviewed by WESA. The Attachment A memo will still have to be reviewed once it is submitted by AMEC to ensure it is consistent with the information reviewed by WESA.

We are in general agreement with the overall conclusions of the model. There are two aspects, however, that should be noted and included in AMEC's summary:

- a) Recharge and evapotranspiration were not varied across the site (the same value was used for wetlands, as wood lots etc.) and no sensitivity analyses was completed to assess the impacts of this on the model results; and,
- b) The six sensitive features on-site (wetlands, wood lots etc.) were not directly accounted for in the model.

The sensitive features were not represented in the model with different characteristics (K, recharge, evapotranspiration) but are merely represented as a location where that particular feature exists. Incorporating these types of characteristics was beyond the scope the modeling and, in our opinion, beyond the scope required. WESA does feel, however, that these conditions should be included in the modeling memo so that readers are aware of the limitations.

17. Aggregate Resources Act

The addendum indicates that... “The depth of excavation is subject to change based on groundwater monitoring that will be conducted prior to and during each phase of extraction.” The additional material that was provided with the revised groundwater flow direction figures indicate that the extraction depth is based on the average water level figure. The use of an average water level to determine the depth of excavation is not recommended since it is possible that the excavation area could be within the water table at certain times. The high water table figure is a more conservative method to determine the depth of excavation.

TOWNSHIP OF WOOLWICH (WESA) COMMENTS

1. Water Level Data

- 1a. WESA is in agreement that there is sufficient water level information.
- 1b. The water level for MP-5 on August 2008 in Table 1B of the original hydrogeological report is shown as 324.65 magd. The surface elevation for the monitor is shown as 327.55 magd. This indicates a water level of 2.9 m below ground surface not 2.9 m below top of riser as indicated in the addendum. The well is only 2.10 m below ground surface. This appears to have been an error in the original table and has been corrected in Table 1B of the addendum (now reported as 325.57 magd).
- 1c. Agreed. However, wells that are dry for most of the year are not useful and should be deepened.
- 1d. WESA is in agreement that the new K values obtained from field work are appropriate.
- 1e. Completed.

- 1f. WESA is in agreement with the overall conclusions of the model. However, a 50% reduction in the catchment area for the area around MP-3 emphasizes the importance of continued monitoring from both a water level perspective and woodlot/wetland function.
- 1g. Concerns with the revised groundwater contour map are summarized in RMOW comment 12.
- 1h. The use of an average water level to determine the depth of excavation is not recommended since it is possible that the excavation area could be within the water table at certain times. The high water table figure is a more conservative method to determine the depth of excavation.
- 1i. Agreed.

2. Groundwater Model

WESA has provided AMEC with comments directly on the updating modeling aspects of the addendum. We have assumed that the memo that was to be included in Attachment A of the addendum is the same as that previously reviewed by WESA. The Attachment A memo will still have to be reviewed once it is submitted by AMEC to ensure it is consistent with the information reviewed by WESA.

We are in general agreement with the overall conclusions of the model. There are two aspects, however, that should be noted and included in AMEC's summary:

- a) Recharge and evapotranspiration were not varied across the site (the same value was used for wetlands, as wood lots etc.) and no sensitivity analyses was completed to assess the impacts of this on the model results; and,
- b) The six sensitive features on-site (wetlands, wood lots etc.) were not directly accounted for in the model.

The sensitive features were not represented in the model with different characteristics (K, recharge, evapotranspiration) but are merely represented as a location where that particular feature exists. Incorporating these types of characteristics was beyond the scope the modeling and, in our opinion, beyond the scope required. WESA does feel, however, that these conditions should be included in the modeling memo so that readers are aware of the limitations.

3. Private Wells

- 3a. Comments on private wells are provided within the RMOW comments in Section 1.
- 3b. WESA is in agreement that the door to door survey provides more detailed information than the MOE database with the exception of geological units encountered. A correlation between wells in the survey and the MOE database should be completed for any wells that will be sampled or are used in a cross section.
- 3c. Completed.

4. Aquifer Vulnerability

- 4a. The removal of the sand and gravel from the proposed pit will change the vulnerability of the upper aquifer which has the potential of impacting shallow dug wells and/or any other wells completed in the same unit and down gradient of the site. WESA is in agreement that there should be no impact on the municipal wells.

It is not clear whether proposed Phase 3 and 7 are within the WHPA for C5/C6. It is possible that the western limits of these phases may be within the WHPA but this should be confirmed or refuted.

- 4b. Discussed in the RMOW comments.
- 4c. Agreed.
- 4d. Agreed.

5. Monitoring Program

- 5a. The use of 107 Golf Course Road would be appropriate for monitoring deeper aquifer but other monitoring wells in the upper aquifer and/or comparable depth to C5/C6 have not yet been established. A minimum of two sets of data must be collected prior to any extraction.
- 5b. Agreed.
- 5c. Agreed although it is not known why temperature was not collected during the April 2010 monitoring.
- 5d. Agreed.
- 5e. Agreed.

5f. The depth of excavation has been established for each phase of extraction and therefore trigger levels and contingency plans can be established. The levels can be modified as new data is obtained but since AMEC has firmly stated that the amount of data collected “greatly exceeded these minimum requirements”, the establishment of trigger levels should be possible.

The monitoring program, including the establishment of monitoring wells around each phase, should be incorporated into the Operational Plan, if not done so already.

5g. Agreed.

5h. Agreed.

Refuelling Activities

Agreed.

Respectfully submitted,

WESA Inc.



Ian Macdonald, M.Sc., P.Geo. EP(CEA)
Principal / Senior Hydrogeologist



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