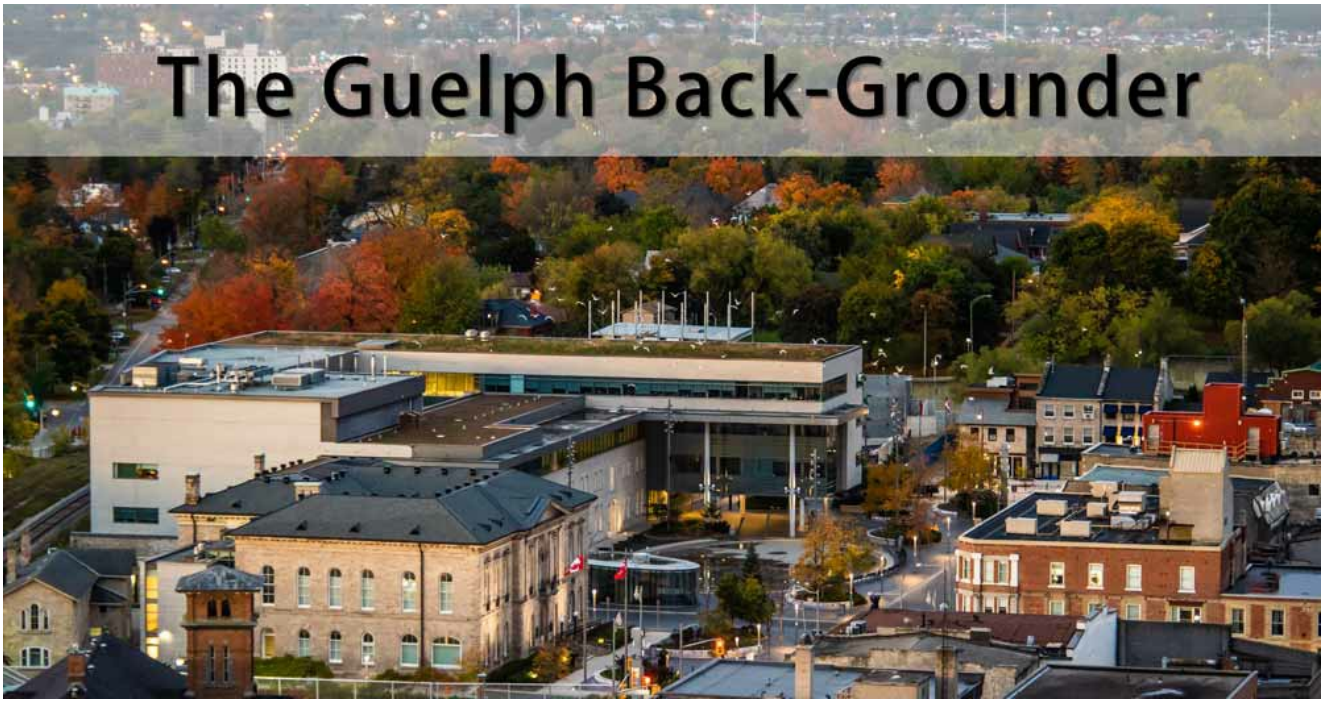
# Water, Quarries, Construction, Growth, and Guelph

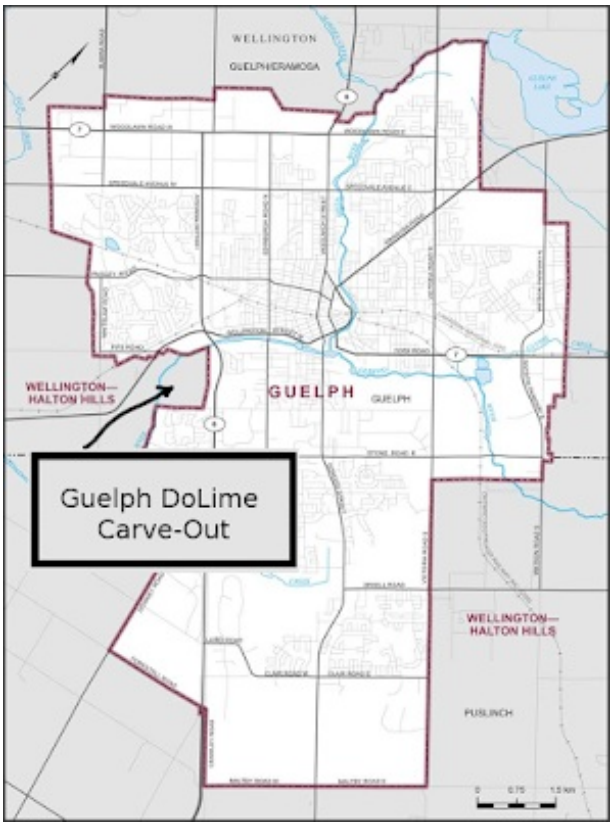
guelph-back-grounder.blogspot.com/2017/08/water-quarries-construction-growth-and.html




Most people don't think of Southern Ontario as being the center of a mining industry. Probably most folks don't think that there is an open pit mine within walking distance of downtown Guelph. But there is. You can just glimpse part of it off the Hanlon Expressway in between Wellington Street and College Avenue, through gaps in the trees on the side of the road away from the center of the city.

Aerial view of the Guelph DoLime Quarry,
photo by Mike Nagy

One of the odd things about this open pit mine is that it isn't in Guelph *legally*, even though it is certainly part of the city *geographically*. Take a look at this map of the boundaries of the city. As you can see, the official boundary of the city ends just at the edge of the DoLime open pit mine. This means that the city has no effective direct control over the property---which is under the jurisdiction of the County and the Province. This quarry has been in operation for over 150 years, and began its life in the countryside and the city grew up around it. It is currently owned by "River Valley Developments" and managed by "James Dick Construction Ltd".




Boundary Map, City of Guelph
Original map from Elections Canada,
minor modification by author

River Valley Developments is owned by Carson Reid, who is the son of Albert Reid, who was the brother of the developer Melville Reid. Melville's brother Albert had a son Orin, who started a company called "Reid's Heritage Homes", which is now managed by Orin's sons Brian and Scott Reid, plus his son-in-law, Tim Blevins. So there are two housing construction and development companies in Guelph owned by members of the Reid family: "Carson Reid Homes" and "Reid's Heritage Homes". "River Valley Developments" is a separate business that owns the Guelph dolime quarry, and lists Carson Reid as the president.

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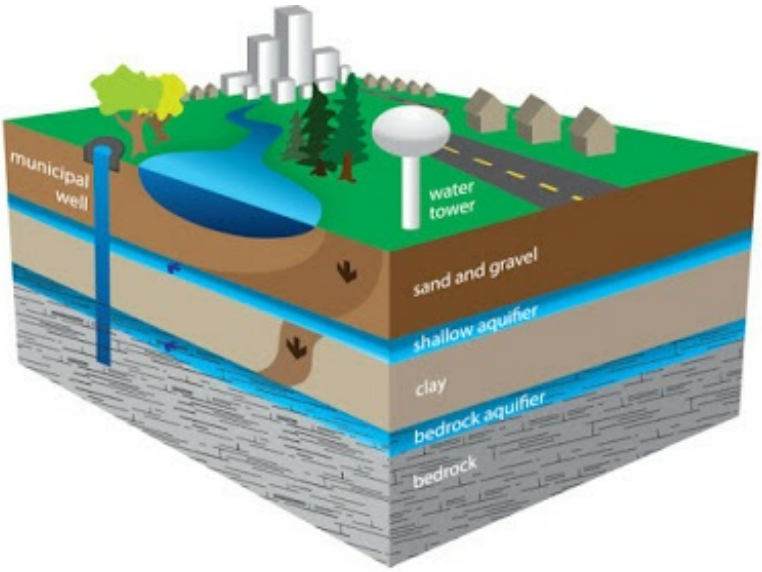
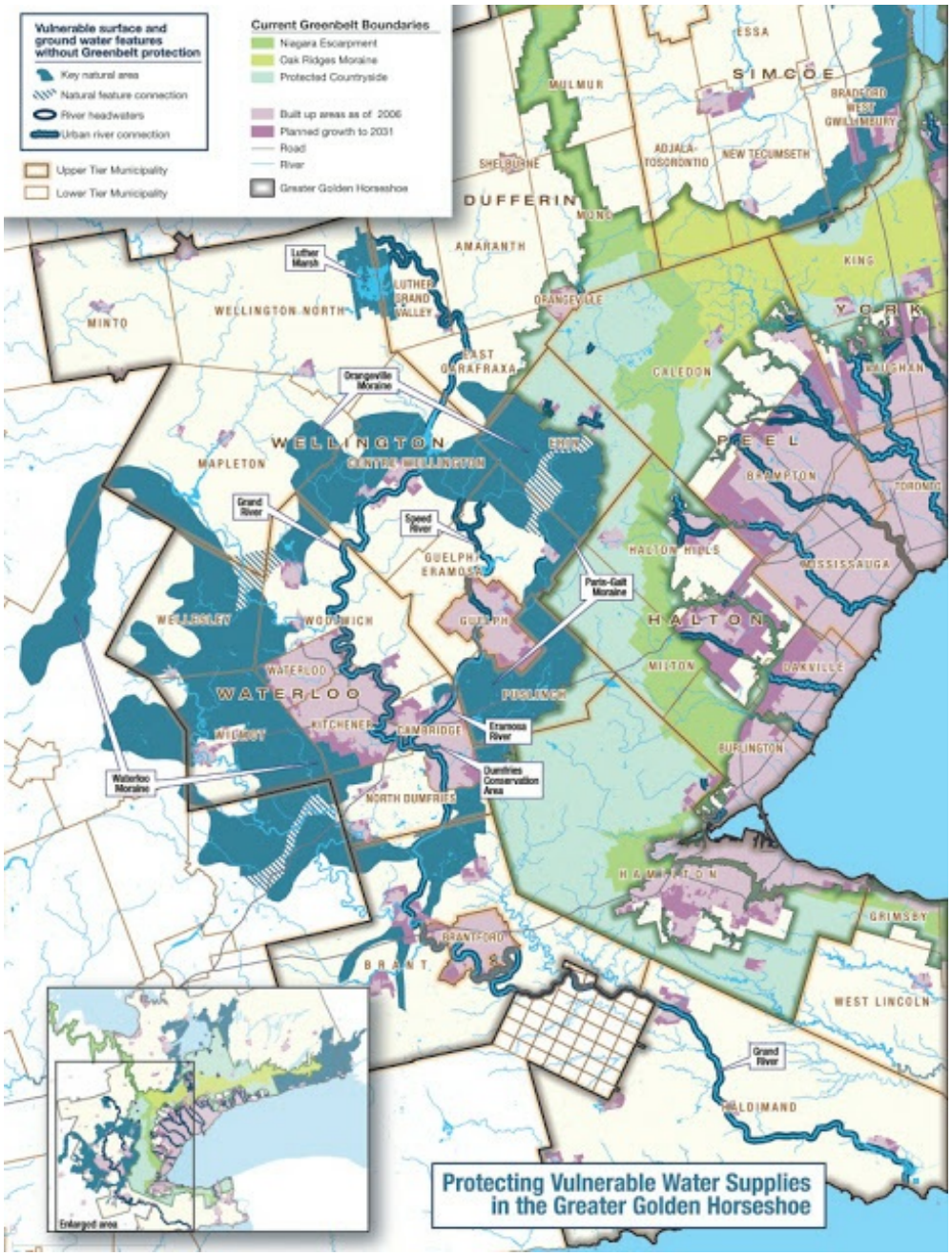
The Guelph DoLime quarry is of importance to the city because concerns have been raised about the impact of it's operations on water quality in the city. Guelph is an "odd duck" in that it is a city that gets its water from a complex of 21 wells. This is a rare thing to do because the population plus it's associated industries uses an awful lot of water. In order to keep it flowing, the city has to be vigilant in preserving the aquifers. To understand why Guelph is able to run a modern city on wells, we need to understand a few things about hydrology.




The Guelph situation,
Image from Guelph City website

Wells are just holes in the ground that allow people to draw water from an aquifer, but the complexity comes from different layers of soil, sand, gravel, rock, and, clay that the water sits in and flows through. As you can see in the above graphic, there are two different aquifers to consider---the shallow one above the clay barrier, and, the deeper one between it and the bedrock.

Guelph has a very strong deep aquifer at least in part because it is surrounded by geological deposits called "moraines" that are left over from the last ice age. Take a look at the following map:


Vulnerable surface and ground water features without Greenbelt protection
Key natural area
Natural feature connection
River headwaters
Urban river connection
Upper Tier Municipality
Lower Tier Municipality
Current Greenbelt Boundaries
Niagara Escarpment
Oak Ridges Moraine
Protected Countryside
Built up areas as of 2006
Planned growth to 2031
Road
River
Greater Golden Horseshoe
ESSA
SIMCOE
MULMUR
BRADFORD WEST GWILLIMBURY
ADJALA-TOSORONTIO
NEW TECUMSETH
SHELBURNE
DUFFERIN
MONO
AMARANTH
KING
YORK
Luther Marsh
LUTHER GRAND VALLEY
ORANGEVILLE
MINTO
WELLINGTON NORTH
EAST GARAFRAXA
CALEDON
Orangeville Moraine
WELLINGTON
CENTRE WELLINGTON
ERIN
PEEL
MAPLETON
BRAMPTON
Grand River
Speed River
GUELPH ERAMOSA
HALTON HILLS
MISSISSAUGA
Paris-Galt Moraine
HALTON
WELLESLEY
WOOLWICH
GUELPH
WATERLOO
MILTON
OAKVILLE
PUSLINCH
KITCHENER
CAMBRIDGE
Eramosa River
BURLINGTON
Waterloo Moraine
Dumfries Conservation Area
NORTH DUMFRIES
HAMILTON
GRIMSBY
BRANTFORD
BRANT
WEST LINCOLN
Grand River
HALDIMAND
Enlarged area
Protecting Vulnerable Water Supplies in the Greater Golden Horseshoe

The dark blue blotches that surround K-W, Guelph, and, Cambridge are moraines.
Image c/o Wellington Water Watchers (right-click on it for a bigger map.)

Moraines are important sources of "recharge" for groundwater and act like sponges that will soak up water during heavy rains and spring melt and slowly release it into both aquifers and streams during relatively dry times. No doubt part of the reason why Guelph has such good ground water is because it is surrounded by them.

The water in an aquifer doesn't just sit still, either. It often flows from place to place---just like water above ground. The difference is, however, that it can be often difficult to know the direction, rate of flow, and, source of water in an aquifer. This means that we can only map this information through very expensive research---and even then, we often end up in a situation where people making decisions can have to play the old "dueling experts" game. The problem is that the city has to decide and water is really, really, really important to the future of the city. Right now River Valley Developments wants to dig deeper into the bedrock that they are mining and this means that they are well into the same depth that the city harvests its water from.

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***Before we get much further, I'd like to remind people that I put a lot of work into these articles and making a few bucks off them allows me to put even more time into research and writing (money buys convenience.) If you can afford it, please consider subscribing through Patreon or tossing something in the tip jar. If that doesn't appeal to you---or you can't afford---no problem.***

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For the past five years the city of Guelph has been opposing a bid by River Valley to double the amount of limestone being taken every year from the quarry.

> The City has been clear in its concerns regarding the amended permit. Concerns are based on the fact that increased pumping above historical levels at the quarry will impact water quantity available at some of the City's municipal wells. The City is calling for a limit at the current pumping rate; a long-term management plan for the quarry; an effective monitoring program; and financial assurances to ensure the quarry owner—rather than Guelph ratepayers—pay for long-term mitigation costs related to its operation. (From a press release dated Feb 4, 2013.)

The key potential problem that can arise would happen if surface water were allowed to seep directly into the deep aquifer without having first been filtered through the layers of gravel, sand, and, clay that exist in both the covering soil or the moraines surrounding Guelph. Consider, for example, a situation where there was some sort of ruptured pipeline,

agricultural run-off, or, industrial accident that led to contaminated water flowing across the surface and ending up in the quarry pit. It would end up flowing directly into the lower aquifer---and from there possibly into the city's wells. Once it is in that aquifer it is essentially beyond the ability of the city to ever remove it.

In addition, by pumping down the deep water aquifer enough to expose the bedrock, the risk could be that this would also lower the aquifer over a much wider area---which would reduce the flow rate in nearby municipal wells.

Finally, there is the problem of what is going to happen to the quarry once the business no longer wants to mine the limestone. This is a far from trivial issue as it means that a lot of money needs to be spent after the cash flow from the sale of limestone has ended. It is true that under the 1980 Pits and Quarries Control Act all quarry operators are expected to put up a financial deposit that they forfeit if they don't pursue a remediation strategy that meets the approval of provincial inspectors. This act was modified in 2017 by the Aggregate Resources and Mining Modernization Act, which gave the Minister of Natural Resources and Forestry increased power to intervene and modify site plans for extraction resources in order to protect both the economic and environmental interests of the community.

> The Schedule includes some amendments relating to enforcement of the Act and regulations. In order to encourage voluntary compliance, the amendments give inspectors the power to provide a person believed to be contravening the Act or regulations with a report indicating the contraventions identified during an inspection. A new offence is established in respect of false or misleading information provided under the Act. The Schedule repeals the current penalties for offences under the Act and provides a new maximum fine of $1,000,000 and a new maximum daily fine of $100,000. A provision is added to protect the Minister, inspectors and public servants from liability for any acts that they have done in good faith under the Act.

> The Schedule includes amendments to give the Ministry powers to obtain more information from licensees and permittees. A licensee or permittee is required to submit reports on the progressive rehabilitation and final rehabilitation of the site of a pit or quarry. Regulation-making powers are added to require licensees and permittees to prepare reports on records they are required to keep under section 62 and submit the reports to the Minister. Regulations may provide for a person with prescribed qualifications to review technical or specialized studies or reports that a licensee or permittee is required to prepare and to submit a report to the Minister. The Minister is given the power to direct licensees and permittees to submit information relating to the operation of a pit or quarry to the Minister and to conduct inventories, tests or studies with respect to the pit or quarry and submit a report thereon to the Minister.

From the "Explanatory Notes", Legislative Assembly of Ontario Site

The city raised its concerns about the long-term impact of the River Valley Developments quarry on the deep water aquifer in 2013. The province agreed to consider these issues, and

a provincially-appointed mediator has been working between the city and the company to find some sort of compromise that both parties can live with. Since mediation happens in secret, the public record just about ends at that point.

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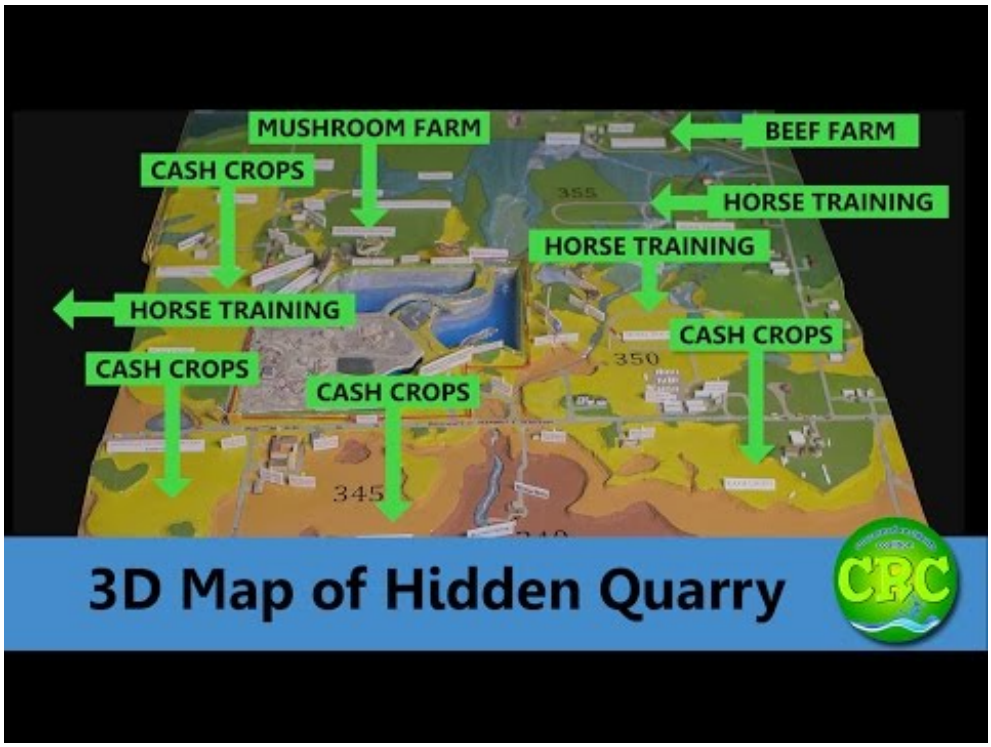
There is another open pit mine that people should be thinking about: the Hidden Quarry project just East of Rockwood, off highway 7. James Dick Construction limited (the same guys that run the Guelph DoLime quarry owned by River Valley Developments) want to open a 39.4 hectare limestone quarry. Just to understand the size, one hectare is roughly the area of a football field, so think of the quarry as being forty football fields in size. This has raised the concerns of local folks who (understandably) are concerned about it. People are afraid that they will have giant trucks roaring down their roads, blasting, dust, and/or, wells drying up. And, of course, just concern about these issues is bound to affect people's property values---let alone if some of it actually comes true! Some folks have even suggested that the deep water aquifers that serve places like Guelph are all connected and if some contamination were to occur in the Hidden Quarry that it would eventually affect the city.

Here's a YouTube video from a Rockwood Group, "The Concerned Residents Coalition" that goes in pretty significant detail about the Hidden quarry proposal.




https://youtu.be/QxcRsRuAMhM

I'm not going to try to sift-out these issues to try to separate the plausible from the far-fetched. I lack the expertise to do so, and that is a very deep swamp for a journalist to negotiate. But I will
pause to point out that there are very well organized groups in this area that have made the issue of gravel pits and limestone quarries---and groundwater in general---a very big issue. These include: Wellington Water Watchers (Guelph DoLime, the Nestle bottling plant in Aberfoyle, and, growing the Ontario Green Belt), the Concerned Residents Coalition (the Hidden Quarry proposal), and, an umbrella group called Gravel Watch Ontario. In addition, we have the Green Party of Ontario leader, Mike Schreiner, who has made concerns about local water quality a key part of his bid to gain election to Queen's Park in the Guelph area. This isn't to say that any of this is anything more than public-spirited individuals seeking to ensure that Guelph's water supply is preserved for future generations. After all, every single advance that society makes has come about through the work of advocacy groups plus politicians who have decided to make a specific issue "their project". All I want to do is point out that is that aggregate extraction is a significant issue in the political consciousness of both local voters and politicians, and as such, it is something that the citizenry really should think about.

Green Party of Ontario Leader, and Guelph candidate, Mike Schreiner photo c/o Wiki Commons

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With that in mind, I think it would be useful to discuss the greater role that aggregates play in our lives. River Valley Developments and James Dick Construction want to dig up limestone because someone wants to buy them. And the people who do are you and me!

In 2009 the Ontario government commissioned a study of the Ontario aggregates industry. In the first decade of the 2000s, it estimated that Ontario used 179 million metric tonnes of sand, gravel, and, limestone *per year*. (A metric tonne is 1,000 kilograms, which is roughly the same weight as an Imperial ton.) That comes out to 14.5 tonnes per person, per year. The per capita use is actually less than what it was in the 1980s, when it was 16.4 tonnes/person/year. But because the population has gone from 8,625,107 in 1981 to 13,448,494 in 2016, the actual total amount used per year has increased by 45 million tonnes over the same time. Since Guelph DoLime and the Hidden quarry are specifically limestone mines instead of gravel pits, it's important to separate out the demand for limestone as opposed to sand and gravel. According to the study I'm working from, 43% of

the aggregates in Ontario are crushed stone (ie, what comes from the Guelph DoLime and Hidden quarries)---as opposed to sand and gravel. This translates to a little over 6 tonnes of quarried stone per person per year.

Aggregates are used in a lot of different things---including such esoteric things as computer screens, abrasive cleansers, glass, road sand, etc. But by far the greatest use (81%) is in construction. And in construction, 62% is used directly, 21% goes into ready mix concrete, 7% goes into making cement, and, the other 10% goes into other construction materials. And the purpose of that construction breaks down as follows: 34% for new roads, 14% for "repair construction" (the majority is road repair), 26% for new residential buildings, 15% for new non-residential building, and, 10% for new "other" engineering (don't know what that means---bridges?) The greatest use of aggregates in Ontario is for roads (34% plus the majority of 14%.)

This is a significant increase since the late 1980s, when it was only 34% of the total. And let's separate out the use of crushed stone in road construction: "road metal" 24%, concrete aggregate 22%, cement 12%, asphalt aggregate 12%, a variety of other uses at 2% or less, plus a whopping 26% of "unspecified uses".

(A few explanations are in order here. "Road metal" is the traditional name given to the stone chips that are mixed with asphalt to make a bitumen road. "Cement" is the name given to the chemically-active substance (usually "burnt" limestone) you mix with water, sand, gravel, chipped stones, etc, with to make "concrete" which is cast in forms to make things like sidewalks, steps, foundations, etc. The "unspecified uses" in the above are just that: "unspecified"---they could be road metal, cement, etc, or something else entirely. The consultants had a hard time finding numbers for many parts of the aggregate survey, which they explained in another part of the text.)

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Aggregates all have two properties in common: they weigh a lot and we use a lot of them. Put these two things together and transportation becomes a major fraction of the end cost of use. This means that it just isn't feasible to import aggregates from some far away "sacrifice zone" and ignore the impact that extraction has on that neighbourhood---like we do for oil:

Alberta tar sands,
Photo by Howl Art Collective, c/o Wiki Commons

This means that if we are going to continue to use a lot of limestone in Ontario, we are going to have to have open pit mines like Guelph DoLime and Hidden quarry pretty much in our own backyards. This raises the question, "Can we do with less limestone?"

The answer is "yes", and we are already moving in that direction. The first option is recycling. If you checked out the first phase of the Metal Works condominium project or other building site you probably saw something like this.

Aggregate recycling. Photo by Peter Craven, c/o Wiki Commons

And while driving along the road, you may have seen something like this.

A pavement recycling machine,
Photo from U.S. dept or transportation, Highway Division

These are two examples of "in situ direct aggregate recycling". There are other things that

can be "recycled" as aggregates. These include demolition waste, slag from steel mills, ground glass, etc. The study I am working from says that Ontario uses 7% recycled content in the aggregate mix, whereas Europe uses as much as 20%. Gravel Watch Ontario suggests that if Ontario recycled at the European level, we would save 22 million tonnes of virgin aggregate a year.

Of course, it's important to remember that this reduction is for total aggregates, not crushed rock (ie what comes out of Guelph DoLime and Hidden quarries.) From what I've read, it appears that recycling tends cut down on the use of sand and gravel more than crushed rock. Moreover, there are issues involved in the use of recycled materials that need to be addressed. For example, there was a problem with highway 427 where road failure resulted from the use of recycled materials with a relatively high concentration of contaminating gypsum materials (eg: drywall) because of swelling due to absorption of moisture. This isn't to say that there is an intrinsic problem with recycled materials, just that there is a learning curve in developing the knowledge and systems to ensure that it is used properly.

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Another interesting option is the use of more wood to build mid-range buildings. It turns out that it is possible to build mid-range sized buildings---both commercial and residential---using a lot more wood instead of concrete, if the local building code allows it. On January 1rst, 2014 the Ontario provincial building code was amended to allow wooden structures up to six stories tall.  This opens the door for more buildings like these:

1201 Mercer St., Seattle Washington

Aspen Art Museum, Aspen Colorado

Arena Stage at the Mead Center for American Theater, Washington District of Columbia

Arcadia Student Living, Charlotte North Carolina
All photos c/o the "Image Gallery" of the Wood Product Council
(lots more great stuff there)

These sorts of building not only use less aggregates, they tend to be cheaper and quicker to build too. And, as you can see, they can be designed both as the Brutalist blocks which are so beloved by institutions (and that enrage so many neighbourhood associations), or, as something that fits better into the existing pattern of communities. There has been some opposition from fire departments and aggregate companies (of course) who say that these buildings aren't as fire resistant as concrete ones, but there are ways of getting around that problem and these are covered in the new code.

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One other way we could cut our use of aggregates would be to live in smaller homes. According to Stats Canada, 1861 6.2 people lived in the average household---by 2011 it had declined to 2.5 At the same time, home size has been increasing. In 1975 the average Canadian home size was 98 square metres, but in 2010 it had increased to 181 square meters. At the same time, the number of people living in that home declined from 3.1 to 2.5. Canadians currently have the third largest average home size in the world---with an average of 72 square meters per person. (Hong Kong has the lowest at 15.)

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There are a lot of ways in which we can probably change the amount of aggregate we use in Canada. We could drive less and take public transit more---which would cut down on the wear-and-tear on roads. We could get a handle on population growth. We could decide to live in more modest homes. All of these things would help us live more in harmony with nature. They would also help with climate change (gravel trucks use a lot of fuel.) But they would all involve Canadians rethinking our values and how we live our lives. What is more important---a big house or a clean environment? Do we want to live in the countryside at the expense of degrading it? The large house in the countryside---which we have to commute from in order to pay for---requires much more aggregates per person than the modest home in town serviced by public transit.

At this point I suppose I could put up an image from the famous poster by Walk Kelly, "We have met the enemy and he is us." (I would if I could find a public domain version.) But that would be disingenuous. A lot of "powers and principalities" exist to inflate people's expectations and wants in order to get people to want to buy the largest houses possible (I won't say "can afford", because many people buy homes that they can't), as far away from work, public transit, shopping, etc as possible. Home builders want to build big luxury houses instead of affordable apartments. The OMB wants to "preserve the character of neighbourhoods filled with single-family, fully detached units". The debate over gravel pits and limestone quarries will work itself out one way or another. In the process of doing so, I hope that some people will take the time to consider what effect their personal decisions affect the world around them.

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***One last point. If you think that this magazine helps inform voters, share it with your friends. "Word of Mouth" is absolutely essential to its success. So post a linke on FaceBook, Twitter, or, however else you connect with friends.***