Gravel WATCH ONTARIO

Water Systems

Above-Ground Water Systems, also known as surface water, are any body of water above ground, including streams, rivers, lakes, wetlands, reservoirs, and creeks, fed by precipitation and water runoff. They participate in the hydrologic cycle, or water cycle, which involves the movement of water to and from the Earth's surface. There are three types of surface water: perennial (permanent), ephemeral (semi-permanent), and man-made (artificial structures). Because surface water is more easily accessible than groundwater, it is relied on for many human uses.

Below-Ground Water Systems, also known as groundwater, explains water that has infiltrated the ground to fill the spaces between sediments and cracks in rock. Groundwater is fed by precipitation, can resurface to replenish streams, rivers, and lakes and is recharged by precipitation, snowmelt, or water seepage from other sources. Groundwater is everywhere beneath the soil surface and can be ever-present in many places if allowed to recharge. Even in dry conditions, it maintains the flow of rivers and streams by replenishing them, providing a valuable substitute for precipitation

Proven Impacts on Water Systems

Contamination

- Groundwater is maintained through the hydrological cycle which is the movement of water above, below, and on the surface of the earth.
- As the water moves through the hydrological cycle, it comes into contact with pollutants in the atmosphere such as harmful gases. When it rains, contaminants are carried into the ground and pollute the groundwater.
- Aggregate extraction may also directly impact water quality on nearby extraction sites, as deleterious substances may enter the watershed through groundwater and surface run off.
- These may negatively affect wetlands and on-site lakes with reduced water levels and increased summer water temperatures, which may be detrimental to cold water fish and other species.

Removal of Topsoil & Vegetation

- There is concern that the process of extracting aggregate can have a potentially significant impact on aquatic features in the surrounding environment.
- Creating pits or quarries requires the removal of virtually all natural vegetation, top soil and subsoil to reach the aggregate underneath.
- This can lead to a loss of existing animal wildlife, as well as a huge loss of biodiversity as plants and aquatic habitats are destroyed.
- While local governments typically set regulations for aggregate extraction projects to avoid negative environmental impacts, the gradual loss of soil materials and associated changes in vegetative cover can still occur.

Disruption of Water Movement/Cycles

- Pits and quarries have a tendency to disrupt the existing movement of surface water and groundwater.
- It has been argued that they could interrupt natural water recharge and could lead to reduced quantity and quality of drinking water for residents and wildlife near a quarry site.
- Aggregate extraction may also disrupt water balance and impact the hydrological cycle of a watershed.
- In addition, the watershed may decrease its capacity of assimilating contaminants as a result of the changes of the stream regime, such as flow and temperature.
- This type of alteration of the water balance within the watershed may affect surface or groundwater levels and aquatic habitats.

Recommendations

Because the need to protect water resources is only increasing, many have studied both the proven and potential impacts of aggregate on water systems. Recommendations regarding best practices and assessments have been developed to provide information on expected effects of an aggregate operations on groundwater quantity and quality. Some of these recommendations include:

- **Storm Water Management -** plans to ensure that storm water recharge to the designated excavation area does not contain contaminants from adjacent land (e.g. agricultural land).
- **Security -** commiting to controlling illicit or inadvertent contaminants that could potentially contaminate water resources.
- **Land Use -** conducting site specific studies to ensure that other intensive land uses typically associated with adverse groundwater impacts do not occur.

Links:

- https://www.nationalgeographic.org/encyclopedia/groundwater/?utm_source=BibblioRCM_Row
- https://www.nationalgeographic.org/encyclopedia/surface-water/
- http://ccob.ca/wp-content/uploads/2012/05/finnish-study-effect-of-gravel-extraction-on-groundwater.pdf
- https://www.worldatlas.com/articles/what-are-the-major-sources-of-groundwater-contamination.html
- https://www.regionaldistrict.com/media/112368/2013_11_08___Full_Report___Aggregate_Supply_and_Demand_Update_and_Analysis.pdf
- https://wwf.panda.org/wwf_news/?333451/Uncovering-sand-minings-impacts-on-the-worlds-rivers
- https://www.torontoenvironment.org/gravel/impacts
- https://www.scirp.org/journal/paperinformation.aspx?paperid=77950
- https://ossga.com/multimedia/29/the_effect_of_aggregate_extraction_on_groundwater_quality-golder.pdf