WESA
A Better Environment For Business

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February 19th, 2010
Project Number W-B8392-00

FINAL DRAFT

Ms. Brenna MacKinnon, M.E.S.
Manager, Development Planning
Planning, Housing and Community Services
Regional Municipality of Waterloo
150 Frederick Street
8th Floor
Kitchener, ON N2G 4J3

Re: Montrose Pit Scoped Subwatershed Study
Hydrogeological Peer Review

Dear Ms. MacKinnon:

WESA Inc. (WESA) was retained by the Regional Municipality of Waterloo (RMOW) to conduct a peer review of the hydrogeological aspects of the Montrose Pit Scoped Subwatershed Study near West Montrose, Ontario, within the Township of Woolwich. It is our understanding that Capital Paving Inc. has submitted an application for a Class 'A' Licence for a 41.72 ha sand and gravel pit with a proposed 500,000 tonnes per year removal rate. The proponent is proposing to excavate below the water table over 1.8% of the extraction area and to within 0.5 m of the water table over the remainder of the extraction. The following documents were reviewed by WESA:

- *Capital Paving Inc. Proposed Montrose Pit Scoped Subwatershed* Study, prepared by Stantec Consulting Ltd. in association with Groundwater Science Corp. dated September, 2009.
- Letter dated September 14, 2009 from Capital Paving Inc. to Brenna MacKinnon (RMOW) re: Montrose Pit Scoped Subwatershed Study (MPSSS).
- Letter dated July 22, 2009 from Sylvia Rafalski-Misch (RMOW) to Capital Paving Inc. re: Montrose Pit Scoped Subwatershed Study Terms of Reference.
- *Hydrogeological Assessment, Capital Paving Inc. Proposed Montrose Pit Part Lots 74 & 75, Concession CGT, Township of Woolwich* prepared by Groundwater Science Corp. dated March, 2008.
- Revised site plans, prepared by Harrington and Hoyle Ltd. Drawings 1-6 dated December, 2009.

INFORMATION REVIEW

The Groundwater Science Corp (GSC) document and the updated/expanded hydrogeological sections of the Stantec/GSC reports are, overall, well done. The reports generally meet the study requirements of the Aggregate Resources Act and essentially all of the Region's Guidelines for Hydrogeological Studies for Proposed Mineral Aggregate Resource Extraction Projects. The overall conclusions from the reports include:

- No subwatershed scale impacts to water resources are expected.
- The proposed pit development will not negatively impact the quantity or quality of groundwater resources either locally or on the subwatershed scale.

Water Taking

The one major aspect that has not been adequately addressed is the water taking associated with washing operations. It is our understanding that all water used for washing will be taken from the on-site pond. We are in agreement that a closed loop system does not cause large overall changes in water levels but more details on the water taking are required to come to this same conclusion on a shorter time scale. The proponent has indicated that a Permit To Take Water will be required and therefore significant water could be pumped from the pond. Factors that can potentially affect water levels include the amount of water to be taken, the duration of the water taking (i.e. an hour at a time or continually pumped for days) and the site life. These questions must be answered and analyzed relative to potential impacts on the shallow groundwater table before the conclusion of minimal impacts can be made. The proposed monitoring plan must be sufficient to ensure that there will be no detrimental water taking impacts.

The proponent is proposing to excavate below the water table over 1.8% of the extraction area. Although the amount of extraction below the water table appears small in comparison to the above water table, the extraction in the remainder of the area is proposed to be only 0.5 m above the water table. This is 1 m closer to the water table than required for operations that licensed for only above water table extraction. Extracting this close to the water table is not recommended since the extra metre of material would aid in the protection of groundwater from potential surface impacts. The ability of the soil to reduce nitrate concentrations, for example, from agricultural operations would be compromised with the deeper extraction proposed.

Cumulative Impacts

The proponent has conducted a preliminary cumulative impacts assessment of aggregate operations within the study area. All the existing operations appear to be limited to above the water table with only two sites that have active extraction within the esker deposit. Determining cumulative impacts for above water table operations is very difficult, however, the proponent should determine if any of the closed or operational pits have any sort of groundwater or surface water monitoring program. Any potential cumulative impacts would only be recognized if these other sites have monitors and the monitoring programs are synchronized with respect to timing, frequency and any chemical parameters to be analyzed.

However, the existing operations in the esker deposit are physically separated from the outwash deposits along the Grand River. Potential cumulative impacts from the esker and the outwash deposits are therefore independent of each other. We are in agreement that the esker operations could result in a slight increase to flow to the Grand River. No temperature changes in groundwater discharge to the River would be expected from the esker operation. If the esker operations were to extend to below the water table then the monitoring requirements noted above would be essential to determine potential cumulative impacts.

The proponent has also conducted a preliminary cumulative impact assessment for the outwash deposits. Since no other active sites are currently in the outwash deposits within the study area, it is premature at this point to speculate on potential cumulative impacts. Future applicants for operations within the outwash deposits would be responsible for addressing any overlapping effects of their proposal with any existing pits that may be present at that time.

Monitoring Program

If the proponent can confirm that the washing operations will not cause any temporary or significant change in water levels beyond the site boundary, WESA is in agreement that no negative impacts on water or groundwater resources are expected on the subwatershed scale. If there are no impacts on the local scale then there should be no impacts on the subwatershed scale. WESA is also in general agreement that local impacts will be minimal, but the key will be the monitoring program. The low response rate to the water well survey (18 of 31 did not respond) is not unexpected given the public's feelings with respect to the proposed pit. With the limited data available, there may be more shallow wells that utilize the shallow sand and gravel unit where extraction will take place. With the possibility of more shallow wells, it is essential that the proponent's monitoring program ensure no lowering of the water table that could potentially affect these wells.

1. The GSC report indicates that equipment refueling operations may take place on the site. If this is the case, then hydrocarbon monitoring (benzene, toluene, ethylbenzene, xylenes and petroleum hydrocarbon fractions F1-F4) should be included in the groundwater monitoring program.
2. The proponent must ensure that all monitoring points are maintained throughout the site life with any damaged or destroyed wells repaired or replaced prior the next monitoring event.
3. The reports indicate that there will be no "significant" water table decline east of the pit property. Can the proponent clarify what is meant by "significant" and what monitoring points will be used to verify that there are no impacts? There are no monitoring points east of the site with BH4 and DP1 at the eastern property boundary. Can any potential decline in the water table at BH4 and BH2 be determined? If trigger levels cannot be established for these monitors, an additional monitor east of the site may be required.
4. If there are not expected to be any "significant" changes in water levels beyond the property boundaries and water levels have been collected for the last three years, there should be sufficient data at present to establish trigger levels in the monitoring wells. The revised site plans indicate that trigger levels would only be established prior to the installation of the control drain. This will not address any potential impacts in Phases 1 to 4 and therefore the trigger levels should be established now and, as new data becomes available, revised if appropriate.
5. With the establishment of trigger levels for Phases 1 to 4, the annual report should include any threshold response or mitigation measures undertaken.
6. The annual monitoring report should also be submitted to the Region.
7. Why were samples for water quality analyses not obtained from monitors BH7, DP1, DP2 and DP3? Water quality from all monitors is required to determine which monitors are representative of overall site conditions. A minimum of two sets of samples (early spring and later summer) for water quality analysis should be collected on an annual basis as stipulated in the Region's aggregate guidelines. There is no mention of water quality monitoring in the revised site plans.

Surface Water

The Tributary East of Letson Road drains areas east of the proposed pit. Portions of the Tributary flow along the northeast property boundary. Although flow can be intermittent, the Tributary should be maintained throughout the life of site operations to ensure that area east of the site can continue to drain to the Grand River. The culvert that is to be removed under the existing road as shown on the Operational Plan Phase A, B and C may need to remain in place. The details of road works, site grading and culvert moving should be reviewed with the MNR, the Township and the GRCA prior to any field work being conducted.

The Stantec report identifies two seeps west of the property (Seep Area and Slope Seep) as well as a surface water swale from the livestock pond to the Grand River. The GSC report suggests that there will no impacts to the wetland in the seeps/swale area. The proponent should determine if the wetlands are maintained by a component of groundwater and/or surface water flow from the site and then confirm that these components will not be impacted by site operations. For example, would the construction of the berm along the north side of Area 1 reduce the amount of surface water flow to the existing pond that drains to the river along the swale? A monitoring point in the wetland between Area 2 and the river (similar to DP5 and DP6) to determine if there are any impacts to the wetland northeast of the drainage swale is required especially since the end of the wetland survey was west of Area 2. Inspections of the seeps and the drainage swale should be included in the monitoring plan and undertaken concurrently with the well water level monitoring.

The monitoring program, with the additions noted above, should be sufficient to determine the potential for any off-site surface water impacts by monitoring conditions up gradient of those surface waters.

If you have any questions concerning this review, please contact the undersigned at your convenience.

Respectfully submitted,
WESA Inc.

FINAL DRAFT

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Principal / Senior Hydrogeologist
Ref: B8392 RMOW Montrose repd final Feb 10.docx