

**Stantec**

To: Stan Holiday
City of Hamilton

From: David Charlton
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File: 162603782

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**Reference: Potential Effects Associated With Test Pit, Test Wells and Trench Establishment
Proposed St. Marys Flamborough Quarry**

Stan – I was requested by Tom Hilditch to prepare a brief memo explaining the process for determining locations for and mitigating any potential environmental effects associated with the proposed test installations discussed in your meeting with St. Marys last Wednesday. Testing will require the establishment of test pits, test wells and the trench proposed as a key component of the groundwater recharge system (GRS). The following outlines the key points in this matter.

The proposed testing includes three main activities that might have a potential impact on natural features:

1. Drilling large diameter test wells;
2. Digging test pits (rubber tired backhoe) to provide additional information on the character of the overburden in selected areas; and
3. Construction of approximately 150 m of a prototype GRS including digging a trench in the overburden and shattering approximately 1 metre of the bedrock.

Test Wells

Technical details on the drilling of test wells and protection of groundwater quality and quantity has been provided by Gartner Lee. The only remaining potential concern from an environmental point of view would be the location of, and access to, the wells. The wells will be located in agricultural fields well removed from any natural features and access will be by existing roads, trails and agricultural fields. There is no potential for damage to natural features, or even to individual trees from this activity. I would not expect that a field investigation would be useful to confirm these locations, prior to installation.

Test Pits

A limited number (4-5) of small (approximately 2 m by 2m) test pits will be dug using a rubber-tired backhoe. The backhoe will be traveling mostly on farm lanes

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and occasionally traversing agricultural fields and cultural meadows. To access test locations, the backhoe may have to cross hedgerows and small depressions in the cultural meadows, however it will not enter any of the large natural features (woodlands, wetlands and creeks) identified on site. No trees will be removed and all due care will be taken to avoid inadvertently damaging any trees in the hedgerows. I would not expect that a field investigation would be useful to confirm these locations, prior to installation.

Test pits will be immediately refilled after the observations and will be open for no more than an hour or two. Pits will be refilled in a reverse order to the order in which the material was removed, with topsoil being replaced last. The small, disturbed areas will quickly revegetate from surrounding seed sources.

Prototype GRS Construction and Maintenance

The location of the GRS test trench was determined in the field through consultation between Stantec and Gartner Lee. To be effective, the test must be located relatively close to the monitoring wells and instruments. This is close to the edge of the large forest and wetland complex at the north end of the site. The location selected allows for a good test of the proposed system while still maintaining a minimum of 10 m between the dripline of the trees and the closest edge of the trench. Allowing for 3:1 side slopes though 2 m of overburden, the actual GRS rock infiltration area will be 16 m or more away from the edge of the forest. The test portion of the GRS trench will be located completely within active agricultural fields and will have no impact on scattered hedgerows or individual trees.

The test of the GRS will include directing an amount of water to the fractured top of the rock consistent with the amount of water that can be infiltrated into the rock. Any excess water will be discharged to Mountsberg Creek, well away from the site of the test. The trench above the rock will not be allowed to fill with water and so there is no potential for indirect effects on adjacent trees that might be associated with waterlogging overburden soils.

The edge of the woodland is generally downhill of the test location. Giving due consideration to the size of the buffers proposed, soils, topography and the rooting characteristics of the adjacent trees it is my conclusion that the trench, even if left in place for several years will not have any significant drying impact on soils in the vicinity of the woodland edge.

During construction of the trench no fill placement will be allowed in the buffer areas. Soil stockpiles will be located in the agricultural fields away from the woodland edge. The exposed soil stockpiles will be contained within silt fencing and will be seeded with a quick growing seed mixture to stabilize the exposed areas and to prevent soil loss.

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The side slopes of the trench will be covered with a geotextile and seeded with an appropriate seed mix to stabilize the trench for the following spring. Depending on the results of the test and safety considerations it may be most efficient to maintain the trench as a future part of quarry mitigation, in which case it will be important to properly stabilize the side slopes.

Gartner Lee is presently surveying the location of the trench relative to the forest edge and a survey plan (as opposed to the concept sketch presented earlier) will be available before construction starts. This plan will indicate the exact locations of the trench, buffers to the woodland, soil stockpiles, test wells and associated working areas. The City and the Natural Heritage Peer Reviewer (Ken Ursic) may wish to attend a site meeting to observe and approve the proposed trench location prior to installation.

Conclusion

There will be no significant environmental effects from the installation of components of the proposed testing. The vast majority of the activity will take place in active agricultural fields with access by farm lane. Adequate buffers will be established and maintained between the test areas and the natural areas on site. Proven mitigation techniques can be implemented to reduce the potential for indirect impacts due to soil erosion.

Please feel free to contact me if you have any questions about this memo.

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