***Intro & SET BACK***

As you may know there is a **required set back** **from sensitive receptors**. This gravel pit’s setback does not go to the end of peoples’ properties in Shingletown as CAN be the case, but instead it goes right up to the back of people’s houses – to their back door, by the looks of it.

***RESEARCH FINE PARTICULATE MATTER & THE BRAIN***

In the last decade there has been increasing research about fine particulate matter in the environment and its impact on the brain. As a highly acclaimed researcher, Caleb Finch, has stated “This is like tobacco research and cancer 70 years ago.” 1

According to the Ontario Stone, Sand and Aggregate Association, suspended particulate matter or “dust” refers to the particles, of varying sizes, in the air we breathe. It is naturally present but can be increased due to aggregate related activities. (OSSGA dust management brochure).

So, let’s look at aggregate activities. Fine particulate matter or dust in gravel pits – can come from transporting, processing and storing the sand and gravel itself, but can also be made up of vehicle and equipment emission. This fine particulate matter produced from these sources is so small that literally thousands of them could fit on the period at the end of this sentence. Dust then becomes something of a soup or stew. And it gets out of the pit through weather and by the vehicles and equipment that create the dust when they enter and exit the pit.

**In terms of the contribution of the gravel trucks and other equipment to this dust stew, a 2017 study out of the University of Toronto in collaboration with Environment and Climate Change Canada as well as Ontario’s Ministry of the Environment, Conservation and Parks found that if there’s a high proportion of trucks on roadways (or in this case a gravel pit), people who spend a lot of time nearby – drivers, workers, residents – are being more exposed to diesel exhaust.** 2 **These particles are much smaller than red blood cells. They can travel and trans-locate around the body. Whether it be cancer, respiratory problems, cardiac problems or neurodegenerative problems, there are numerous adverse health effects associated with the chemicals in these emissions”. Greg Evans**

***ENTRY POINTS TO THE BODY***

Dust from gravel pits gets into the body through our nose and mouth. Respiratory disease is well documented but what we know now is that the **lining of the lungs can be infiltrated by these micro particles**, and these end up in the blood stream and get to the brain. **Through the nose, microparticles can pass through the olfactory bulb a**nd pass directly into the various parts of the brain. When swallowed, particles can actually alter the **microbiome** of the gut which processes food and gives us nutrients and vitamins, etc. The health of the microbiome directly impacts brain health. 3

***STUDIES***

There are many studies that link air pollution to brain inflammation and cell damage.3 Connections have been researched in the area **of fetal impacts leading to developmental challenges in children when the mothers were exposed to pollution**; there are studies connecting exposure to air pollution to anxiety and depression in youth. There is a frequently cited study from the US of 1400 women across the country that found that the more that these women were subjected to exposure to particulate matter the less white matter they had. Why is this important? Because a decrease in white matter is strongly associated with dementia.

***UNICEF***

In 2017 UNICEF published a special paper on How Air Pollution Can Affect Brain Development in Young Children. “With every breath, children take in more air per unit of body weight than adults. By extension, when air is toxic, they take in more toxic air per unit of body weight than adults. Children in our community will be at risk because they live near the gravel pit and breathe and swallow its dust.”

I was informed that there is no check box for carbon emission levels on applications for gravel pits which I find somewhat puzzling. There were many amendments to the ARA, but none focused on this hugely important issue, but then I realized that carbon emissions contain fine particulate matter, much as is the stuff from sand and gravel processing. It is, in fact, dust.

***NOISE***

The **World Health Organization** published a study in 2011 and found that at least one million healthy years of life are lost each year in Europe alone due to noise pollution and this doesn’t include industrial workplace noise. 5

**People think they “get use” to noise**, like noise from gravel pits, and no harm results. But Numerous studies have linked noise pollution to increased anxiety, depression, high blood pressure, heart disease and stroke. Scientific American tells us that ‘Even a modest level of noise, over a long enough period of time (Like beeping trucks, air conditioners, hair dryers or in this case from a gravel pit), can cause damage ***to the brain networks that extract meaning from sound.*** Many of us don’t even realize our brains are being blunted and our thinking impeded by this invisible force.” **If possible, choose where you live wisely, based on noise levels. The constant low-level meaningless noise is chipping away at your brain’s ability to make sense of meaningful sounds like speech, and may hasten cognitive decline in old age.” 6**

**Noise impacts restorative sleep**. You can close your eyes, but your ears are always open. Sleep during daytime hours is critical for both young brains for growth and development and old brains for optimal functioning. Behavioural challenges and attention problems of children can result from disrupted sleep patterns, and cognitive and functional challenges can result from disrupted sleep in seniors. It’s my understanding that this gravel pit requests the opportunity for occasional night time activity which can make its noise impact on sensitive receptors even more compelling

**In the world of mental health, we have wondered about the increase in anxiety and depression, particularly in children and in youth for over a decade. This mounting evidence of pollution related effects on the brain – both through air and noise - appear to be contribute to a viable explanation, at least partially, the same way that tobacco has been tied to lung cancer.**

**References**

1. <https://www.motherjones.com/environment/2019/05/researchers-now-have-even-more-proof-that-air-pollution-can-cause-dementia/>
2. <https://uttri.utoronto.ca/news/near-road-air-pollution-pilot-study-released/>
3. <https://www.the-scientist.com/features/air-pollution-may-damage-peoples-brains-66473>
4. <http://gravelwatch.org/air-quality-health/>
5. <http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf>
6. <https://blogs.scientificamerican.com/guest-blog/how-sound-can-be-an-ally-or-an-enemy-of-a-healthy-brain/>
7. <https://www.quebec.ca/en/health/advice-and-prevention/health-and-environment/the-effects-of-environmental-noise-on-health/effects-of-environmental-noise-on-physical-health/>

Other:

<https://www.brainfacts.org/thinking-sensing-and-behaving/diet-and-lifestyle/2018/noise-pollution-isnt-just-annoying-its-bad-for-your-health-062718>

<https://www.health.harvard.edu/mind-and-mood/protect-your-brain-from-stress>

<https://www.science.org.au/curious/earth-environment/health-effects-environmental-noise-pollution>

<https://www.ncbi.nlm.nih.gov/pubmed/28444645>

<https://www.apa.org/monitor/2012/07-08/smog>

<https://www.apa.org/monitor/2019/04/numbers-toxic-air>

<https://www.the-scientist.com/notebook/time-in-nature-is-good-for-you-66484>