

Town of Caledon Supplementary Aggregate Policy

Water questions

Part 1. Questions from Jane Thompson, April 29, 2024

Hi Joe,

For the benefit of our experts and in preparation for our meeting on Tuesday here are some subject areas that would be of interest:

Hydrogeology and hydrology:

1. How is dewatering done, in detail. Like, where are the sumps in relation to other operations, how does the water drain towards and collect in them, how are they moved as extraction proceeds, what happens to the water as it collects on the quarry floor, is there any pre-treatment, how is it discharged, at what rate, how does it affect natural stream flows, is there quality monitoring, is there a measuring system for quantity.

Response:

Dewatering is designed according to the phases of extraction. Areas which are initially proposed for extraction are defined and the amount of water falling as rain and/or snowmelt is calculated and area set aside for capture and retention. This amount is not typically sized to a very large standard as the bed/floor of an extraction zone can flood and to size to a large event will make operations more difficult. Water is collected in a contained zone and then often sent to a primary and secondary clarifier through a batch process – once the water is deemed clean enough (based on a target) it can be pumped to a receiver (watercourse or headwater drainage feature) at existing pre-quarry rates.

2. Highly Vulnerable Aquifers: What are the criteria for “highly vulnerable aquifers” under the ROP, or generally in hydrogeology? What are the implications of that designation? How do you protect HVA’s? Can you protect them while allowing aggregate extraction within them? How does that relate to down gradient users?

Response:

Highly vulnerable aquifers are defined as subsurface, geologic formations that are sources of drinking water, which could relatively easily be affected by the release of pollutants on the ground surface. Areas that are designated as highly vulnerable have thin permeable soils and a shallow water table.

The criteria for the designation of Highly Vulnerable Aquifers (HVA) are established under Part IV of the 2021 technical rules of the Ontario Clean Water Act¹. Highly vulnerable aquifers in Peel Region are mapped on draft Schedule X5 (September 2021)².

¹ <https://www.ontario.ca/page/2021-technical-rules-under-clean-water-act#section-3>

² <https://peelregion.ca/officialplan/review/pdf/maps/schedules/schedule-x5.pdf>

As indicated on page 9 of the Peel 2041 Discussion Paper, policies in the source protection plans have been developed to address significant threats. Municipal official plans are required to conform to significant threat policies and have regard for moderate and low threat policies.³

More details on highly vulnerable aquifers are presented in the document “peel-2051-water-resources.pdf”.⁴

2. High Recharge Areas: what are the criteria, what are the implications, how do you protect the quality and quantity down gradient? Can it be done within an aggregate operation. How does that relate to down gradient users?

Response:

Recharge areas are locations on the ground surface that have appropriate characteristics to facilitate the infiltration of precipitation and surface water run-off below ground surface to the water table. Soil properties, topography, land cover, and precipitation were used as some of the input data to a model to calculate the recharge distribution across the source protection region.

The criterion for the designation of Significant Groundwater Recharge Area (SGRA) is established under Part V of the 2021 technical rules of the Ontario Clean Water Act⁵. A recharge area is designated as significant when the rate of recharge, relative to the source protection area as a whole, is fifteen percent higher than average. Significant Recharge Areas in Peel Region are mapped on draft Schedule X6 (September 2021)⁶.

3. High Discharge Areas: criteria, implications, protection, down gradient impacts to quality and quantity and users?

Response:

This concept is not referred to specifically in the Source Water Protection regulations of the Clean Water Act. However, it is generally accepted in Ontario that proposed groundwater takings should not exceed 10% of the estimated groundwater discharge to streams (that is, 10% of the estimated stream baseflow). The technical rules of the Clean Water Act require that a groundwater reserve be incorporated in the assessment of the degree of potential hydrologic stress in a subwatershed. The groundwater reserve is calculated as 10% of the estimated average annual groundwater discharge rate⁷.

³ <https://www.peelregion.ca/planning/officialplan/pdfs/water-resources-discussion-swp.pdf>

⁴ <https://www.peelregion.ca/officialplan/review/pdf/peel-2051-water-resources.pdf>

⁵ <https://www.ontario.ca/page/2021-technical-rules-under-clean-water-act#section-3>

⁶ <https://peelregion.ca/officialplan/review/pdf/maps/schedules/schedule-x6.pdf>

⁷ <https://www.ontario.ca/page/2021-technical-rules-under-clean-water-act>

4. Provincial Plans protect Key Hydrologic Features which includes all permanent and intermittent streams. To protect the function, quality and quantity of water do you need to protect the drainage area? is that the same as top of bank? Which should apply?

Response:

KHF need to be studied and assessed as to their environmental significance. There is prescription around the appropriate management practice based on whether a feature is a watercourse or a headwater drainage feature. This relates to form and function and the presence or absence of a CA regulation. This is not associated with TOB. Top of bank is merely a CA term used to define stability – it assists in establishing the limits of a regulation.

5. Seeps and springs: How can they be maintained down gradient with extraction, dewatering?

Response:

Seeps and springs are generally associated with wetland areas. Wetland areas are mapped as either designated as Provincially Significant Wetlands or Locally Significant Wetlands. Wetland may be maintained by requiring that groundwater levels do not decline below thresholds, or by the direct delivery of discharge water from quarry dewatering activities.

With respect to protecting wetlands (and more specifically seeps and springs) the necessary steps in assessing a proposed land use include:

- Identifying the groundwater resources that may potentially be affected;
- Identifying the potential impact to those resources in the resources are not protected; and
- Establishing the mitigation measures to ensure that the resources are protected.

6. Do you have experience with infiltration trenches to help recharge the ground water during excavation. Has this concept of recharge infiltration trenches being used successfully elsewhere? Is it predictable?

CJN response:

Infiltration trenches are not different in concept from recharge wells. Provided they are designed properly, monitored and maintained, they are an established and effective way of getting water back in the ground.

Where land access is available, infiltration trenches have the advantage of having more predictable performance than recharge wells.

There are many forms of infiltration systems but they all work around the same concept which is to put surface water into contact with the ground and allow it to infiltrate and evapotranspire. It is commonly used in new development applications to mitigate the impacts of additional runoff due to urbanization. In aggregate settings it can perform a similar function to modulate the impact of changing a local runoff regime on natural features

7. Re dewatering discharge into golf course irrigation ponds which then flow into the Credit River; How can this be acceptable? What happens when the ponds are full?

Solutions such as this need to be assessed holistically considering both local scale and regional scale impacts. Discharge to holding systems can be functional however the release rates need to be assessed against local objectives and ensure that broader scale issues around flooding and erosion are not exacerbated

8. How do you address cumulative impacts in relation to ground and surface water and the existing and potential impacts of aggregate extraction.

Response:

The Joint Agency Review Teams have requested that the potential impacts of aggregate extraction be examined in the context of cumulative impacts to groundwater and surface water resources. In the greenfield developments, the impact assessment is conducted with respect to the agreed-upon characterization of baseline conditions that are representative of pre-development conditions. This is more challenging for the assessment of proposed extensions of existing operations. Pushback has been experienced, with proponents maintaining that impacts should be assessed with respect to observed current conditions.

Furthermore, each stage of a quarry operation needs to be assessed to ensure that worst cases are considered and that mitigation measures are appropriate.

9. Flooding and Hazards: Can we see how the regulated areas look on a map. What do the regulated flood limits look like in some of the resource areas? Are they delineated throughout the rural area? How has it been determined where there is a regulated limit and where not? What happens in unregulated areas in relation to flooding, is it still a concern? How are proposals reviewed where there is no regulated limit?

Response:

CVC prepares and maintains regulation maps – these are available on their website – some hazards are defined by technical studies where as other are estimated until such time as the technical studies can be done.

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Part 2. Questions from Ian Sinclair, April 29, 2024

Further to Jane's points I wish to add for discussion:

Discharge to receiving streams:

Capacity of receiving stream to accept increased flow without channel erosion

The sensitivity of receivers to being able to accept more or less runoff is a function of its class and form as a watercourse or HWDF. This work is done at the characterization stage.

Receiving stream distance from dewatering quarry and a suitable receiving location; adjacent or measured in kilometers?

There is no prescribed limit or distance – this is a function of proximity to the feature and sensitivity

Will forms of easements or public road occupation agreements be required to accommodate dewatering mains to a receiving stream?

Only if the feature is not contiguous with the aggregate extraction – often public ROWs can serve this purpose (roadside ditches) with the approval of the municipality

Design of discharge location into a receiving stream.

Temperature of discharge water into a cold water fishery?

This again relates to the characterization of the feature and its sensitivity – in cases where thermal impacts are detrimental a thermal management plan can be established (cooling trenches, shading, bottom draws etc.)

Blasting residue in discharge water

I have no intel on this

Do PTTWs cover water quality for discharge waters?

Most often these relate to quantity only

In addition:

The previous Caledon O.P. under which current aggregate application shall be heard, the following policies are relevant;

The Credit Valley Conservation Authority Sub-watershed Studies 15 and 18 boundaries abut through the proposed quarry site. The CVC Sub-watershed Studies are inadequate in detail to rely upon to assess the quantity and quality impacts on ground and surface waters likely to result from de-watering operation lasting many decades.

Agreed – SWS are not conducted at the scale necessary to support an aggregate extraction

The following policies relevant to a quarry application have not been thoroughly met:

Town of Caledon Official Plan, Chapter 5, Town Structure and Land Use Policies

5.11.2.4.4 The Town of Caledon will consider an amendment to this Plan to redesignate lands for a new extraction operation or an expansion to an existing operation as extractive industrial purposes on lands identified as CHPMARA Aggregate Reserve Lands on Schedule L subject to Section

5.11.2.1.2 and subject to the following additional requirements:

b) A Sub-watershed Study has been completed and appropriate policies are incorporated into this Plan and the application conforms thereto. Alternatively, the Applicant may undertake a comprehensive broader scale environmental study as described in Section 5.11.2.4.17 which is to be considered in conjunction with the EIS required in support of the pit or quarry;

5.11.2.4.2 The Town of Caledon will approve an application for an Official Plan Amendment to designate lands identified as Aggregate Resource Lands on Schedule L for a new extraction operation or expansion to an existing extraction operation when the following criteria have been met:

g) The Applicant, for operations which propose below water table extraction, has completed a Water Resources Study as described in Section 5.11.2.4.15 and has demonstrated water resources will be protected, maintained and, where applicable, enhanced and that there will be no unacceptable impacts;

5.11.2.4.15 The Water Resources Study required by Section 5.11.2.4.2(g) shall identify all sources of water and their functions and analyze and assess the impact of the application on each of those water resources and shall satisfactorily demonstrate that there will not be unacceptable impacts and shall address the following:

- a) The quantity and quality of mineral aggregate resource located below the water table;
- b) That the removal of the mineral aggregate resource and the subsequent rehabilitation of the lands will satisfy the applicable performance measures in Sections 3.2.5.13 and 5.11.2.2.6 of this Plan;
- c) That measures to protect water resources will be implemented in the design and operation of fuel storage and handling systems, machinery storage and servicing and the use and storage of potential contaminants on the site. The storage of fuel and other potential contaminants on-site may be restricted if necessary to protect water resources; and,
- d) That an appropriate monitoring program will be implemented and that the results of this monitoring program will be provided to the Town of Caledon, the Region of Peel, the Niagara Escarpment Commission where applicable and the applicable Conservation Authorities.