Dig Conservation, Not Holes

A Report on the GTA's Thirst for Gravel and How to Quench it

TORONTO ENVIRONMENTAL ALLIANCE:
DIG CONSERVATION, NOT HOLES

Executive Summary

The Greater Toronto Area (GTA) is literally made of stone, sand and gravel, collectively known as aggregate. Aggregate is in the cement we use to make sidewalks, bridges, large buildings, sewers, the foundations of our homes, and the underground tunnels for subways, cars, and pedestrian walkways. Large amounts of aggregate are also used to make our roads, both the beds on which they sit and the asphalt we use to pave them. Put simply, aggregate is everywhere.

For a material so vital to our cities, it's strange there is so little publicly available information about how much aggregate we use to build the various types of urban infrastructure we rely on.

The aggregate industry has revealed that, each year, the GTA consumes 40%[1] of the aggregate produced in Ontario. Over the next 25 years, the GTA will continue to use large amounts of aggregate as urban infrastructure is renewed and as new urban infrastructure is built. ***According to industry estimates, the GTA will use about 1,500,000,000 tonnes (1.5 billion) of aggregate over the next 25 years.***[2]

If the future imitates the past, the GTA will get this 1.5 billion tonnes of aggregate from environmentally sensitive lands in the Greenbelt, like the Niagara Escarpment.

Most of the aggregate will come from pits or quarries marking the countryside around the GTA, hidden from most of us until we fly over them. To date, the pits and quarries that have largely "fed" the GTA are right in the middle of some of the most precious ecological and agricultural land in Ontario: the world-renowned Greenbelt. For example, Canada's largest aggregate quarry is in the middle of the Niagara Escarpment, designated by the United Nations as a World Biosphere Reserve.

If the future imitates the past, the GTA will get this 1.5 billion tonnes of aggregate from environmentally sensitive lands in the Greenbelt, like the Niagara Escarpment. To put this in context, the land disturbed to get 1.5 billion tonnes of aggregate is about the same size as a 60 foot deep (20 metre) hole from Toronto's Bloor Street to the waterfront between Greenwood Avenue and the Kingsway.

If we don't change our current aggregate usage, renewing and building the GTA's infrastructure will destroy precious water resources, prime agricultural land and world-renowned natural spaces in the Greenbelt.

The key recommendations of this report call for GTA municipalities to individually and collectively adopt a 3Rs approach – reduce, reuse and recycle – to aggregate consumption in order to ensure GTA infrastructure does not destroy the ecological integrity and agricultural livelihood of the Greenbelt. It also recommends that municipalities urge the Province of Ontario to develop new aggregate policies that mandate the 3Rs and promote the production of "sustainable" aggregate.

1. Ontario Stone Sand and Gravel Association (OSSGA) Website http://www.theholestory.ca/inhtw.php
2. OSSGA's About Aggregates #5 publication – Importance of Aggregate. "The projected consumption of aggregate in Ontario for the next 25 years is 4 billion tonnes." 40% of 4 billion is 1.6 billion; to be conservative this report uses 1.5 billion tonnes as the GTA's 25 year projected aggregate demand.

BY THE NUMBERS:

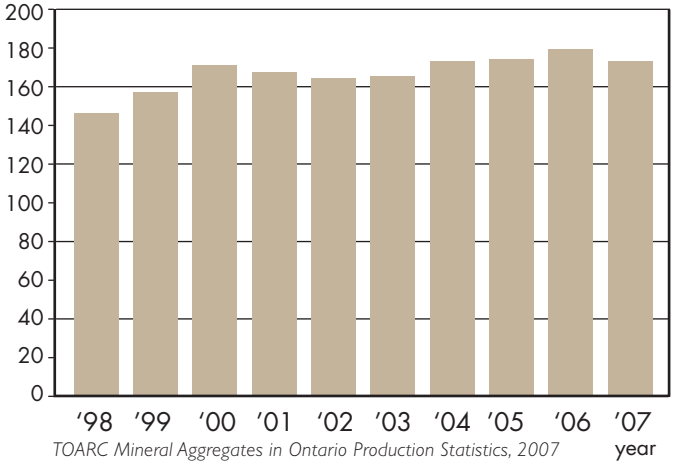
Aggregate Use in Ontario and the Greater Toronto Area (GTA)

Considering aggregate is used in virtually all of the GTA's urban infrastructure, it is surprising how little information exists about how much we use and where it comes from.

The publicly available data on aggregate supply and demand in the province is extremely limited. This lack of information makes it challenging to develop meaningful policies designed to meet future aggregate demand. What we do know comes mainly from The Ontario Aggregate Resources Corporation (TOARC), which provides annual data on aggregate production. Its seven member board of directors is comprised of five representatives from the aggregate industry, one representative of the environmental community and one representative of Ontario's municipalities.

TOARC annually releases information on province-wide aggregate production, how many licenses are issued and the number of pits and quarries in municipalities across Ontario. The latest TOARC data shows that Ontario used 173 million tonnes of aggregate in 2007[3], or 15 tonnes per person in Ontario.[4]

Ontario Aggregate Production
In The Past 10 years (Millions of Tonnes)



TOARC Mineral Aggregates in Ontario Production Statistics, 2007

Very little detailed information is available on the consumers of aggregate. According to the Environmental Commissioner of Ontario, about 55% of Ontario's annual aggregate consumption is for the construction and maintenance of roads.[5] As well, we know that more than 50% of the aggregates produced in Ontario are used by the public sector.[6]

Industry sources further estimate that about 40% of the aggregate produced in Ontario annually is consumed by the GTA.[7] For 2007, the most recent year for which data from TOARC is available, this amounts to 69.2 million tonnes.[8]

3. The Ontario Aggregate Resources Corporation (TOARC). Mineral Aggregates in Ontario Production Statistics, 2007. The data shows average production over the past 4 years to be about 175 million tonnes annually.
4. The US averages 9.1 tonnes per capita and the UK averages 4.8 tonnes of aggregate per capita. See National Stone, Sand and Gravel Association. 50 Fascinating Facts about Stone, Sand and Gravel http://www.nssga.org/pdf/50facts.pdf and Quarry Products Association. The aggregates industry at a glance http://www.qpa.org/iss_fact01.htm, 2006.
5. Winfield, M and A. Taylor. Rebalancing the Load: The need for an aggregates conservation strategy for Ontario, 2005. The Pembina Institute. Also Environmental Commissioner of Ontario. 2002 – 2003 Annual Report. Toronto: Environmental Commissioner of Ontario, pg. 31.
6. TOARC, 2007.
7. OSSGA Website http://www.theholestory.ca/inhtw.php.
8. Derived from TOARC, 2007. 40% of 173 million tonnes equals 69.2 million tonnes of aggregate consumed by the GTA.

The Environmental Impacts of Aggregate Extraction

With the exception of those who work in the building trades, the closest most of us ever come to "virgin" aggregate (that is, aggregate that comes straight from an aggregate mine and has not been reclaimed from rubble or other debris) is at home building stores. While a bag of stones or gravel may look fairly benign, the process of getting it to us is anything but benign. Aggregate is mined from the earth, either dug out of pits or blasted out of quarries. This process has many significant environmental impacts.[9]

Creating the pits or quarries requires the removal of virtually all natural vegetation, top soil and subsoil to reach the aggregate underneath. Not only does this lead to a loss of existing animal wildlife, it also leads to a huge loss of biodiversity as plants and aquatic habitats are destroyed. Moreover, adjacent eco-systems are affected by noise, dust, pollution and contaminated water.

Pits and quarries disrupt the existing movement of surface water and groundwater; they interrupt natural water recharge and can lead to reduced quantity and quality of drinking water for residents and wildlife near or downstream from a quarry site.

Most old pits and quarries are not being properly rehabilitated. As noted in one study "less than half of the land disturbed for aggregate production between 1992 and 2001 has actually been rehabilitated."[10] The province classifies pits and quarries as "interim uses of the land" and requires 100% rehabilitation of pits and quarries. Clearly this requirement is not being met. Destroyed ecosystems and source water aquifers are irreplaceable. This is not an interim land use. The landscape is blotted with destructive pits and quarries, and species of all kinds endure permanent negative impacts.

A more detailed picture of the environmental impact of aggregate mining is outlined in a 2005 legal challenge to the expansion of an existing quarry in the Niagara Escarpment. The report focuses on the following potential environmental impacts:[11]

- Potential impairment of water quality on the site, including harm to the aquifer
- The water quality of residential wells close by could be harmed
- The water level of on-site lakes could be reduced, detrimentally affecting provincially specific wetlands

9. Winfield and Taylor, 2005 pgs 8-9.
10. Winfield and Taylor, 2005 pg 10.
11. Castrilli, J. Application to the Lieutenant Governor in Council regarding Dufferin Aggregates application to expand their Milton Quarry prepared for Coalition on the Niagara Escarpment (CONE) and Protect Our Water and Environmental Resources (POWER). 2005.

- Heightened summer water temperature in an on-site lake could have a detrimental impact on the viability of cold water fish in an adjacent stream
- Potential harm to on-site and off-site wetlands
- Loss of habitat for the Jefferson Salamander, which is designated as threatened under the federal Species at Risk Act
- Potential loss and fragmentation of continuous natural environment

Of course, each pit or quarry has unique characteristics and impacts, but every pit or quarry will degrade the natural environment. For pits or quarries situated on lands designated as ecologically significant, this degradation has an even greater adverse impact.

For communities, the displacement of water resources is one of the biggest concerns pits and quarries pose. However, there are many other concerns. Beyond the physical changes to the landscape, the daily barrage of noise, dust and exhaust produced by hundreds of dump trucks hauling aggregate can have serious effects on the health of people living nearby.

Where our "Virgin" Aggregate Comes From

Ontario's most recent report on aggregate production states that aggregate was supplied from 3,764 licensed aggregate sites on private land in designated parts of the province and 3,361 permitted sites on Crown Land.[12] Traditionally, pits and quarries are sited close to where the aggregate is used. Over 75% of the aggregates used in the GTA come from the Niagara Escarpment and the Oak Ridges Moraine, two extremely important and ecologically sensitive areas.[13] In other words, the majority of the GTA's aggregate has come from the world-renowned Greenbelt surrounding the GTA. This countryside is home to farmers (who increasingly supply us with local food), vibrant rural communities, incredible tourist destinations, and diverse ecosystems that provide us with many important ecological services.[14]

Many of Canada's biggest aggregate quarries are situated on the Niagara Escarpment, designated by the United Nations as a World Biosphere Reserve. The Escarpment is home to over 40% of Ontario's rare species and a major source water area for Southern Ontario.[15] Hundreds of other active or abandoned pits and quarries also blemish the Greenbelt, disrupting both agricultural and ecologically important land.

12. TOARC, 2007.
13. Winfield, M and A. Taylor, 2005 pg 9
14. On ecological services provided by the Greenbelt, see David Suzuki Foundation report called "Ontario's wealth Canada's future: Appreciating the Value of the Greenbelts' Eco-Services" available at www.greenbelt.ca/sites/ourgreenbelt.ca/files/DSF-Greenbelt-Web1.pdf
15. Niagara Escarpment Commission. http://www.escarpment.org/about/ecology/flora/index.php.

The Current Path: More Greenbelt Destruction

Over the next 25 years, the GTA will need to renew its urban infrastructure. At the same time the GTA will need to house millions more new Ontarians. This will mean building new urban infrastructure to accommodate a larger population while trying to minimize development that destroys our remaining natural spaces. Aggregate will be required to meet these pressing needs.

The question GTA residents – in particular elected officials – need to ask themselves is whether they want this aggregate demand to be met by destroying precious ecologically-sensitive land and farmland, much of it in the Greenbelt?

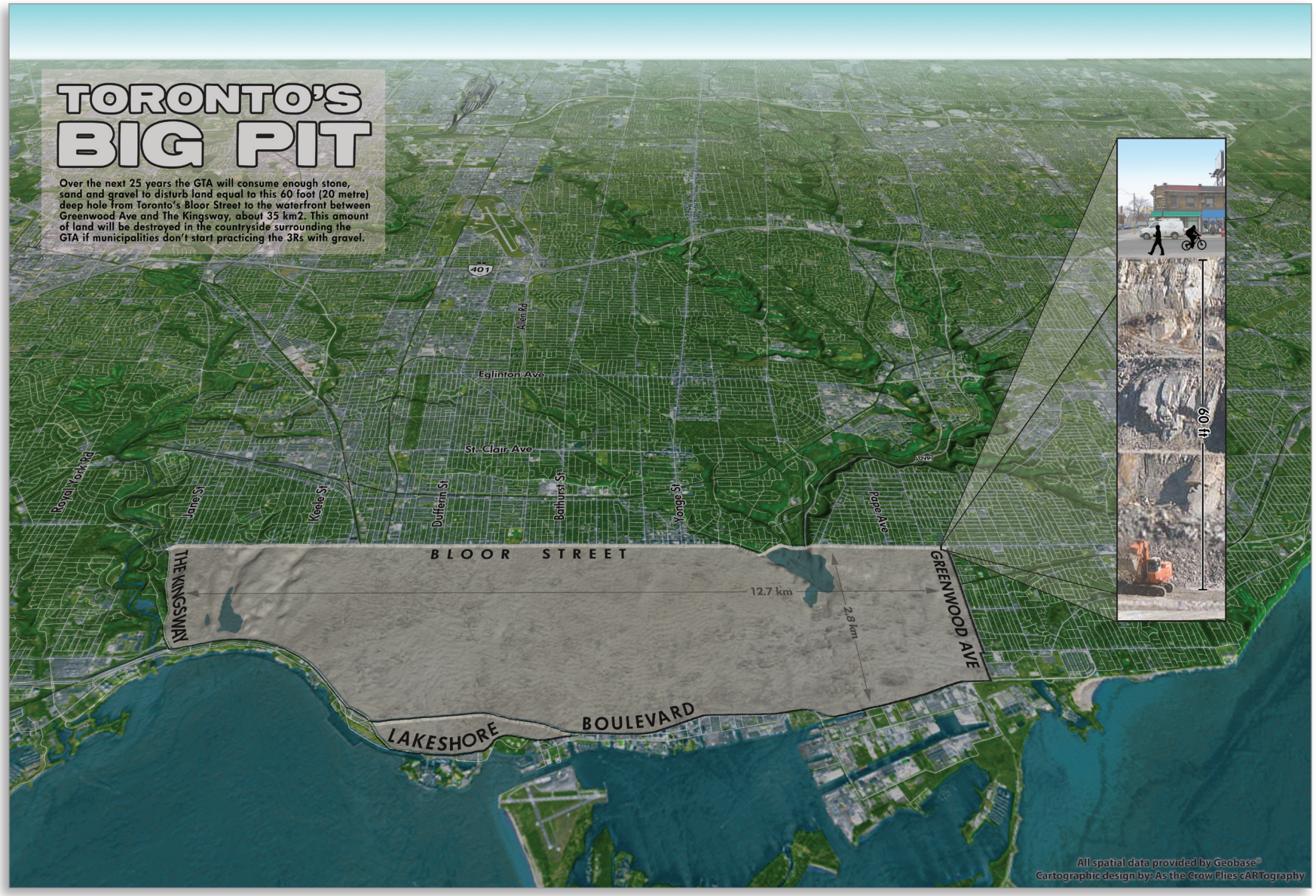
To provide a picture of what is at stake, consider how much land would be required to mine the 1.5 billion tonnes of aggregate needed to sustain our annual usage. Imagine a 60 foot hole (roughly the size of a 6-storey building) that starts at Toronto's Bloor Street to the north, the Kingsway to the west, Greenwood Avenue to the east all the way down to the lake (see "Toronto's Big Pit" image on page 6.) This volume of space, roughly 35 km^2, would contain the GTA's gravel needs over the next 25 years.[16]

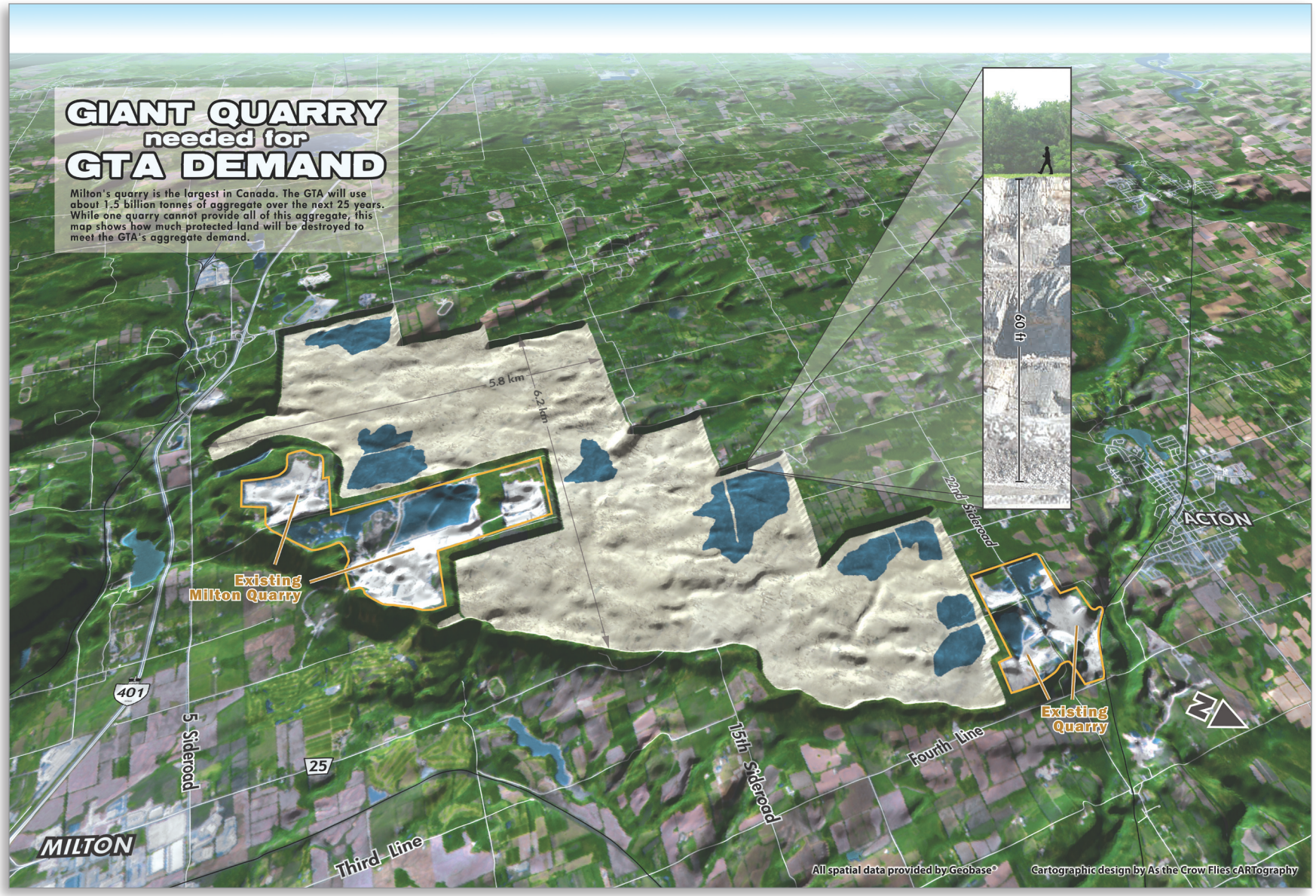
Another way to picture this is by comparing the required volume of space to Canada's biggest aggregate quarry, in the heart of the Niagara Escarpment. For those familiar with travelling on Highway 401 westbound, this quarry is just north and west of Milton, Ontario. From the westbound 401, you can just see a gash in the middle of the escarpment, just north of the highway as you pass Milton, to your right. The quarry area is about 1,100 acres. The expanded Milton quarry map (page 7) illustrates the amount of natural space required to sate this 25 year aggregate demand.

While it is unlikely that one quarry would provide all the aggregate required by the GTA, it is very likely that 35 km^2 of precious agricultural and ecologically-sensitive land in and around the Greenbelt will be destroyed to meet the GTA's aggregate needs.

Put simply, if the GTA doesn't adopt policies that minimize future aggregate mining in the Greenbelt, we will be devastating the livelihood of farmers that provide us with local food, we will be harming local communities close to the pits and quarries, and we will be destroying ecologically-sensitive lands that provide important ecological services that benefit us all.

16. See Appendix 1 for details on how these figures were developed.


TORONTO'S
BIG PIT
Over the next 25 years the GTA will consume enough stone, sand and gravel to disturb land equal to this 60 foot (20 metre) deep hole from Toronto's Bloor Street to the waterfront between Greenwood Ave and The Kingsway, about 35 km2. This amount of land will be destroyed in the countryside surrounding the GTA if municipalities don't start practicing the 3Rs with gravel.
401
Allen Rd
Eglinton Ave
St. Clair Ave
Royal York Rd
Jane St
Keele St
Dufferin St
Bathurst St
Yonge St
Pape Ave
DVP
BLOOR STREET
THE KINGSWAY
GREENWOOD AVE
12.7 km
2.8 km
LAKESHORE BOULEVARD
60 ft
All spatial data provided by Geobase
Cartographic design by: As the Crow Flies cARTography


GIANT QUARRY
needed for
GTA DEMAND
Milton's quarry is the largest in Canada. The GTA will use about 1.5 billion tonnes of aggregate over the next 25 years. While one quarry cannot provide all of this aggregate, this map shows how much protected land will be destroyed to meet the GTA's aggregate demand.
5.8 km
6.2 km
60 ft
22nd Sideroad
ACTON
Existing
Milton Quarry
Existing
Quarry
401
5 Sideroad
25
15th Sideroad
Fourth Line
Third Line
MILTON
All spatial data provided by Geobase®
Cartographic design by As the Crow Flies cARTography

Preserving the Greenbelt by Practicing the 3Rs

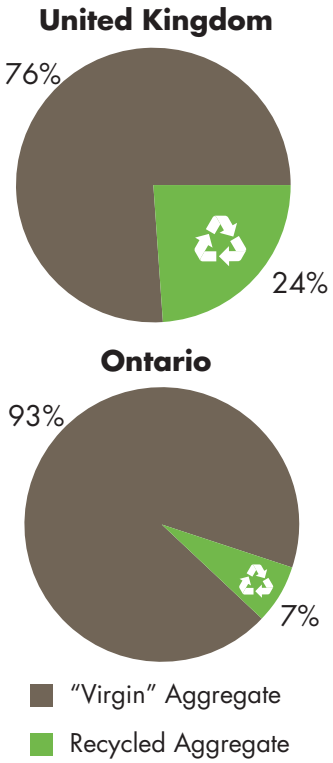
We do not need to destroy more of the Greenbelt to ensure the GTA's infrastructure is maintained and grows. The simple solution, as outlined by the Ontario Greenbelt Alliance[17] is to take something we practice every day at home – the 3Rs (reduce, reuse and recycle) and apply it to aggregate use in our cities.

Reduce: Most importantly, we need to reduce our reliance on "virgin" aggregate. That doesn't mean we stop building: rather the demand for virgin aggregate extraction can be reduced by changing building codes and provincial standards. For example, neighbourhood road designs can be altered to conform to the 6.5 metre road width found in older municipal developments in Ontario rather than the 8.5 metre road width of today's sprawling local streets.[18]

Reuse: More often than not, when we renew our existing urban infrastructure, we create the raw materials we need for new construction. New materials, however, are not always necessary. Depending on road conditions and seasonal temperatures, nearly 100% of the surface asphalt can be reused. The Ministry of Transportation (MTO) uses a variety of reclamation methods that reuse the asphalt surface of our major highways.[19] This lessens the demand for not only virgin aggregate, but also the crude petroleum used to create asphalt.

Recycle: Crushed concrete and aggregates can be recycled as fill in a variety of construction projects. Ontario standards currently allow for such uses of recycled debris but there is no monitoring and no requirement that recycled aggregate be used first. This and more can and is being done in other jurisdictions. For example, of the 281 million tonnes of aggregates used in the UK, 67 million tonnes – about 24% – is recycled aggregate.[20] In contrast, the Ontario Ministry of Natural Resources claims up to about 7.2% of Ontario's annual aggregate use is made up of recycled aggregate.[21]

A positive GTA example of recycling was the work done by the St. Lawrence Cement Group during the demolition of parts of the Lester B. Pearson International Airport. 450,000 tons of concrete rubble was crushed and recycled for use in road base materials.[22]



17. Ontario Greenbelt Alliance. Green Gravel: Priorities for Aggregate Reform in Ontario. http://greenbeltalliance.ca/reports/Green Gravel Priorities FINAL.pdf
18. Environmental Commissioner of Ontario. 2002-2003 Annual Report. Toronto: Environmental Commissioner of Ontario, 2003, pg 34. "The ECO speculates that a review of the design standards for urban streets and new subdivisions could serve a dual purpose, both conserving aggregate and reducing urban sprawl."
19. Ontario Ministry of Transportation. Southern Highways Program 2008 – 2012. http://www.mto.gov.on.ca/english/pubs/highway-construction/southern-highway-2008/index.shtml, 2007.
20. Quarry Products Association, 2006. A variety of measures have been put in place by the UK government to encourage the use of recycled aggregate including not allowing aggregate construction wastes in landfills and charging a levy of about $4.00 CDN per tonne on primary aggregate extraction.
21. Messerschmidt, B and M.MacKay. Mineral Aggregate Recycling and Reuse Study 2008 Pavement Rehabilitation and Preservation Workshop presentation, 2008.
22. St. Lawrence Cement Group. Building Value Responsibly Sustainable Development Report February 2006. www.holcim.com/holcimweb/gc/CA/uploads/SLC SD Report February 2006 FINAL.pdf

What GTA Municipalities Can Do

The Ministry of Natural Resources is in the midst of a review of aggregate use in the Province. A Terms of Reference for this review is scheduled to be released some time in 2009[23]. While the provincial review proceeds, GTA municipalities can begin the process of reducing virgin aggregate use and practicing the 3Rs.

In particular, municipalities can begin filling the information void about aggregate use in the GTA by determining where they use aggregate, how much they use and what future demands will be. Municipalities can also begin investigating "best practices" in other jurisdictions and start applying these to their aggregate use policies. As well, municipalities can immediately develop procurement policies that limit the use of "virgin" aggregate.

Accordingly, we urge all GTA municipalities to adopt the following recommendations:

1. Ensure that any new requests of proposals (RFPs) that include the use of aggregate require the successful bidder to demonstrate they will use the highest level of recycled content allowable under provincial standards.
2. Provide detailed information to the public on aggregate use within the municipality that includes:
    a. How much and what type of aggregate is used for various types of urban infrastructure (eg. roads, sidewalks, bridges, sewers, etc) within the municipality annually
    b. How much of the aggregate used is "virgin", how much is recycled and how much comes from alternative sources
    c. Where the aggregate comes from, including specific pits and quarries, and the quantities from each source
    d. Projected aggregate use over the next 25 years
3. Investigate how other jurisdictions effectively reduce "virgin" aggregate use through the use of 3Rs and report out to the appropriate council committee with recommendations about how the municipality can adopt similar strategies.
4. Urge the Ministry of Natural Resources (MNR) to ensure the 3Rs are the cornerstone of any updated aggregate policy for the Province and that it investigates and implements the production of "sustainable" aggregate.

23. The Environmental Commissioner of Ontario first asked for such a review in his 2002/2003 annual report.

APPENDIX 1

How We Arrived at Our Numbers

As noted in the body of the report, very little public information exists on aggregate use in Ontario. The following methodology was used in deriving projected aggregate use in the GTA over the next 25 years and in deriving the landmass required to supply this aggregate.

Estimating the GTA's Aggregate Use for the next 25 Years

Estimates as to how much aggregate will be required by the GTA over the next 25 years varies. According to industry sources, the GTA accounts for 40% of Ontario aggregate consumption[24]. Taking the average annual gravel use in Ontario from 2004-7 (175 million tonnes), calculating the GTA share (40%) and then multiplying by 25 years equals 1.75 billion tonnes.

The Ontario Stone, Sand and Gravel Association website [25] notes that projected aggregate use for Ontario over the next 25 years will be 4 billion tonnes. Again, assuming the 40% figure, this works out to 1.6 billion tonnes for the GTA.

To err on the side of caution we are estimating the GTA is on track to use about 1.5 billion tonnes over the next 25 years.

Estimating the Land Required to Mine the GTA's Projected Aggregate Use

There is no publicly available method to easily calculate how much land is required to mine 1.5 billion tonnes of aggregate. Pit and quarry sizes vary as does the depth of a given pit or quarry. Indeed there is no accessible information that allows one to calculate the "average" pit or quarry.

The only clue about how much land is required to mine 1.5 billion tonnes of aggregate comes from a comment made by Ms. Carol Hochu, President of the Aggregate Producers Association of Ontario, to an Ontario Legislative Committee in 2000. Ms. Hochu stated:

"If I could just paint a picture for you about what 150 million tonnes means, picture an area bounded by College, that is, the front of the Queen's Park building, west over to Spadina, east over to Yonge and down to the waterfront. If you dug 60 feet into the ground in that whole area bounded by those roads, that represents about 150 million tonnes of aggregate product."[26]

The area Ms. Hochu outlines in downtown Toronto is about 3.5 km^2. In other words, 150 million tonnes of aggregate is equivalent to a 60 foot hole 3.5 km^2. Therefore, 1.5 billion tonnes of aggregate is equivalent to a 60 foot hole 35 km^2.

Using GIS and mapping technology, we have calculated the equivalent of a 60 foot deep 35 km^2 and superimposed this on existing maps.

24. OSSGA Website http://www.theholestory.ca/inhtw.php
25. OSSGA http://www.theholestory.ca/index.php
26. Standing Committee on Finance and Economic Affairs, February 16, 2000.Presentation by Ms. Carol Hochu, President of the Aggregate Producers Association of Ontario available at: www.ontla.on.ca/web/committee-proceedings/committee_transcripts_details.do?locale=en&Date=2000-02-16&ParlCommID=7&BillID=&Business=Pre-Budget+Consultations#P656_262200

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Toronto Environmental Alliance
30 Duncan Street, Suite 201
Toronto, Ontario, M5V 2C3
www.torontoenvironment.org

For more information contact:
Jamie Kirkpatrick, Greenbelt Campaigner
Phone: 416-596-0660
Email: jamie@torontoenvironment.org