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Rebalancing the Load:

The need for an
aggregates conservation
strategy for Ontario

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Executive Summary	3
1. Introduction	5
2. What is Mineral Aggregate and What Are Its Uses?	6
3. The Environmental Impacts of Aggregate Extraction	8
4. The Evolution of Aggregates Policy in Ontario	11
4.1. Introduction	11
4.2. The Emergence and Evolution of Provincial Aggregates Legislation	11
4.3. Land-Use Planning Policy and Aggregates	13
4.4. The Niagara Escarpment and Oak Ridges Moraine	14
4.5. Aggregate Resource Charges	14
4.6. Recent Policy Proposals	15
4.7. Summary	15
5. Aggregate Demand and Supply	17
5.1. Introduction	17
5.2. Aggregate Production	18
5.2.1. Total Production	18
5.2.2. Imports and Exports	20
5.2.3. Commodity Types and Geographic Distribution of Production	20
5.2.5. Factors Affecting Regional Supply and Demand	22
5.3. Summary	23
6. Alternatives to Increasing the Supply of Aggregate	24
6.1. Introduction	24
6.2. Substitution with Alternative Materials	25
6.3. Changes in Design of Infrastructure and Buildings	26
6.4. Changes in Development Patterns	26
6.5. Provincial Action on Aggregate Conservation	26
6.6. Summary	27
7. Initiatives in Other Jurisdictions to Reduce Demand for Aggregate	28
7.1. Introduction	28
7.2. The United Kingdom	29
7.3. Sweden	31
7.4. Denmark	31
7.5. Summary	32
8. Conclusions and Recommendations	33
8.1. Summary of Findings	33
8.2. Towards an Aggregate Conservation Strategy for Ontario	34
8.3. Updating Policy and Legislation	35
8.4. Conclusions	36

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About the Pembina Institute

The Pembina Institute is an independent, not-for-profit environmental policy research and education organization specializing in the fields of sustainable energy, community sustainability, climate change and corporate environmental management. Founded in 1985 in Drayton Valley Alberta, the Institute now has offices in Calgary, Edmonton, Vancouver, Ottawa and Toronto.

Photos of quarry and recycling operations by Peter MacCallum. These photos are from a series of images MacCallum has created of industrial operations and infrastructure in and around Toronto. MacCallum is represented by the peak gallery – www.peakgallery.com.

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Executive Summary

This study examines the evolution of public policy in the Province of Ontario with respect to mineral aggregates (i.e., sand, gravel and quarried stone) over the past 35 years.

The study notes that aggregate extraction has emerged as an area of growing conflict over the past few years. Aggregate producers emphasize the need to access the resource as close as possible to markets to minimize transportation costs, while host communities and local and provincial environmental and conservation organizations highlight the significant and often irremediable social and environmental impacts of aggregate extraction.

The study finds that, over the study period, provincial policies with respect to the sector have increasingly emphasized the provision of access to aggregate resources as a priority over other competing potential land uses. Recent provincial policy proposals, including a revised provincial policy statement under the *Planning Act*, would further reinforce this direction.

The study concludes that this policy approach does not reflect a sustainable approach to the management of the resource and fails to balance aggregate extraction against other land uses that may serve the greater public interest. Its continuation is found to be likely to lead to increasingly intense land use and social conflicts over aggregate development, particularly in southern Ontario.

The study notes that there is increasing acknowledgement of the need for an alternative approach, emphasizing conservation and the use of alternative materials to primary (i.e., newly extracted) aggregates, to meet the province's mineral aggregate needs. The development of a conservation strategy has been recommended by the province's Environmental Commissioner and the need for such a strategy acknowledged by the provincial government in its recently proposed growth management plan for the Greater Golden Horseshoe region.

The study finds that the province lacks basic

information on current demand for and uses of aggregate. Further, the province does not have up-to-date projections regarding future demand. The lack of current, comprehensive, publicly available information makes it impossible to properly assess claims of a supply "crisis" in the southern part of the province, or, more generally, to manage the resource in a sustainable manner.

The study finds that, to date, the provincial government has done little to ensure the efficient use of the resource through such things as using secondary materials as substitutes, or implementing alternative approaches to urban design and infrastructure that would reduce the overall need for aggregates. The only significant action taken by the province to promote conservation has been the recent revision of standards to permit the use of higher levels of secondary materials in road construction.

The study finds that other jurisdictions, including the United Kingdom, Denmark and Sweden, faced with similar conflicts between aggregate extraction and the protection of natural heritage, prime agricultural and source water lands have adopted a wide range of policy measures intended to promote the more efficient use of the resource. Extraction taxes have been employed to make secondary materials more competitive with primary aggregates, grants have been used to facilitate an increase in the supply of secondary aggregates, and policies and guidelines have been implemented to promote the substitution of secondary materials for primary ones. The United Kingdom, for example, imposes a charge on aggregate extraction that is more than 60 times the current charge in Ontario.

The study concludes that **Ontario needs to develop and implement a comprehensive strategy for the management and conservation of the province's aggregate resources.** Such a strategy should seek to reduce overall demand for aggregate resources, and maximize the substitution of secondary materials for newly extracted aggregate.

The key elements of the strategy would include

- developing and publishing up-to-date assessments of mineral aggregate supply and demand in Ontario
- imposing higher charges for primary aggregate extraction to promote efficient use of the resource and finance conservation measures
- reducing the need for primary aggregates through the use of alternative development standards
- removing policy barriers to the use of recycled materials as substitutes for primary aggregates
- establishing requirements for the use of recycled materials as substitutes for primary aggregates in public projects wherever possible
- establishing targets for reduced use of primary aggregates
- establishing controls on the disposal of potential substitutes for primary aggregates
- adopting policies to promote less road-dependent urban developments
- completing a life-cycle assessment of aggregate transportation options.

More broadly, the study recommends that the province update its policy and legislation with respect to mineral aggregates, including

- modifying the Provincial Policy Statement made under the *Planning Act* to provide a better balance between aggregate extraction and other land-use priorities.
- strengthening the rehabilitation requirements of the *Aggregate Resources Act*, and the more effective enforcement of these requirements by the Ministry of Natural Resources (MNR).
- adopting measures to address the backlog of unremediated aggregate extraction sites.

The study notes that the emerging “crisis” regarding aggregate supply in southern Ontario, and the growing conflicts over the status of aggregate extraction relative to other potential land uses in the region, provide an important opportunity for a long-overdue debate on the direction of Ontario’s public policies regarding mineral aggregate resources. The study suggests that, as recognized by the Environmental Commissioner, and the provincial government itself, it is time for Ontario to seriously consider the alternatives to the current, unsustainable policy of attempting to guarantee perpetual access to primary aggregate resources before all other land-use policy objectives.

1. Introduction



Ontario policy has largely put the priority on easy access to aggregates rather than on protecting natural areas and water sources, leading to increasing conflict over the location of aggregate operations.

The extraction of mineral aggregate resources has been the focus of growing public attention in Ontario. Aggregate extraction has become a focal point of debates about protection of source waters, reform of the province's planning policies, the establishment of a greenbelt in the Golden Horseshoe region, and the proposed growth management plan for the region.

The aggregates debate is characterized by two key factors: the increased environmental awareness of the impacts of extraction operations on ground and surface water flows and supplies, agricultural lands and natural heritage areas; and the desire of the aggregate industry to access resources in close proximity to the point of use to minimize transportation costs.

The purposes of this report are to

- provide an overview of the evolution of provincial policy in Ontario with respect to aggregate extraction
- provide an overview of aggregate extraction

activities, with special focus on southern Ontario and the Greater Toronto Area (GTA)

- explore alternatives to the current policy framework of maximizing access to the resource at minimum economic cost, with a focus on opportunities to reduce demand for newly extracted (or primary) aggregate, through conservation, substitution and recycling
- examine initiatives of other jurisdictions facing similar challenges in balancing the demand for aggregate against the protection of natural heritage, prime agricultural and source water lands, and other competing land uses
- make recommendations for a more sustainable and balanced approach to the management of aggregate resources in Ontario.

The report is intended to prompt debate about the future direction of public policy in Ontario regarding the extraction, use and conservation of aggregate resources.

2. What is Mineral Aggregate and What are its Uses?

Aggregate resources include sand, gravel, clay, earth, shale, stone, limestone, dolostone, sandstone, marble, granite and rock other than metallic ores. Aggregate resources currently form the backbone of much of society's built infrastructure. Aggregate resources are used in the foundations and bricks of homes and other buildings, and to build roads, highways and

bridges, and to form drainage structures. Aggregates are also used in the production of glass, paint, plastics, paper, fertilizers, steel and pharmaceuticals.¹

Table 1 below provides a breakdown of the main types of aggregate production in Ontario from 1989 to 2002 for aggregate licences.

Table 1: Aggregate Production in Ontario 1989 to 2002, million tonnes

Year	Sand and Gravel	Crushed Stone	Other	Total
1989	93.23	55.76	1.95	150.94
1990	79.62	52.42	2.74	134.78
1991	64.24	40.26	2.78	107.28
1992	57.99	39.52	3.15	100.66
1993	59.62	43.04	2.19	104.85
1994	59.07	45.28	2.76	107.11
1995	55.70	45.01	3.09	103.80
1996	62.52	47.48	4.27	114.27
1997	69.05	51.23	4.01	124.29
1998	68.84	51.64	3.20	123.68
1999	72.87	53.40	4.26	130.53
2000	80.07	62.57	2.85	145.49
2001	79.46	61.76	3.54	144.76
2002	79.09	58.19	3.89	141.17

Source: Mineral Aggregates of Ontario Statistical Update, 1998 to 2002 (http://www.toarc.com/publications_statistics.asp)

¹ Hollingsworth, Brian. 2002. *Mineral Aggregates Issue Paper*. Prepared for the Smart Growth Central Ontario Zone.



Parks Canada

Road and highway construction is the leading consumer of aggregates in Ontario. A single kilometre of two-lane highway can consume more than 15,000 tonnes of aggregates.

Table 2 outlines the most recent available information (1987) on the uses of various types of aggregate.

Table 2: Aggregate Uses in Ontario 1987

Use	Tonnes (thousands)	Per cent (%)
Sand and Gravel		
Roads	50,819	52.8
Concrete Aggregate	19,231	20.0
Asphalt Aggregate	6,193	6.4
Fill	15,085	15.7
Mortar Sand	2,235	2.3
Mine Backfill	698	0.7
Railroad Ballast	284	0.3
Other Uses	1,706	1.8
Total Sand and Gravel	96,251	100
Quarried Stone		
Crushed Stone	31,163	65.9
Roads	4,581	9.69
Concrete Aggregate	4,432	9.37
Asphalt Aggregate	5,401	11.42
Fill	1,701	3.40
Total Crushed Stone	47,278	100

Source: Planning Initiatives Ltd. and Associates. 1992. *Aggregate Resources of Southern Ontario: A State of the Resource Study*. Ministry of Natural Resources.

As indicated in Table 2, road construction is thought to be the leading use of aggregates in Ontario. It is currently estimated that over 55 per cent of all of Ontario aggregates are consumed in road construction.² The construction, for example, of a two-lane highway can consume over 15,000 tonnes of aggregate for each kilometre. As shown in Table 3, the new construction of a six-lane asphalt freeway can consume over 48,000 tonnes of aggregates per kilometre.

Table 3: Typical Aggregate Quantity Requirements for One Kilometre of Highway

Road Type	Number of Lanes	Quantity (Tonnes)
Local Road	2	15,500
Regional/Provincial Road	4	40,500
Freeway (Composite)	6	29,000
Freeway (Asphalt)	6	48,500
Freeway (Concrete)	6	22,000

Source: Cautillo, Guy and Joe Bucik. 2003. *Use of Aggregates by MTO: Balancing Competing Needs*. Presentation to the Environmental Commissioner of Ontario

² Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 31.

3. The Environmental Impacts of Aggregate Extraction



Peter MacCallum

Vegetation and topsoil is removed as the first step in expanding quarry operations. This can affect water drainage and permanently alter the natural environment.

There are currently almost 2,800 pits³ and quarries⁴ on private land, and another 3,200 on Crown land, producing sand, gravel and crushed rock in Ontario.⁵ In addition to these, 6,700 former pits and quarries sit abandoned.⁶

The construction and maintenance of roads, as well as buildings and other infrastructure, consume enormous amounts of aggregate resources. The extraction of aggregate significantly and permanent-

ly alters the natural environment. Operators of pits and quarries remove virtually all vegetation, topsoil and subsoil to access the resource. In doing so, they remove any natural habitat that may have been on site, and disrupt pre-existing streamflows.

In fact, impacts on surface and groundwater are one of the major concerns regarding aggregate operations. The extraction of aggregate resources changes the slope of land and alters water drainage patterns.

3 A pit is land or land under water from which unconsolidated aggregate (e.g., sand) is being or has been excavated and the site has not been rehabilitated.

4 A quarry is land or land under water for which consolidated rock is or has been excavated and the site has not been rehabilitated.

5 The Ontario Aggregate Resource Corporation. 2004. *Mineral Aggregates in Ontario 2002 Statistical Update*. Toronto: TOARC, pg. 1.

6 Ray Ford. 2004. "9,500 Holes and Counting." *On Nature*, August 2004.

As well, aggregate deposits act as underground water reservoirs; once the aggregate is excavated, their water storage capacity is lost.⁷ Aggregate operations are also characterized by the release of significant amounts of particulate matter (i.e., dust) and noise pollution from extraction and processing activities as well as smog precursors and greenhouse gases from the operation of heavy equipment and machinery. The heavy truck traffic to and from aggregate sites is often a serious hazard and nuisance affecting people over wider areas, and is a significant source of air pollution itself.⁸

It has been estimated that over 75 per cent of the GTA's aggregate comes from two key areas: the Niagara Escarpment and the Oak Ridges Moraine.⁹ These areas have been sites of significant controversy and conflict regarding aggregate extraction. The Niagara Escarpment and the Oak Ridges Moraine are home to some of the most accessible aggregate resources in southern Ontario and are, at the same time, significant natural heritage sites.¹⁰ The types of conflicts that have emerged in relation to aggregate development are highlighted by the recent Dufferin Aggregates case (See accompanying text box).

Case Study: Dufferin Aggregates Milton Expansion

The expansion of the Dufferin Aggregates operation in Milton offers a good example of the conflicts between the economic value of aggregate and other potential land uses. The operation provides high-value stone for roadbeds and concrete, and it is in close proximity to Toronto.

However, the facility is also in one of the largest stretches of forest left in the GTA. The Dufferin Aggregates' expansion plans propose to quarry abandoned fields and skirt most of the surrounding forests and wetlands — home to the nationally threatened Jefferson salamander and the Halton North Forest Area of Natural and Scientific Interest (ANSI).

Dufferin Aggregates is planning an ambitious program to maintain water levels in the wetlands, pumping groundwater into injection wells that will artificially maintain the wetlands while operations are under way. The plan was challenged by the Coalition on the Niagara Escarpment (CONE) and Protect Our Water and Environmental Resources (POWER), and was the subject of an eight-month hearing before the Ontario Municipal Board and Environmental Review Tribunal. A decision on the proposal is expected by the end of 2004.

Adapted from: Ford, R. 2004. "9,500 holes and counting," On Nature, Autumn 2004, p. 18.

Progressive and final rehabilitation of pits and quarries is required under the provincial *Aggregate Resources Act* (ARA).¹¹ However, the evidence indicates that land is being degraded at a faster rate than pit and quarry sites are being rehabilitated, with

the result that the total impact of aggregate extraction operations continues to grow. As **Table 4** on the next page shows, for example, the extremely small portion of land disturbed in 2002 that was rehabilitated.

7 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 30.

8 Assuming 35 tonne trucks, aggregate transportation consumes 0.56 litres of fuel, and results in the release of 1.5 kilograms of greenhouse gases per kilometre Clayton Research and MHBC Regional & Urban Planning & Resource Development. 2004. *The Implications of Restricting Aggregate Supply in the GTA*, pg. 13.

9 Clayton Research and MHBC. 2004. *The Implications of Restricting Aggregate Supply in the GTA*, pg. 4.

10 In recognition of the ecological significance of the Niagara Escarpment, it was designated a World Biosphere Reserve by the United Nations.

11 *Aggregate Resources Act*, Part VI.

Table 4: Rehabilitation of Aggregate Sites 2002, hectares

District	Disturbed Area	Rehabilitated Area	Area Left Disturbed	Portion of Area Rehabilitated
Aurora	3,820	147	3,673	4%
Aylmer	3,172	105	3,067	3%
Bancroft	300	2	298	1%
Guelph	4,670	152	4,518	3%
Kemptville	4,045	73	3,972	2%
Midhurst	3,480	109	3,371	3%
Pembroke	462	7	455	1%
Peterborough	3,457	62	3,395	2%
Saulte Ste. Marie	333	6	328	2%
Sudbury	821	19	801	2%
TOTAL	24,559	681	23,878	3%

Source: Ontario Mineral Aggregate Resource Corporation. 2002. *Mineral Aggregates in Ontario: 2002 Statistical Update*, http://www.toarc.com/pdf/stats_2002.pdf

Overall, less than half of the land disturbed for aggregate production between 1992 and 2001 has actually been rehabilitated.¹²

More broadly, the Environmental Commissioner of Ontario has noted that aggregate operations are a chronic source of complaints to the Ministry of Natural Resources (MNR), Ministry of the Environment, host municipalities and the Environmental Commissioner's office itself.¹³ In his most recent annual report to the Legislature Assembly, the

Environmental Commissioner pointed out that the MNR has been consistently unable to meet its own targets for field-audits (i.e., inspections) of aggregate operations, due to a lack of adequate staffing.¹⁴ The Commissioner has also highlighted the Ministry's lack of appropriate enforcement tools with respect to aggregate operations, observed that the overall situation is perpetuating conflicts at existing operations and undermining the public's confidence in the regulatory system itself.¹⁵

12 See <http://plg.uwaterloo.ca/~holt/pit/pps/gravel-watch-ont-pps-040803a-final.htm>

13 Environmental Commissioner of Ontario. 2004. *2003–2004 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 64.

14 The province currently has 20 field inspectors (pers.comm., Brian Messerschmidt, MNR, December 10, 2004) to oversee the 6000 active pits and quarries, or one inspector per 300 operations.

15 Environmental Commissioner of Ontario. 2004. *2003–2004 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 64.

4. The Evolution of Aggregates Policy in Ontario



Peter MacCallum

Ontario aggregates policy emphasizes securing access to supplies close to demand centres rather than encouraging demand reduction and recycling.

4.1. Introduction

For aggregate producers, transportation costs can quickly exceed extraction costs and royalty charges.¹⁶ To minimize transportation costs they have traditionally sought access to aggregate resources in as close proximity as possible to the point of consumption. Given the extent of environmental and social impacts associated with aggregate production, this objective has often resulted in intense conflicts both with host communities and with a broader public audience over the priority given aggregate extraction relative to other potential land uses, such as the protection of natural heritage, source water and prime agricultural lands.

Over the past 35 years the province has taken an increasingly active role in attempting to manage these conflicts. In doing so, in the view of many observers, the province has established a legislative and policy framework that has consistently and increasingly favoured the facilitation of aggregate extraction over other values and potential land uses.

4.2. The Emergence and Evolution of Provincial Aggregates Legislation

As awareness and concern for environmental protection and preservation grew in Ontario in the mid-1960s, the impact of aggregate extraction on the

¹⁶ Clayton Research and MHBC. 2005. *The Implications of Restricting Aggregate Supply in the GTA*, pg. 10, suggests the current transportation cost is \$0.15 per tonne/kilometre.

environment began to emerge as a focus for public attention. As a result, municipalities throughout the province began to enact regulatory by-laws to control pits and quarries and/or prohibit their expansion.¹⁷

As municipal regulatory activity increased, the aggregates industry began to press the provincial government to develop and implement province-wide legislation that would provide stability and uniform governance for the industry and ultimately ensure continued access to the resource. The province, seeking to facilitate increased urban development by ensuring the availability of low-cost aggregate, responded to these industry demands by developing province-wide legislation that would ensure access to aggregate resources.¹⁸

A Mineral Resources Committee was created by the province in 1969 to examine the industry's concerns and make recommendations that would ensure the continued availability of aggregates close to market. Two years later, on November 3, 1971, the *Pits and Quarries Control Act* (PQCA) came into effect. This provincial legislation signalled a key shift in responsibility for approvals of aggregate extraction from municipalities to the province. Control over aggregate resources thus changed from a relatively decentralized system to a centralized one with the province in control and the municipalities increasingly constrained in their ability to limit aggregate extraction operations.¹⁹

In 1975, the provincial government established a group called the Ontario Mineral Aggregate Working Party to review the PQCA.²⁰ As a result of the working party's efforts, an *Aggregate Resources Act* (ARA) was tabled and received a first reading in 1979. However, the legislation was not adopted until 1989. The ARA expanded the responsibilities of producers

to mitigate the environmental and social impacts of aggregate extraction, but maintained the overall direction of limiting the ability of municipalities to constrain aggregate operations.²¹

Following the 1995 provincial election, significant funding reductions were made to the MNR's aggregates program.²² The *Aggregate and Petroleum Resources Statute Law Amendment Act* was enacted in December 1996 to deal with the resulting loss in provincial government capacity. The act shifted a number of responsibilities from the MNR to the industry. The province retained responsibility for setting standards, issuing approvals and conducting enforcement actions. Responsibility for compliance inspection and reporting, operational accountability, and management of rehabilitation funds, however, was transferred to the industry. Effectively, the provincial government entered into a partnership with the Aggregate Producers of Ontario, the aggregate industry association, to manage the industry and its environmental impacts.²³

The standards with which applicants for a way-side permit or aggregate permit were required to comply under the new system (the Aggregate Resources of Ontario Provincial Standards (AROPS)) were adopted in 1997.²⁴ The standards are focussed on mitigating the impacts of operational activities. The standards do not establish tests that must be passed for new aggregate extraction to be established, or existing operations expanded.

The 1996 amendments to the ARA also changed the powers of the Minister of Natural Resources relative to the Ontario Municipal Board (OMB)²⁵ and the powers of the OMB itself. The minister was given complete discretion in deciding whether to refer licence applications to the OMB for a public

17 Ministry of Natural Resources. N.D. *Historical Overview of the Aggregates Legislation in Ontario*. Peterborough: MNR.

18 Chambers, Colin. 2003. *Pits, Politics and Peripheralization: Case Studies of the Towns of Caledon and Erin*. Paper delivered at the American Association of Geographers Annual Meeting, March 2003.

19 Chambers, Colin. 2003. *Pits, Politics and Peripheralization: Case Studies of the Towns of Caledon and Erin*. Paper delivered at the American Association of Geographers Annual Meeting, March 2003.

20 Ministry of Natural Resources. N.D. *Historical Overview of the Aggregates Legislation in Ontario*. Peterborough: MNR.

21 Ministry of Natural Resources. N.D. *Historical Overview of the Aggregates Legislation in Ontario*. Peterborough: MNR. On the development of the ARA, see also J. Swaigen, "Pits and Quarries" in J. Swaigen and D. Estrin. 1993. *Environment on Trial: A Guide to Ontario Environmental Law and Policy*. Toronto: Emond-Montgomery and CIELAP, pp. 744-747.

22 The program budget was reduced by 70% and 18 positions were eliminated. See M. Winfield, and G. Jenish. 1999. *Ontario's Environment and the 'Common Sense Revolution': A Four-Year Report*. Toronto: CIELAP.

23 For a detailed discussion of these arrangements see M. Winfield and H. Benevides. 2001. *Drinking Water Protection in Ontario: A Comparison of Direct and Alternative Service Delivery Models*. Ottawa: The Pembina Institute, Appendix 3: "Compliance Self-Monitoring and Reporting by Ontario Natural Resource Industries."

24 Government of Ontario. 1997. *Aggregate Resources of Ontario Provincial Standards, Version 1.0*. Toronto: Queen's Printer of Ontario.

25 The Ontario Municipal Board is an independent adjudicative tribunal that hears appeals and applications and resolves land-use disputes under a variety of legislation; <http://www.omb.gov.on.ca/>

hearing. Second, upon referral to the OMB, the minister retained discretion to determine the issues to be examined. Third, while the OMB's responsibility is "to direct the Minister to issue the licence subject to the prescribed conditions," the minister "may refuse to impose an additional condition specified by the Board if he or she is of the opinion that the condition is not consistent with the purpose of the Act."²⁶

The effect of these amendments was to allow the minister to decide, one, whether appeals of applications for aggregate licences under the ARA by individuals or municipalities are allowed to proceed before the OMB and, two, the scope of any case referred to the OMB.²⁷ Again, the underlying theme appears to be the constraint of municipalities or individuals in limiting or preventing aggregate extraction operations in any way that would interfere with access to the resource.

Finally, the 1996 legislation transferred responsibility for the collection and disbursement of aggregate resource charges (royalties) and the rehabilitation of abandoned pits and quarries to The Ontario Aggregate Resources Corporation (TOARC).²⁸ The corporation, in which the sole shareholder is the Aggregate Producers Association of Ontario, and whose board of directors is dominated by representatives of the aggregate industry,²⁹ also assumed responsibility for the conduct of policy-related research on aggregate resources.³⁰

4.3. Land-use Planning Policy and Aggregates

The priority given to aggregate development that emerged in Ontario starting in the late 1960s is manifest not only in the province's regulatory legislation, but in provincial land-use planning policies as well.

In 1979, MNR adopted the "Mineral Aggregates Policy for Official Plans." The policy provided that lands identified as having significant aggregate deposits could not be developed until the aggregates had first been removed. By implication, aggregate extraction was given priority over all other land uses.³¹

When a new version of the *Planning Act* was adopted in 1983, it included provisions permitting the provincial government to issue policy statements intended to give direction to municipalities and other planning authorities in land-use planning. Adopted in 1983, the first provincial policy statement made under the Act, the "Mineral Aggregate Resource Planning Policy Statement" (MARPPS), was a version of the 1979 policy. The policy required that official plans identify both existing pits and quarries and unmined deposits of aggregate, and protect both from any incompatible land uses.³²

While not requiring that municipalities zone deposit areas for development, the policy prevented the approval of any incompatible land uses. The policy also placed aggregate development proponents in a strong position to appeal to the OMB if a municipality refused to zone a deposit for development.

The overall direction of the MARPPS remained unchanged when a comprehensive set of provincial policy statements, flowing from the work of the Commission on Planning and Development Reform,³³ was adopted by the province in December 1994. The stated goal of the Mineral Aggregate and Mineral Petroleum Resources Policy Statement was "to ensure mineral aggregates are available at a reasonable cost and as close to markets as possible to meet future local, regional and provincial needs."³⁴ The statement required that planning authorities identify and protect as much of the mineral aggregate under their

²⁶ Aggregate Resources Act, Part VI.

²⁷ Chambers, Colin. 2003. *Pits, Politics and Peripheralization: Case Studies of the Towns of Caledon and Erin*. Paper delivered at the American Association of Geographers Annual Meeting, March 2003.

²⁸ One of the effects of this arrangement was to eliminate the requirement that aggregate operations post rehabilitation security deposits to ensure the availability of funds for rehabilitation in the even of bankruptcy or closure. See Winfield and Benevides, *Drinking Water Protection in Ontario*, Appendix 3, for a discussion of these arrangements.

²⁹ In 2004, 5 of 8 directors were representatives of the industry. The Ontario Aggregate Resources Corporation. 2004. *2003 Annual Report*. Toronto: Ontario Aggregate Resources Corporation.

³⁰ Environmental Commissioner of Ontario. 2004. *2003–2004 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 163.

³¹ Swaigh, J. and D. Estrin. 1993. *Environment on Trial: A Guide to Ontario Environmental Law and Policy*. Toronto: Emond-Montgomery and CIELAP, pg. 746.

³² Swaigh, J. and D. Estrin. 1993. *Environment on Trial: A Guide to Ontario Environmental Law and Policy*. Toronto: Emond-Montgomery and CIELAP, pg.746.

³³ Commission for Planning and Development Reform in Ontario. 1992. *New Planning in Ontario*. Toronto: Queen's Printer for Ontario.

³⁴ Ministry of Municipal Affairs. 1994. *Comprehensive Set of Policy Statements, Statement F — Mineral Aggregate, Mineral and Petroleum Resources Policies*.

jurisdiction as was practical.³⁵ In addition, development was only to be permitted in areas of mineral aggregate resources where extraction would not be feasible, development would not hinder or exclude aggregate extraction, or the proposed land use or development would serve the greater long-term interest of the general public.³⁶ The new Provincial Policy Statement (PPS) came into effect in March 1995.³⁷

The priority given aggregate extraction over other land uses was significantly strengthened when the PPS was extensively re-written following the 1995 election. The new policy statement, adopted in March 1996, requires that as much mineral resources as is realistically possible be made available to supply market needs, as close to market as possible, without consideration of other land-use planning objectives.³⁸ The prohibition on development that would preclude or hinder the establishment of new extraction operations or access to resources was also enhanced.³⁹ Essentially, the PPS was further modified to provide a framework through which aggregate resources have been given priority over other potential land uses.⁴⁰

In addition to re-drafting the PPS, in 1996 the new government adopted amendments to the *Planning Act* eliminating the requirement that planning decisions “be consistent with” provincial policy. The requirement that decisions “be consistent” with provincial policy had been contained in the 1995 amendments to the Act adopted in response to the recommendations of the Commission and Planning Development Reform. Although the 1996 amendments were generally intended to give municipalities more flexibility in planning decisions, the provincial government subsequently used its powers under the *Planning Act* to directly override local planning decisions that might limit future aggregate development. The aggregates provisions were the only element of the PPS where such enforcement interventions occurred.⁴¹

4.4. The Niagara Escarpment and Oak Ridges Moraine

Despite the overall direction of the province’s land-use policies regarding aggregate resources, areas of significant resource potential have, on rare occasions, been removed from the available land base. The two notable examples of such action by the province are with respect to parts of the Niagara Escarpment via the *Niagara Escarpment Planning and Development Act*, and Niagara Escarpment Plan,⁴² and parts of the Oak Ridges Moraine, as a result of the *Oak Ridges Moraine Conservation Act* and Plan.⁴³ In both cases, vocal public concerns regarding the negative impacts of aggregate resource extraction on the integrity of the features were significant factors in the provincial decisions to protect them from development.

4.5. Aggregate Resource Charges

The current provisions of the ARA and PPS reflect the 35-year trend of limiting local control over aggregate development, and giving aggregate development priority over other potential land uses. Other aspects of the province’s policy framework with respect to aggregates also emphasized the theme of maximizing access to the resource at minimum cost to resource users.

The province’s current royalty for the extraction of aggregate, for example, is \$0.06 per tonne. The fees are distributed on the basis of \$0.04 to the municipality in which the site is situated, \$0.005 cents to the regional municipality, \$0.005 cents to the Aggregate Resources Trust for Rehabilitation, and the remainder (\$0.01) to the provincial crown.⁴⁴

The resource charge has been unchanged since 1990. Without indexing for inflation, the charge effectively has become smaller each year.⁴⁵ The current charge is so low that the revenues generated

35 Ministry of Municipal Affairs. 1994. *Comprehensive Set of Policy Statements, Statement F — s.1.1.*

36 Ministry of Municipal Affairs. 1994. *Comprehensive Set of Policy Statements, Statement F — s.1.4.*

37 See http://web.idrc.ca/en/ev-64477-201-1-DO_TOPIC.html

38 Ministry of Municipal Affairs and Housing. Year. *Provincial Policy Statement Policy 2.2.3.1.*

39 Ministry of Municipal Affairs and Housing. Year. *Provincial Policy Statement Policy 2.2.3.3.* (development “may be” permitted vs. “will only be” permitted).

40 Ford, Ray. 2004. “9,500 Holes and Counting.” *On Nature*, August 2004.

41 See Winfield and Jenish, *Ontario’s Environment and the ‘Common Sense Revolution:’ A Four-Year Report*, pg. 3–41.

42 See www.escarpment.org on the development and details of the Niagara Escarpment Plan.

43 See http://www.mah.gov.on.ca/userfiles/HTML/nts_1_31_1.html regarding the Oak Ridges Moraine Conservation Act and Plan.

44 Ontario Regulation 244/97, s. 2.

45 If corrected for inflation, the charge would amount to 8 cents per tonne today based on Stats Can CPI 1990 to 2003 of 1.3. Stats Can Table 326-0002.

for the province (\$1.65 million in 2002) amount to less than the operating budget of the MNR's aggregate resources program.⁴⁶

As discussed in section 7, at \$0.06 cents per tonne, Ontario's fees are significantly lower than the rates charged in other jurisdictions. The total public revenues obtained from aggregate resources charges for the 165 million tonnes of aggregate produced in Ontario in 2002 were just under \$9.9 million dollars.⁴⁷ The current fee structure provides little incentive to aggregate consumers to ensure the efficient use of the resources.

4.6. Recent Policy Proposals

The October 2003 provincial election has been followed by a series of major policy initiatives related to land-use planning. These have included the adoption of legislation to restore the requirement that planning decisions "be consistent with" provincial policy.⁴⁸ In addition, a proposed revised PPS was released for public consultation in June 2004.⁴⁹

Despite the fact that the new government's overall stated goals with respect to planning policy are to curb urban sprawl, and to strengthen the protection of natural heritage, prime agricultural and drinking water source lands,⁵⁰ the proposed new PPS would significantly further strengthen the status of aggregate extraction as an overriding land-use priority.

In addition to reproducing the language of the existing policy, the proposed policy would add a provision that "demonstration of need for mineral aggregate resources, including any type of supply/demand analysis, will not be required, notwithstanding the availability, designation or licensing of mineral aggregate resources locally or elsewhere."⁵¹

The theme of the overriding priority given to mineral aggregate development was also reflected in the August 2004 report of the Greenbelt Task Force, appointed by the province to advise it on the establishment of a "greenbelt" to protect natural heritage and source water lands, and prime agricultural

areas in the Golden Horseshoe region. Perhaps surprisingly, given its goals, the Task Force recommended that aggregate extraction be permitted to continue within the proposed greenbelt, and that areas of aggregate potential included in the greenbelt be protected from incompatible land uses,⁵² with the implication that aggregate extraction would be permitted in those areas. The draft Greenbelt Plan, released in October 2004, permits aggregate development throughout the proposed greenbelt including, under certain conditions, at the site of key natural heritage features.⁵³

4.7. Summary

The current provincial policy framework governing aggregates extraction is designed to maximize access to aggregate resources as close to markets as possible. This policy approach is intended to ensure a supply of inexpensive aggregate by minimizing transportation costs from extraction sites to markets.

To facilitate aggregate extraction, control over the approval and oversight of aggregate operations has been progressively shifted from municipal governments to the province, first through the *Pits and Quarries Control Act* and later via the *Aggregate Resources Act*. At the same time, successive expressions of provincial land-use policies have granted aggregate extraction priority over virtually all other land uses. The province's current draft revised PPS would further strengthen these directions.

The combination of strong policies regarding access to the resource and low resource charges has provided few incentives to aggregate producers or consumers to use the resource efficiently, or to consider the use of alternatives to newly extracted aggregate.

The province's policy approach has also engendered intense conflicts between aggregate producers, host communities and other constituencies. As demonstrated by the Dufferin Aggregates case, the existing policy framework is seen by many who are

46 For fiscal 1004/05 the program budget is \$1.7 million. Pers.Comm., Brian Messerschmidt, Manager Aggregate and Petroleum Resources Section, December 10, 2004.

47 The total revenues were \$9,852,979. TOARC. 2004. *2003 Annual Report*, pg. 14.

48 Bill 26 — *The Strong Communities Act*. 2003.

49 Ministry of Municipal Affairs. 2004. *Draft Provincial Policy Statement (PPS)*. Toronto: Ministry of Municipal Affairs.

50 Ministry of Municipal Affairs. 2004. *Draft Provincial Policy Statement (PPS)*. Toronto: Ministry of Municipal Affairs.

51 Ministry of Municipal Affairs. 2004. *Draft Provincial Policy Statement (PPS)*. Toronto: Ministry of Municipal Affairs, s.2.5.2.1.

52 Greenbelt Task Force. 2004. *Toward A Golden Horseshoe Greenbelt: Advice and Recommendations to the Minister of Municipal Affairs and Housing*. Toronto: Ministry of Municipal Affairs, pg. 21.

53 Ministry of Municipal Affairs. 2004. *Greenbelt Draft Plan*. Toronto: Queen's Printer for Ontario, s.4.3.2.

affected by aggregate development to fail to effectively balance aggregate development with natural heritage, agricultural land and source water protection, and other potential land use priorities.

More broadly, the existing aggregates policy framework has not recognised that, notwithstanding its overall direction, the areas of the province where aggregate resources can be acceptably developed will

inevitably become increasingly constrained as development occurs, and other pressing public policy priorities, such as natural heritage conservation and source water protection, have to be addressed. The decisions to ultimately protect parts of the Niagara Escarpment and Oak Ridges Moraine from aggregate development are the most prominent examples of such outcomes.

5. Aggregate Demand and Supply



Peter MacCallum

The aggregates industry is pressing for increased access to supplies as demand rises due to expanding urban areas such as the GTA.

5.1. Introduction

In recent years, the aggregate industry has suggested that Ontario is entering a “supply crisis,” particularly in the GTA where development and population growth pressures are concentrated. Analyses prepared for the industry suggest that existing licensed aggregate reserves in the GTA will be exhausted within the next decade and that increased reliance on imports will result in higher aggregate costs, and increases in air pollution associated with aggregate transportation.⁵⁴

The situation has led to demands by the industry that the province facilitate increased access to aggregate resources. The perceived need to respond to these demands appears to be the rationale for the province’s recent proposals to further strengthen the overriding priority given to aggregate extraction in provincial land-use planning policies and initiatives.⁵⁵

Despite the apparent importance attached to the resource, there is remarkably little publicly available information about the profile and direction of demand for mineral aggregate resources in Ontario. The MNR

⁵⁴ Clayton Research and MHBC. 2004. *The Implications of Restricting Aggregates Supply in the GTA*, pg. 1.

⁵⁵ See, for example, Ministry of Municipal Affairs. 2004. *Draft Provincial Policy Statement (PPS)*. Toronto: Ministry of Municipal Affairs.

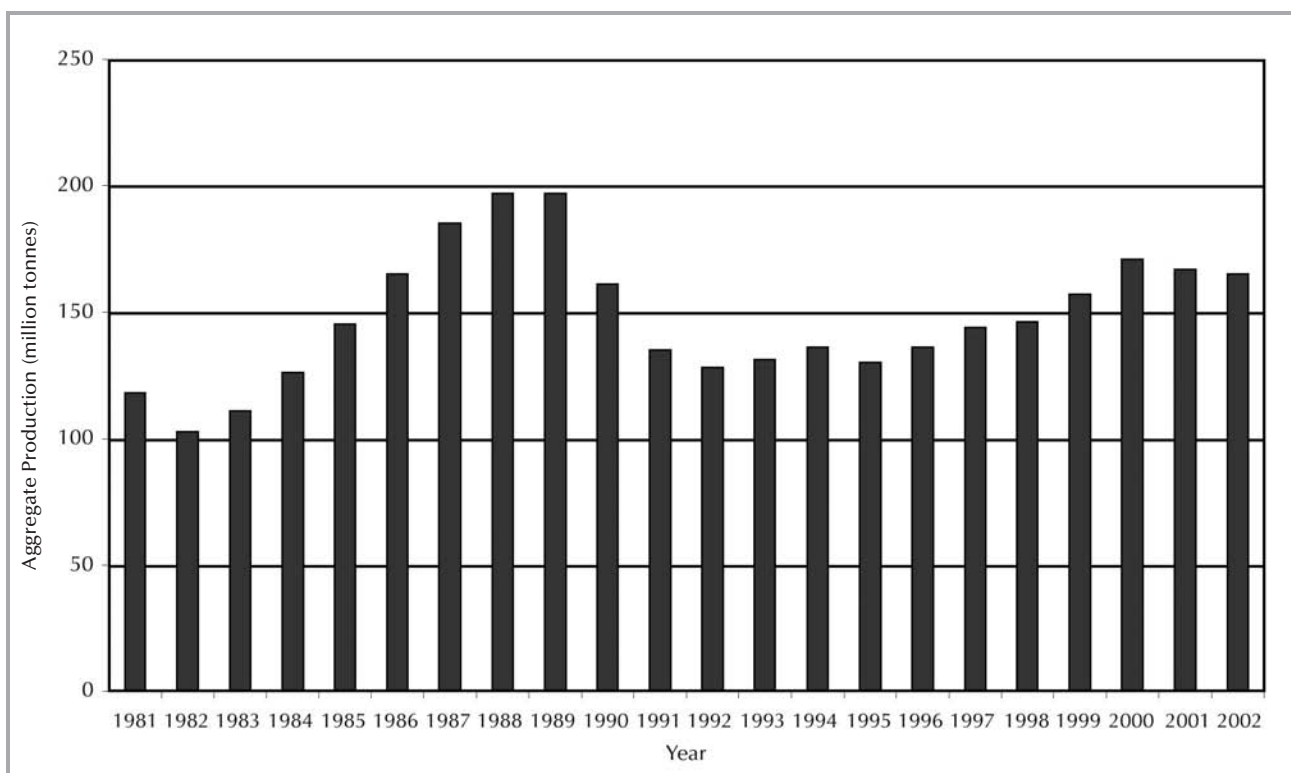
completed the last comprehensive study on mineral aggregate demand and supply in Ontario in 1992.⁵⁶ Responsibility for conducting research on aggregate resources management was transferred from the MNR to TOARC in 1997.⁵⁷ TOARC publishes annual statistical updates on aggregate production, but has not undertaken any detailed research on recent trends in aggregate demand or utilization patterns. The arrangement with TOARC has left the province with little capacity to undertake research on aggregates-related issues independently of the industry.

5.2. Aggregate Production

5.2.1. Total Production

Figure 1, below, shows total production of aggregate resources in Ontario from 1981 to 2002. Production peaked in 1988 and 1989 with 197 million tonnes of aggregates produced in each of those years. Aggregate production has remained relatively stable since 2000 at approximately 170 million tonnes annually, with a slight downwards trend evident in the past few years.

Figure 1: Total Ontario Aggregate Production 1981–2002



Source: 1981 to 1985 data from Clayton Research, 1986 to 2002 data from Mineral Aggregates of Ontario Statistical Update, 1998 to 2002. http://www.toarc.com/publications_statistics.asp

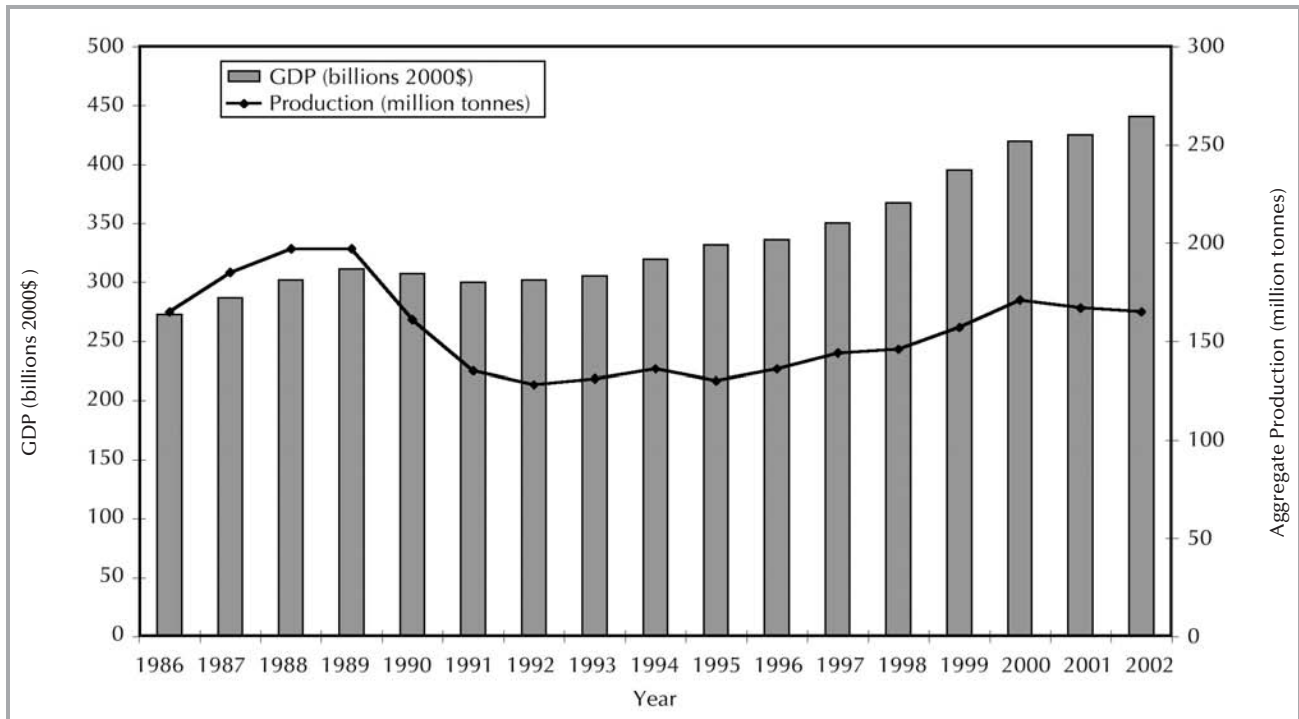
Figure 2, next page, charts both aggregate resource production and provincial Gross Domestic Product (GDP) for the 1986 to 2002 period. As the figure demonstrates, aggregate production increased in the late 1980s when the economy was expanding. In the

early 1990s, when the Province of Ontario was experiencing a recession, aggregate production declined. Since then both the economy and aggregate production have been on an upward trend with a slight decline in production since 2000.

56 Planning Initiatives Ltd. and Associates. 1992. *Aggregate Resources for Southern Ontario: A State of the Resource Study*. Toronto: Ministry of Natural Resources.

57 Environmental Commissioner of Ontario. 2004. *2003–2004 Annual Report*, pg. 163.

Figure 2: Aggregate Production vs. Provincial GDP 1986–2002

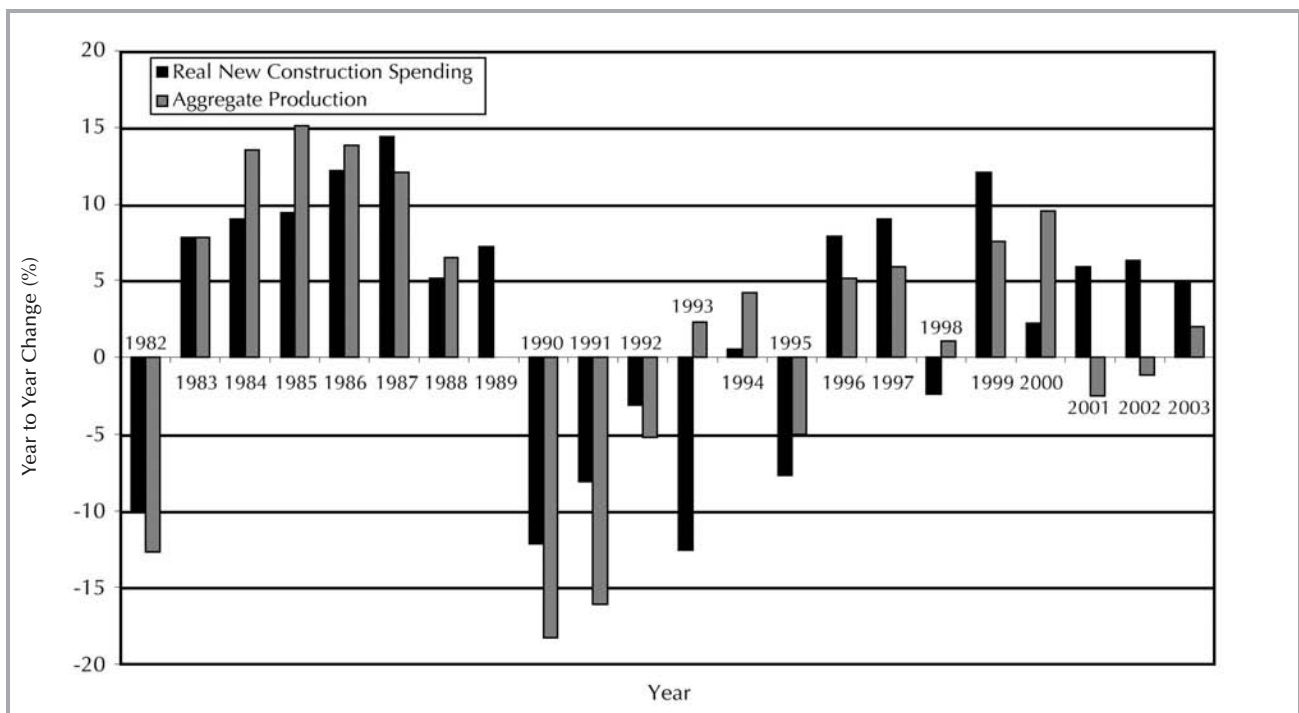


Source: The Ontario Aggregate Resources Corporation. 2002. Mineral Aggregates of Ontario Statistical Update, 2002. GDP figures from Statistics Canada.

The overall picture suggests that trends in aggregate production follow the overall state of the economy. Aggregate production also appears to be correlated with the level of construction activity in the province.

As **Figure 3** demonstrates, with few exceptions, when construction spending increases so too does aggregate production.

Figure 3: Ontario Aggregate Production vs. New Construction Spending 1982–2002



Source: Clayton Research. Presentation made at Aggregate Producers of Ontario 2004 AGM.

5.2.2. Imports and Exports

Further factors influencing aggregate demand and supply are the levels of aggregate imports and exports to and from Ontario. Statistics Canada data demonstrates that the value of non-metallic mineral product exports from Ontario exceeds the value of such imports. As shown in Table 5, the value of both

imports and exports increased over the 1997 to 2000 period. Information on the types of aggregates imported and exported, the actual tonnage imported and exported, and the regions of Ontario that are the sources of exports or recipients of imports is not publicly available.

Table 5: Ontario Non-metallic Mineral Products: The Value of Exports and Imports 1997–2000, million\$

Trade Flow	1997	1998	1999	2000
Ontario exports	482.3	514.6	503.2	509.5
Ontario imports	267.1	262.1	309.0	341.3

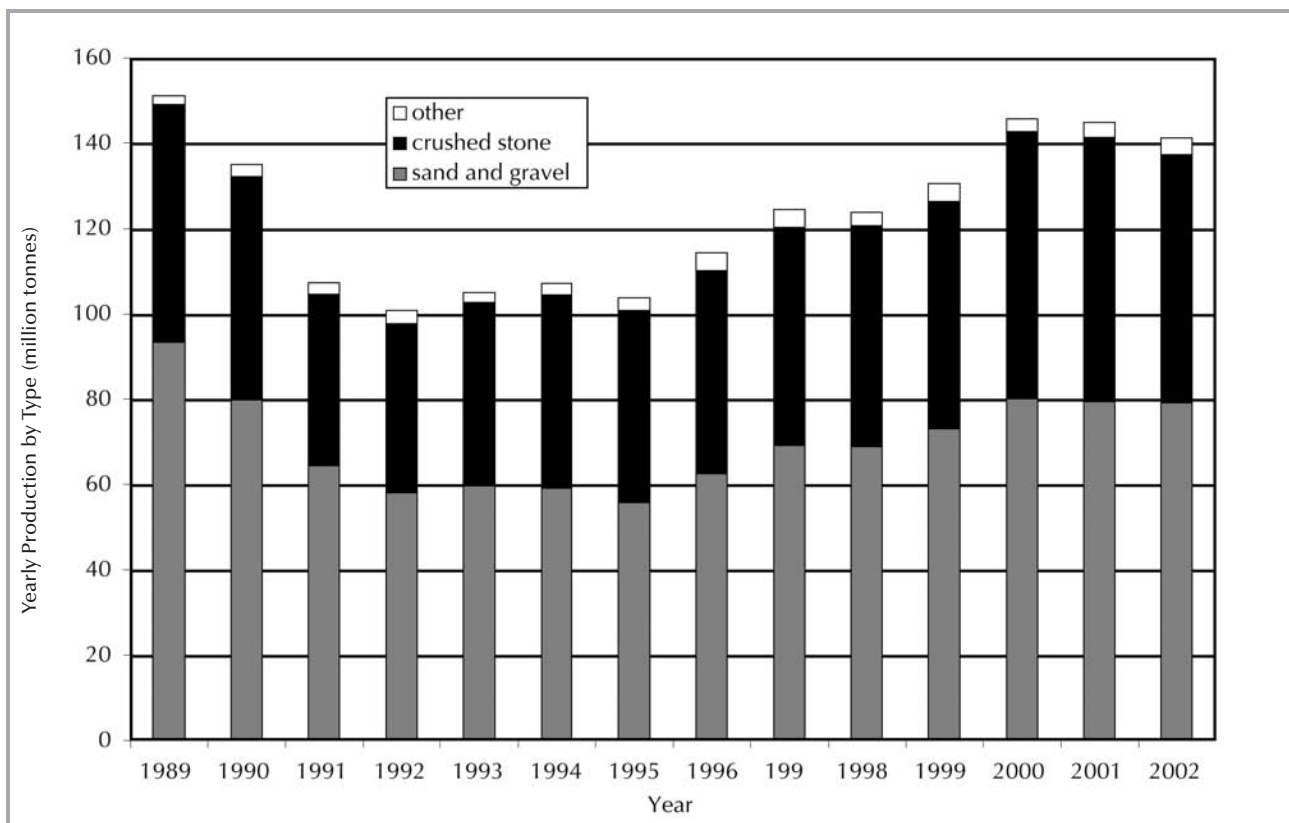
Source: Statistics Canada, CANSIM Table 386-0002.

5.2.3. Commodity Types and Geographic Distribution of Production

Aggregate includes many distinct types and grades of materials, varying in their geologic origin and in

subsequent processing. Each product type is processed to meet set engineering standards.⁵⁸ Figure 4 shows the breakdown of production by aggregate type.

Figure 4: Aggregate Production by Type 1989–2002



Source: Ontario Aggregate Resources Corporation. 1998 to 2002. Annual Production Statistics. http://www.toarc.com/publications_statistics.asp

58 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 31.

It is also important to consider the source of these resources within the province. **Table 6**, below, presents a breakdown of production by aggregate type for a

number of districts within Ontario for 2002. As indicated in the table, the bulk of production comes from the GTA and Guelph districts.

Table 6: 2002 Licensed Aggregate Production by District and Commodity Type (thousands of tonnes)

District	Total	Sand and Gravel	Crushed Stone	Clay and Shale	Other Stone
Aurora (GTA)	29,841.76	14,820.16	13,208.99	1,276.51	536.10
Aylmer	14,082.87	10,315.49	3,757.53	1.72	8.13
Bancroft	2,294.70	115.83	2,134.22	7.58	37.07
Guelph (Cambridge)	35,831.12	23,169.40	12,526.46	131.68	3.57
Kemptville	18,465.82	5,888.73	11,617.94	107.73	851.43
Midhurst	17,689.51	11,989.24	5,413.40	109.31	177.56
Pembroke	1,884.19	1,262.49	210.04	0.00	411.66
Peterborough	17,407.78	8,446.79	8,905.72	40.65	14.62
Sault Ste. Marie	828.14	777.74	32.92	0.00	17.48
Sudbury	2,850.18	2,305.40	387.17	64.64	92.98
TOTAL	141,176.09	79,091.27	58,194.39	1,739.83	2,150.60

Source: The Ontario Aggregate Resources Corporation. 2002. *Mineral Aggregates of Ontario Statistical Update, 2002*. http://www.toarc.com/publications_statistics.asp

Between 1991 and 2002, there were an estimated 106 million tonnes in new licensed reserves in GTA. Over the same period, 314 million tonnes of aggregate were produced in the GTA.⁵⁹ Under business-as-usual assumptions, the MNR's 1992 report predicted that average annual demand for aggregates in the GTA would be 87 million tonnes in the 2006 to 2010 period.⁶⁰ More recent estimates prepared for the aggregate industry suggest consumption of aggregates within the GTA will be about one-third higher over the 2003–2014 period than in the previous 12 years.⁶¹ However, the basis for these estimates of

increased demand is unknown.

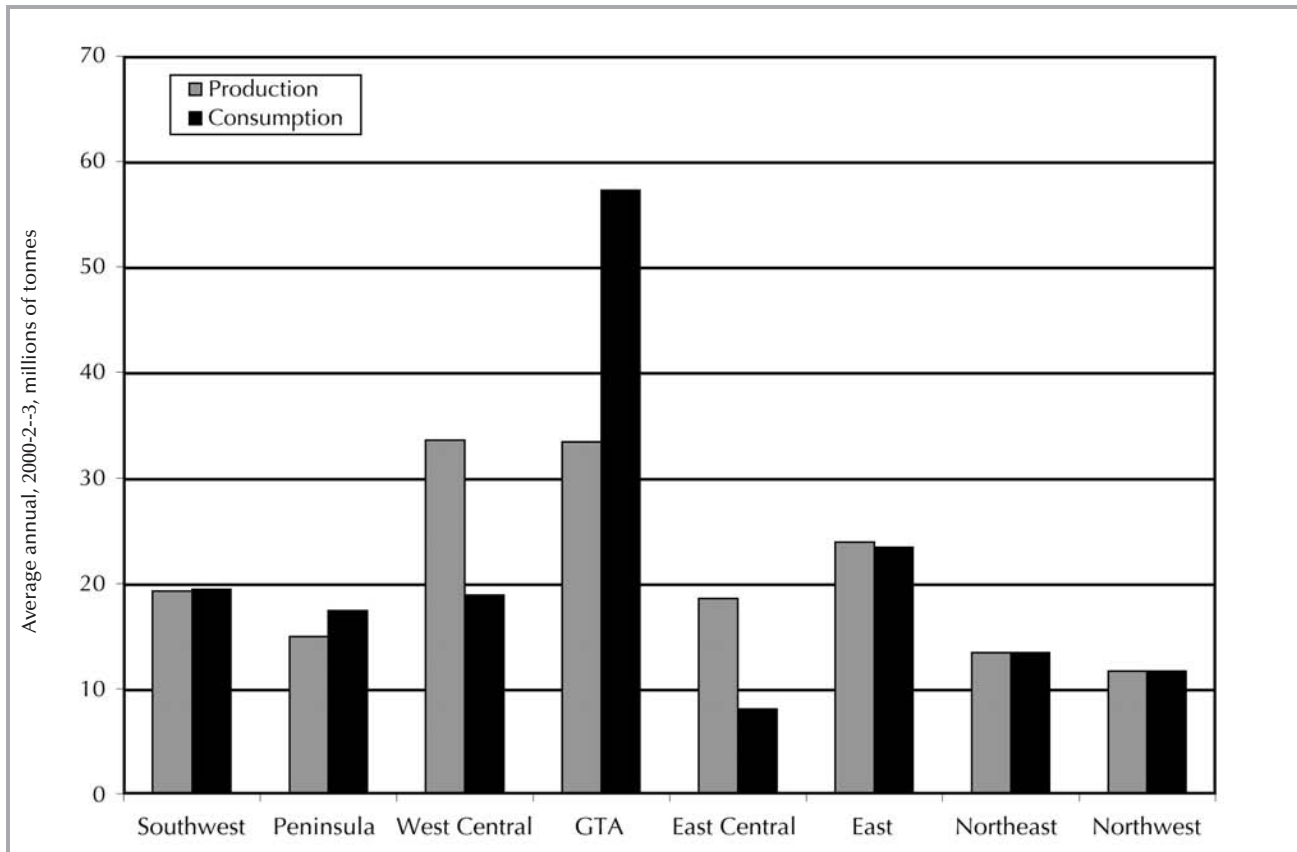
Figure 5, on the next page, suggests that consumption in the GTA exceeds production, although it is important to note that there are not any publicly available data sources through which the consumption figures used in this figure can be confirmed. **Figure 5** also suggests that production in the east and west central regions is significantly higher than consumption in the same regions. This indicates that these neighbouring regions are the likely source of the estimated 44%⁶² of the GTA's aggregate supplies that are imported from outside of the GTA.

59 Clayton Research and MHBC. 2004. *The Implications of Restricting Aggregates Supply in the GTA*, pg. 3.

60 Planning Initiatives Ltd. and Associates. 1992. *Aggregate Resources of Southern Ontario A State of the Resource Study*. Ministry of Natural Resources.

61 Clayton Research and MHBC. 2004. *The Implications of Restricting Aggregates Supply in the GTA*.

62 Clayton Research and MHBC. 2004. *The Implications of Restricting Aggregates Supply in the GTA*, pg. 7.

Figure 5: Aggregate Production and Consumption by Region

Source: Clayton Research. Presentation made at Aggregate Producers of Ontario 2004 AGM.

5.2.5. Factors Affecting Regional Supply and Demand

It is important to note that the question of regional supply and demand is more complex than the balance between total production and consumption. In some cases, the types of aggregate required for specific uses are not available in a given geographic region. Imports may be necessary to meet these needs.

Road construction is estimated to be the largest use of aggregate in Ontario, accounting for 55 per cent of total consumption.⁶³ To improve pavement longevity and reduce the need for repairs, for example, the Ministry of Transportation (MTO)'s aggregate specifications for highways have become more stringent over time. Key changes to aggregate specifications have included increased portions of stone, with larger amounts of crushed particles. In the late 1990s, for example, MTO increased the crushed material content

requirement for materials used as a base in highways from 50 to 60 per cent.⁶⁴

As a result of these changes, the demand for resources from quarries has increased, while the demand for products from aggregate pits has declined, as such resources have been deemed unsuitable for achieving longevity objectives. More specifically, demand has increased for aggregate from the Niagara Escarpment and the Carden Plain.⁶⁵

At the same time, some of MTO's highest specification aggregates, used in asphalt paving materials for high-volume freeways, are not found in the GTA or immediate vicinity. Such aggregates must be brought south from the Canadian Shield. These changes have contributed to the need to import aggregates to the GTA and have resulted in increased transportation distances for aggregates in Ontario in recent years.⁶⁶ Increased extraction of aggregate

63 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 31.

64 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 33.

65 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 33.

66 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pp. 32–33.

resources within the GTA would not help to meet these particular construction demands.

There is also anecdotal evidence suggesting that shifts in profile of uses of aggregate may be taking place. Net residential densities in the GTA, for example, have risen over the past decade.⁶⁷ This would imply a reduction in demand per unit of housing of aggregate. However, the trend towards higher net residential densities is being offset by increasing amounts of land used for infrastructure and public uses (e.g., stormwater management ponds, wide streets, parks, schools, etc.), with the result that gross density is not increasing at the same rate as net residential density.⁶⁸ Demand for aggregate associated with these uses may, therefore, be increasing.

Unfortunately, the currently available data on aggregate consumption provides no basis for assessing the impact of such trends on the future need for aggregate in Ontario. As noted earlier, the last comprehensive and publicly available assessment of the demand for aggregate resources in Ontario was completed by the MNR in 1992. TOARC, which assumed responsibility for policy-related research on aggregate resources, only documents production. It has not undertaken research on the sources of demand for aggregate, or changes in the patterns of aggregate use in the province.

The result is that the province does not have a current profile of the uses of aggregates in Ontario, a picture of how those use patterns might be changing, or projections of the scale or shape of likely future demand. The 1992 study is also the most recent assessment of the overall state of the province's resources. As the Environmental Commissioner noted in his 2002–2003 Annual Report, the MNR has "not informed the public about the current status of our aggregate resources."⁶⁹

5.3. Summary

The current publicly available data on aggregate supply and demand in Ontario is extremely limited. The last comprehensive assessment of the resource was completed in 1992. Annual data on aggregate production is provided by TOARC, and the province now relies on TOARC for research on aggregate resources management. However, information is not available on total demand for aggregate, the profile of consumption by sector, region and material type or the amounts and types of aggregate imported to and exported from Ontario.

The current publicly available data on aggregate demand and consumption is not adequate to support good decision making regarding the province's aggregate resources. It is virtually impossible, for example, to assess claims regarding the need for additional supply and production in the GTA, or that demand is likely to increase over time, as some have suggested. It is known that the GTA currently imports, likely from neighbouring regions of the province, a significant amount of its aggregate supply. However, on the basis of currently available information, it is not possible to determine the amount of those imports that is due to demand for types of aggregate not available in the region and that increased production in the region would not help address.

More broadly, significant shifts in the patterns of demand for aggregate appear to be occurring. Increasing use is being made, for example, of crushed rock, in some cases only available from the Canadian Shield, instead of gravel in road construction. Changes in land-use and development patterns may affect aggregate demand as well.

Given the significance attached to aggregate resources in the province's land-use policies, the lack of current public information on the profile and trends in demand for the resource is striking. The situation makes it impossible to undertake meaningful future planning, as demand for certain types of resources may be rising while for others it may be falling.

67 IBI Group in association with Dillon Consulting Ltd. 2002. Toronto-Related Region Futures Study, Interim Report: Implications of Business-as-Usual Development. Toronto: Neptis Foundation, pg. E.9.

68 IBI Group and Dillon Consulting Ltd. 2002. Toronto-Related Region Futures Study, pg. E.9.

69 Environmental Commissioner of Ontario. 2003. 2002–2003 Annual Report. Toronto: Environmental Commissioner of Ontario, pg. 34.

6. Alternatives to Increasing the Supply of Aggregate



Peter MacCallum

An aggregates recycling operation in Toronto. Such operations can help conserve resources and reduce waste.

6.1. Introduction

The Environmental Commissioner of Ontario has highlighted in his recent annual reports to the Legislative Assembly the need for the province to consider alternatives to attempting to continue to increase the supply of aggregate.⁷⁰ One of the recommendations contained in the Environmental

Commissioner's 2002–2003 report was that “the Ministries of Natural Resources and Transportation collaborate on a strategy for conserving Ontario's aggregate resources. This strategy, which should be developed with public consultation, should consider both road construction needs and the need to conserve aggregate resources.”⁷¹ In making this recommendation,

70 Environmental Commissioner of Ontario. 2003. 2002–2003 Annual Report. Toronto: Environmental Commissioner of Ontario, pg. 33.

71 Environmental Commissioner of Ontario. 2003. 2002–2003 Annual Report. Toronto: Environmental Commissioner of Ontario, pg. 35.

the Commissioner observed that “Ontario is not taking full advantage of the opportunity to conserve aggregate.”⁷²

The conservation-focussed approach recommended by the Environmental Commissioner would be a significant departure from the Government of Ontario’s past responses to the need for aggregate of seeking to maximize the amounts of material available for exploitation, as close to their markets as possible. However, the approach of responding to demand by maximizing the amount of resource available for development at minimum cost has resulted in increasingly intense conflicts between aggregate development and other land-use policy goals, such as the protection of ecologically significant, prime agricultural and source water lands. In fact, the current approach has been widely criticized as not reflecting a rational approach to land-use planning and for failing to balance aggregate development against other potential land uses.⁷³

The provincial government itself acknowledged the need for a different approach in its proposed growth management plan for the greater Golden Horseshoe region, *Places to Grow*, noting the need to promote the conservation of aggregate resources.⁷⁴

Both the Environmental Commissioner’s report and *Places to Grow* identify a number of potential ways in which demand for newly extracted aggregate might be reduced. These options include

- substituting alternative materials for newly extracted aggregate
- changing the designs of buildings, roadways and other structures to reduce the need for aggregate in their construction
- changing the design of urban settlements as a whole to reduce the need for aggregate-intensive infrastructure.

6.2. Substitution with alternative materials

A number of materials can be employed as replacements for different forms of aggregate. Aggregates previously used in construction may be recycled for other uses. These materials can include concrete, brick and masonry from the demolition of buildings and other structures, and crushed or damaged bricks, blocks, cement, concrete and asphalt from infrastructure and building construction and maintenance projects.⁷⁵

In addition, byproducts of other processes not previously used as aggregates can also be used as substitutes for aggregates in construction projects. Materials used in this way include blast furnace slag, nickel and copper slags, fly ash and bottom ash, lime and cement kiln dusts, waste foundry sands, shingles, tires and glass, and waste overburden and rock from mining and road construction operations.⁷⁶

The amount of materials available from these types of sources is significant. The most recent estimates available (1991) indicate, for example, that the Canadian mining industry generates approximately one million tonnes of waste rock per day.⁷⁷ In addition to ongoing generation, large amounts of waste rock are stored at former and operating mine sites. In Ontario, such sites are often served by, or are in close proximity to, rail transportation services.

However, not all of these materials are suitable for use in all applications. Consideration must be given to the technical suitability of materials in given situations. Furthermore some material streams (e.g., used foundry sands and cement kiln dust) may be contaminated with hazardous substances that limit the degree to which they can be used without risk of harm to the environment or human health and safety.

Current data on the availability of most potential substitute materials in Ontario, and their levels of

72 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 34.

73 See, for example, the August submissions of the Canadian Environmental Law Association, Ontario Nature, and the Pembina Institute regarding the Ministry of Municipal Affairs and Housing June 2004 Draft Provincial Policy Statement.

74 Ministry of Public Infrastructure Renewal. 2004. *Places to Grow: A Growth Plan for the Greater Golden Horseshoe Region*. Toronto: Ministry of Public Infrastructure Renewal, pg. 46.

75 John Emery Geotechnical Engineering Ltd. 1992. *Mineral Aggregate Conservation — Reuse and Recycling*. Prepared for the Ontario Ministry of Natural Resources. See also Land Use Consultants. 2000. *Controlling Environmental Effects: Recycled and Secondary Aggregates Production*. Study commissioned by the Department of Environment, Transport and Regions, Section 2.

Available at: http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606242.hcsp.

76 John Emery Geotechnical Engineering Ltd. 1992. *Mineral Aggregate Conservation — Reuse and Recycling*. Prepared for the Ontario Ministry of Natural Resources. See also Land Use Consultants. 2000. *Controlling Environmental Effects: Recycled and Secondary Aggregates Production*. Study commissioned by the Department of Environment, Transport and Regions, section 2.

Available at: http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606242.hcsp

77 Government of Canada. 1991. *The State of Canada’s Environment*. Ottawa: Minister of Supply and Services, pg.11–19.

use as substitutes for primary aggregates, is at best fragmentary⁷⁸ and, in most cases, simply not publicly available. The most recent figures available suggest that, as of 1990, the use of wastes and byproducts in construction projects was about six million tonnes per year. This was equal to about three per cent of Ontario's total aggregate production.⁷⁹

Experience in other jurisdictions, particularly the United Kingdom where detailed analyses of the availability of substitute materials have been developed,⁸⁰ suggests that substitution rates of over 20 per cent may be possible.⁸¹ In addition to reducing demand for newly extracted aggregate, substitution policies also offer the potential to divert waste materials from disposal.

A 1992 report prepared for the MNR on the reuse and recycling of aggregate materials recommended government policies be implemented to foster the use of waste and byproducts in construction projects. The report cited sustainable development policies and landfill restrictions as the key factors providing favourable economics for the use of wastes and byproducts in construction.⁸²

6.3. Changes in Design of Infrastructure and Buildings

Changes in the design of infrastructure and buildings can also result in reductions in the need for new aggregate. Using alternative development standards to reduce the width of typical residential streets from 8.5 metres, as is the norm in new developments today, to 6.5 metres, as is typical in older neighbourhoods, could reduce the need for aggregate considerably.⁸³

6.4. Changes in Development Patterns

More broadly, changes in settlement patterns to reduce the need for aggregate-intensive infrastructure, particularly major roads (see Table 1), may have significant impacts on the need for aggregate. Urban trains typically require less aggregate resources and encourage compact, high-value land use as compared to the sprawling developments that highways attract. Railways also move more people and freight in far less space than do roads. Two railroad tracks can carry as many people in an hour as a sixteen-lane highway.⁸⁴

A kilometre of single track railway requires approximately 8,300 tonnes of aggregate per kilometre.⁸⁵ As shown in Table 3, a four-lane highway, by comparison, can consume 40,500 tonnes per kilometre of aggregate, and a six-lane highway nearly 50,000 tonnes per kilometre.

6.5. Provincial Action on Aggregate Conservation

Unfortunately, despite the potential, the province has done little over the past 30 years to pursue the options of substitution or design change to reduce demand for aggregate.

The MTO's specifications for road construction, specifically the "Special Provisions for Provincial Highways," allow for the use of reclaimed aggregates, concrete and asphalt pavement in highway construction, subject to qualifying criteria. The specifications also allow the use of certain other materials, such as particular types of slag and crushed glass or ceramics,

78 It is thought, for example, that up to 100 per cent of stripped or older asphalt is now used in new pavements and in the granular base layers that support pavements on both provincial and municipal highways. Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 33.

79 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 34.

80 See Land Use Consultants. 2000. *Controlling Environmental Effects: Recycled and Secondary Aggregates Production*. Study commissioned by the Department of Environment, Transport and Regions, Section 2. Available at: http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606242.hcsp.

81 Office of the Deputy Minister. 2003. *National and Regional Guidelines for Aggregates Provision in England 2001–2016*. Available at: http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_608572.hcsp

82 John Emery Geotechnical Engineering Ltd. 1992. *Mineral Aggregate Conservation — Reuse and Recycling*. Prepared for the Ontario Ministry of Natural Resources.

83 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 34. For a broader discussion of issues related to alternative development standards, see Ministry of Housing and Ministry of Municipal Affairs. 1995. *Making Choices: Alternative Development Standards Guideline*. Toronto: Queen's Printer for Ontario.

84 Lowe, Marcia D. 1994. *Back on Track: The Global Rail Revival*. Washington D.C.: World Watch Institute.

85 This is made up of 3,700 tonnes of crushed rock and 4,600 tonnes of aggregate. Canadian National Railways, personal communication, November 25, 2004.

that have acceptable engineering and environmental characteristics.⁸⁶

Municipalities, who are responsible for the maintenance for nearly 90 per cent of the province's highways,⁸⁷ for their part, commonly adopt Ontario Provincial Standards for Roads and Public Works (OPS) regarding the design of roads and specifications for materials. The OPS were recently modified to reflect the allowable limits for secondary materials permitted in the MTO specifications as a means to encourage the use of recycled materials in municipal projects.⁸⁸ The modification, however, in no way ensures the use of recycled materials. The use of recycled materials is not mandatory and is at the discretion of the project leader. The MTO does not monitor the amount of non-virgin material used in provincial highways or municipal projects and,⁸⁹ in practice, municipalities are thought to use only minimal levels of recycled materials.⁹⁰

In addition, in the past year, the provincial government has initiated reviews of its land-use planning and infrastructure policies with the stated purpose of reducing urban sprawl, and promoting more compact development patterns.⁹¹ Although these initiatives have not been explicitly designed for this purpose, they may result in changes in development patterns that will reduce long-term demand for newly extracted aggregate. The Environmental Commissioner has noted that, under business-as-usual scenarios, currently proposed MTO highway initiatives will require large volumes of aggregate, equal to or greater than that consumed in the past two decades.⁹²

6.6. Summary

Demand for primary aggregates can be reduced in a number of ways. In some circumstances secondary materials, such as construction and demolition wastes, can be substituted for newly extracted aggregates. In addition, changes in the design of buildings and their infrastructure, as well as communities and their infrastructure, particularly high volume roads, can also reduce requirements for primary aggregates.

Despite the expressions of concern regarding the availability of future supplies of newly extracted aggregate in the GTA, and increasing conflicts regarding aggregate development, the provincial government has taken little action to conserve aggregate resources. With the exception of recent changes to MTO specifications regarding the permissible levels of use of secondary materials in road construction, the province has not adopted any specific policy measures, either to promote the substitution of alternatives to newly extracted aggregate, or to alter the design of buildings, infrastructure and settlement patterns to make more efficient use of aggregate resources. Nor has the province undertaken any up-to-date assessment of the potential for substitution, or building, infrastructure and community design changes to reduce demand for primary aggregates.

The province's proposed July 2004 growth management plan for the greater Golden Horseshoe region, *Places to Grow*, references the need for an aggregate conservation strategy, but did not contain any specific measures to implement such a strategy.

86 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 33.

87 The provincially managed highway network is comprised of 19,396 kilometres, expressed in terms of two lane equivalents, while the municipal highway network estimated at 141,000 kilometres. Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 31.

88 Ministry of Natural Resources and Ministry of Transportation Ontario, personal communication, September 20, 2004.

89 Peel Region has recently used mixed broken glass as an aggregate in road construction. Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 34.

90 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 34.

91 These are, most notably, Bill 26, *The Strong Communities Act*, the *Planning Act*, OMB reform and Provincial Policy Statement reform initiatives, and the proposed Growth Management Plan for the Greater Golden Horseshoe.

92 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, pg. 34.

7. Initiatives from Other Jurisdictions



Peter MacCallum

Other jurisdictions have developed much more aggressive aggregate recycling programs. Above, demolition of an old building produces tonnes of aggregate laden debris.

7.1. Introduction

Ontario's current approach of attempting to maximize access to new aggregate supplies, and taking virtually no action to conserve aggregate resources, is in stark contrast to that of other jurisdictions facing

similar challenges in balancing the demand for aggregate with the need to limit the impacts of aggregate extraction on groundwater supplies, natural heritage features, prime agricultural lands, and other competing land uses.

The United Kingdom, Sweden and Denmark, for example, have adopted policies to reduce the demand for aggregates and increase aggregate recycling. The main policy tool used for this purpose is environmental taxes, which provide an economic incentive to reduce extraction and increase recycling. At the same time, these jurisdictions have pursued additional policies designed to complement and reinforce the environmental taxes. The result is an integrated policy approach to achieving aggregate conservation objectives

7.2. The United Kingdom

The overall policy approach to aggregates development in the United Kingdom seeks to address the role of mineral resources development in economic growth and employment, while recognising that aggregate extraction can have significant environmental impacts and often takes place in areas of attractive countryside. The government's overall sustainable development objectives for mineral planning are⁹³

- i) to conserve minerals as far as possible, whilst ensuring adequate supply to meet the needs of society for minerals
- ii) to minimize the production of waste and to encourage efficient use of materials, including appropriate use of high-quality materials, and recycling of wastes
- iii) to encourage sensitive working practices during minerals extraction and to preserve or enhance the overall quality of the environment once extraction has ceased
- iv) to protect areas of designated landscape or nature conservation from development, other than in exceptional circumstances where it has been demonstrated that development is in the public interest.

The United Kingdom's policy framework is based on the view that future sources of aggregate are likely to become increasingly constrained in terms of the areas of the country where than can be acceptably worked, and that therefore less reliance will be placed on traditional land-won (i.e., mined) sources.⁹⁴

Key initiatives in the United Kingdom to reduce aggregates extraction include a) an aggregates tax, b) a sustainability fund, and c) guidelines setting targets for aggregate extraction and the use of alternative materials.

The aggregates levy in the United Kingdom was introduced in April 2002. The aim of the tax is "to reduce demand for primary aggregates, and encourage the use of recycled materials and address the environmental costs associated with quarrying."⁹⁵ The tax applies to all sand, gravel, and crushed rock extracted in the United Kingdom or its territorial waters or imported into the region. The tax is charged at a rate of £1.60 (\$3.73 CAD) per tonne. The tax does not apply to coal, clay, metals, gemstones or industrial materials.

Revenue from the aggregates tax is recycled back to business through a 0.1% reduction in National Insurance contributions. As well, a portion of the revenue is dedicated to a *Sustainability Fund*⁹⁶ that is used to reduce the impact of aggregate extraction operations in the United Kingdom. Specifically, the Sustainability Fund is used to

- reduce the demand for aggregates
- increase the use of recycled aggregates
- achieve better environmental management of aggregate sites
- improve approaches to dealing with the legacy of damage from past quarry operations.

At its launch in 2002, the United Kingdom Department for Environment, Food and Rural Affairs estimated that the size of the Sustainability Fund would be £35 million (\$79 million CAD) for each of the first two financial years following its establishment. The share for England was allocated at £29.3 million (\$66 million CAD) per year broken down as follows: £6.5 million (\$15 million CAD) to reduce demand for primary aggregates; £6 million (\$13.6 million CAD) to promote more environmentally friendly extraction and transport; £16 million (\$36 million CAD) to reduce the effect of local aggregate extraction; and £0.8 million (\$1.8 million CAD) for local initiatives.⁹⁷

93 Office of the Deputy Prime Minister. N.D.. *Minerals Planning Guidance 6: Guidelines for Aggregate Production in England*. Para 11, accessed December 14, 2004. http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606879.hcsp

94 Office of the Deputy Prime Minister. N.D. *Minerals Planning Guidance 6: Guidelines for Aggregate Production in England*. Para 23 and 25, accessed December 14, 2004. http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606879.hcsp

95 <http://www.economicinstruments.com>, www.fiscallygreen.ca

96 http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_609170.hcsp

97 Royal Institute of Chartered Surveyors. 2003. *Nearly 30m Pounds of Aggregates Levy Sustainability Fund Allocated to Projects*.

<http://www.rics.org/Environmentalandlandconsultancy/Mineralresourcemanagement/Mineraltaxation/Nearly+30+m+of+Aggregates+levy+sustainability+fund+allocated.htm>

Key initiatives that have been funded as part of the objective to reduce aggregate demand include projects designed to promote greater use of recycled and secondary materials. More specifically, grants have been awarded to specific companies for the delivery and processing of specified amounts of recycled materials.⁹⁸ Thus, through this initiative, the government is largely targeting the supply of recycled aggregates while the tax itself is intended to address the demand for primary aggregates.

For 2003–2004, the allocation of the Sustainability Fund in England was projected at: £9 million (\$20.04 million CAD) to reduce demand for primary aggregates; £6 million (\$13.6 million CAD) to promote more environmentally friendly extraction and transport; £13.5 million (\$31 million CAD) to reduce the effect of local aggregate extraction; and £0.8 million (\$1.8 million CAD) for local initiatives.⁹⁹

In addition to these measures, the United Kingdom has adopted guidelines establishing the amount of aggregate extraction to take place and

setting targets for the use of recycled materials. As shown in **Table 7**, the 2001–2016 guidelines seek to reduce total aggregate consumption by 19 per cent relative to the previous (1994) guidelines. The guidelines also set a goal of alternative materials meeting 23% of demand for aggregate over the period to which they apply, with a target of 60 million tonnes per annum by 2011.¹⁰⁰ These goals reflect the consideration that, while it was estimated in 1989 only 10 per cent of aggregates used in construction came from secondary and recycled materials, subsequent research demonstrated that such materials could contribute further to the overall supply of aggregates.¹⁰¹

From a land-use planning perspective, the United Kingdom government is currently considering policy changes that would require development plans to indicate acceptable locations for aggregate recycling plants so that, within a five-year period, every local planning authority would have made provisions for recycling centres for construction and demolition waste.¹⁰⁴

Table 7: National and Regional Guidelines for Aggregate Extraction in England 1994 and 2001, millions of tonnes per year

Element of Supply	1994 Guidelines (millions of tonnes per annum (averaged))	2001 Guidelines (millions of tonnes per annum (averaged))	% Difference, 1994 vs 2001 Guidelines
Land sand and gravel	81	67	-17
Crushed rock	127	101	-20
Marine sand and gravel	21	14	-33
Net imports to England	21	11	-48
Alternative materials ¹⁰²	35	57	63
TOTAL	280	250	-11

Source: Office of the Deputy Minister. *National and Regional Guidelines for Aggregates Provision in England 2001–2016*.¹⁰³

98 http://www.aggregain.org.uk/aggnews_detail.asp?NewsID=446

99 Royal Institute of Chartered Surveyors. 2003. *Nearly 30m Pounds of Aggregates Levy Sustainability Fund Allocated to Projects*. <http://www.rics.org/Environmental/landandconsultancy/Mineralresource/Mineraltaxation/Nearly+30+m+of+Aggregates+levy+sustainability+fund+allocated.htm>

100 See http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_608572-02.hcsp#P31_4304

101 Office of the Deputy Prime Minister. N.D. *Minerals Planning Guidance 6: Guidelines for aggregates provision in England*. Para 32. http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606879.hcsp, accessed December 14, 2004.

102 Defined as construction and demolition wastes, asphalt road planings, used railway ballast, colliery spoil, china clay waste, slate waste, power station ashes, and should this be “blast furnace and steel slags. Office of the Deputy Prime Minister. N.D. *Materials Planning Guidance 6: Guidelines for Aggregates Provision in England*. Annex E. http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606879.hcsp, accessed December 14, 2004.

103 http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_608572.hcsp

104 Land Use Consultants. 2000. *Controlling Environmental Effects: Recycled and Secondary Aggregates Production*. Study commissioned by the Department of Environment, Transport and Regions.

Available at: http://www.odpm.gov.uk/stellent/groups/odpm_planning/documents/page/odpm_plan_606242.hcsp

7.3. Sweden

The Swedish government has three coordinated and reinforcing policies to limit primary aggregate extraction in the country. First, as is the case in the United Kingdom, Sweden has an aggregates tax. Second, Sweden has strict standards for road construction materials and provides a “bonus” to contractors for the use of alternative materials in projects. Third, Sweden has a landfill tax, but provides an exemption from the landfill tax for aggregate material disposed at a designated landfill. The exemption is intended to promote the placement of waste aggregate material in facilities from which it can be easily retrieved for future use.

In 1996, the Swedish Government introduced a tax on the extraction/sale of sand and gravel. The tax, set at a rate of SEK 5 (\$1 CAD) per tonne of material, has both an informative and incentive effect on aggregate users. Since gravel is relatively inexpensive to extract, a key intention of the tax is to make alternative materials increasingly competitive with primary extraction. Alternative materials in this sense include crushed rock (the use of which reduces the total amount of material required for a project) and recycled materials such as concrete.¹⁰⁵

The impetus for the tax came from an explicit recognition of the importance of gravel as a ground water reservoir material in the country. In certain parts of Sweden, gravel beds are essential for drinking water supply. The Geological Survey of Sweden predicted in 1994 that, at the existing rate of gravel consumption, 80 municipalities in southern Sweden would exhaust their natural gravel by 2024, and that 40 of these municipalities would have no natural gravel left by 2004.¹⁰⁶ The tax is thus designed to provide an incentive to reduce extraction of sand and gravel and increase the use of stated alternatives.

In addition to the tax, one of the most important stimuli for reducing primary materials extraction in Sweden comes from the National Roads Authority (NRA). Since 1994, the NRA has been raising its quality standards for road construction materials in

the country. It is now often the case that the only way to meet the strict standards established by the NRA is through the use of crushed rock.¹⁰⁷ To complement the standards, the NRA awards a “bonus” to construction firms that use crushed rock in road building, thereby creating an incentive for firms submitting tenders to use crushed rock in their bids. By increasing the concentration and use of crushed rock, the total amount of materials needed to complete a project is reduced and, importantly, the demand for natural gravel, a vital and limited ground water reservoir material in Sweden, is reduced.

To complement the tax on sand and gravel, in 2000, the Swedish government imposed a tax on waste going to landfill equal to SEK 250 (\$43 CAD) per tonne of waste. In conjunction with this tax, the government offers an exemption from the tax for each tonne of gravel, earth, clay, slate, limestone and other kinds of stone deposited in a “special landfill” not used for other wastes. Such landfills act as a warehouse for storing aggregate waste thereby making it available for reuse in subsequent projects.

Finally, as a measure to increase the use of recycled materials, if contractors do not use recycled materials in projects, Swedish codes require them to justify and document why this is the case. This and the policies described above have led to a reduction in the use of sand and gravel in the country. Figures obtained from the NRA show a dramatic decline in sand and gravel usage for Sweden overall, from 82 per cent of total aggregate consumption in 1984 to 40 per cent of total aggregate consumption in 1998.¹⁰⁸ An evaluation of the tax on sand and gravel completed by the Swedish Ministry of Environment concluded that the “tax is an effective way of encouraging conservation of natural gravel.”¹⁰⁹

7.4. Denmark

The Danish government has created a policy environment where road contractors, producers of waste material, and suppliers are motivated to work together to assist the use of recycled materials.¹¹⁰ In a

105 European Commission. 2001. *Study on the Economic and Environmental Implications of the Use of Environmental Taxes and Charges in the European Union and its Member States*. http://www.europa.eu.int/comm/environment/enveco/taxation/environmental_taxes.htm.

See also <http://www.economicinstruments.com>

106 <http://www.economicinstruments.com> (Sectors - Industry - Charges and Taxes - Resource Use Charges - Extended summary (Sweden)).

107 This trend is similar to that experienced in Ontario where increased engineering standards have deemed some aggregate resources unfit for certain construction projects.

108 See www.economicinstruments.com

109 Swedish Ministry of Environment, personal communication, October 7, 2004.

110 US Department of Transport. 2000. *Recycled Materials in European Highway Environments: Uses, Technologies and Policies*. Washington D.C.: Department of Transport. <http://ntl.bts.gov/lib/9000/9800/9800/pdfs-recycolor.pdf>

1997 study, the Organisation for Economic Co-operation and Development (OECD) concluded that the Danish government plays a key role in driving recycling in the country.¹¹¹ The government has achieved high levels of recycling by supporting research and demonstrations, implementing tax policies and issuing requirements for recycling.

The government's general policy is that recycling should be done at the highest feasible rate. To help achieve this objective with respect to aggregate recycling, the government has implemented a tax on raw materials, high waste disposal fees that can be avoided by reusing and recycling materials, and grants to assist in the start-up of private sector recycled materials processing companies. These policies, in combination with buy-in from society for recycling objectives, has resulted in high levels of aggregate recycling in Denmark. Of the total amount of aggregate produced in Denmark, less than three per cent is ultimately disposed of as waste in landfill.¹¹²

The raw materials tax and waste tax in Denmark are closely linked. The two were introduced together in January 1990. While the waste tax is meant to discourage waste generation, the raw materials tax is intended to reduce resource extraction. Since 1990, the raw materials tax has been equal to DKK 5 (\$1 CAD) for each cubic metre of raw material extracted. This tax applies to extracted or imported stone, gravel, sand, clay, limestone, chalk, peat and topsoil. Raw materials delivered to foreign countries are not subject to tax while imports of such materials are.¹¹³

To complement the tax on raw materials, the government has also implemented a tax on waste delivered to landfill. The rate for this tax is DKK 375 (\$79 CAD) per tonne of waste. The tax on raw materials combined with the charge on waste disposal provides a strong incentive for aggregate users to employ recycled materials rather than extracting new materials and disposing of old ones. Indeed, the benefit to doing so is not only the avoided raw materials charge, but also the avoided disposal fees, which are 75 times higher than regular disposal fees.

The strength of these combined policies has been

demonstrated with a 90 per cent recycle rate for all demolition materials in the country (this equals one million cubic metres and is stated to be the maximum realistic amount for the country). On top of these initiatives, since 1990 when the taxes were implemented, all aggregates used at sea (harbours, defences) must, according to national legislation, be taken from recycled materials. This now amounts to eight million cubic metres of aggregate material.

7.5. Summary

In contrast to Ontario, the United Kingdom, Sweden and Denmark have adopted integrated policies targeted at both reducing overall demand for aggregates, and substituting recycled materials for primary aggregates.

The main tool employed in each of the countries to reduce demand for primary aggregates is environmental taxes. In all three countries, taxes or changes have been imposed on the extraction of aggregate. At \$3.73 per tonne in the United Kingdom, \$1 per tonne in Sweden and \$1 per cubic metre in Denmark, these charges are many times the \$0.06 per tonne charge in Ontario.

In some cases, such as the United Kingdom, a portion of the revenue from extraction charges is used to increase the supply of recycled aggregates. In Denmark, the government has provided grants to companies to facilitate the establishment of aggregate recycling facilities and in doing so has stimulated recycled aggregate supply.

Authorities in the United Kingdom, Sweden and Denmark have also established targets and guidelines related to primary aggregate use and aggregate recycling to support the economic incentives provided through taxes and grants such as those described above. In the United Kingdom, guidelines specify the use of alternative materials and limit aggregate extraction. In Sweden, contractors are given a bonus if they avoid the use of sand and gravel in contracts. In Denmark, regulations mandate the use of recycled materials in some circumstances.

111 OECD. 1997. *Recycling Strategies for Roadways*. Paris: Organisation for Economic Cooperation and Development.

112 US Department of Transport. *Recycled Materials in European Highway Environments: Uses, Technologies and Policies*. <http://ntl.bts.gov/lib/9000/9800/9800/pdfs-recycolor.pdf>

113 European Commission. 2001. *Study on the Economic and Environmental Implications of the Use of Environmental Taxes and Charges in the European Union and its Member States*. http://www.europa.eu.int/comm/environment/enveco/taxation/environmental_taxes.htm. See also <http://www.economicinstruments.com>.

8. Conclusions and Recommendations

8.1. Summary of Findings

Mineral aggregates are essential for the construction of infrastructure and buildings. However, the extraction of mineral aggregates is associated with significant, and in many cases, irremediable environmental and social impacts. The adverse effects of aggregate extraction have been a long-standing source of conflict between aggregate extraction operations and host communities. The debates over aggregate operations have intensified the past few years. The debates have been driven, on one hand, by increasing concerns over future aggregate supplies in southern Ontario, and, on the other, by concerns over the impacts of aggregate extraction on source waters, prime agricultural lands, and significant ecological features such as the Niagara Escarpment and the Oak Ridges Moraine.

Over the past 35 years, provincial policy regarding mineral aggregates has focused strongly on maximizing access to newly extracted aggregate at minimum cost. Regulatory responsibility for the approval and oversight of aggregate operation has been “uploaded” from municipalities to the province, in large part to facilitate access to the resource by aggregate producers. At the same time, aggregate extraction has been granted increasing priority over other land uses in provincial land-use planning policy.

The situation has led to increasing calls for the provincial government to explore alternatives to meeting the need for aggregate materials by attempting to guarantee access to aggregate deposits. Ontario’s Environment Commissioner recommended in his 2002–2003 Annual Report that “the Ministries of Natural Resources and Transportation collaborate on a strategy for conserving Ontario’s aggregate resources.”¹¹⁴ The province’s proposed growth management plan for the greater Golden

Horseshoe region, released in July 2004, also noted the need to promote the conservation of aggregate resources through increased reuse and recycling, and called for changes in urban design to reduce the need for aggregate.¹¹⁵

Despite the importance of aggregate resources implied in current policies, the provincial government, which now relies on the industry-owned Ontario Aggregate Resource Corporation for policy-related research on aggregate resources in the province, lacks basic information on current demand for and uses of aggregate. The province also lacks up-to-date projections regarding future demand. The absence of current, comprehensive, publicly available information makes it impossible to properly assess claims of a supply “crisis” in the southern part of the province or, more generally, to ensure the sustainable management of the resource.

The lack of detailed information on trends and patterns in demand also makes the evaluation of the potential for substitution or demand reduction difficult. Experience in other jurisdictions, for example, suggests that substitution rates of secondary materials for primary aggregates of over 20 per cent are possible, but there is no way to assess the feasibility of such a shift in Ontario on the basis of current publicly available data.

It is clear, however, that the provincial government has done little to ensure the efficient use of the resource through such things as the use of secondary materials as substitutes, or implementing alternative approaches to urban design and infrastructure that would reduce the overall need for aggregates. The only significant action taken by the province to promote conservation has been the recent revision of the OPS to permit the use of higher levels of secondary materials in road construction.

114 Environmental Commissioner of Ontario. 2003. *2002–2003 Annual Report*. Toronto: Environmental Commissioner of Ontario, Recommendation 2.

115 Ministry of Public Infrastructure Renewal. 2004. *Places to Grow*. Toronto: Ministry of Public Infrastructure Renewal, pg. 46.

However, these changes in no way ensure that such materials will be employed. Rather, the province's approach of seeking to guarantee access to the resource, in combination with instituting low resource charges, has not provided any incentives to aggregate producers or consumers to use the resource efficiently. The proposed provisions of the draft PPS released in June 2004, which would explicitly exclude requirements for analysis of the need for new aggregate extraction,¹¹⁶ would further remove any incentives for a conservation strategy on the part of the industry.

The lack of action on the part of the province to reduce demand for primary aggregates or increase the use of recycled materials is particularly striking when compared to the approaches taken by other jurisdictions facing similar challenges. The United Kingdom, Sweden and Denmark have adopted a wide range of policy measures intended to promote more efficient use of this resource. Extraction taxes have been employed to make secondary materials more competitive with primary aggregates, grants have been used to facilitate an increase in the supply of secondary aggregates, and policies and guidelines have been implemented to promote the substitution of secondary materials for primary ones. The United Kingdom, for example, imposes a charge on aggregate extraction that is more than 60 times the current charge in Ontario of \$0.06. The charge imposed in Sweden is more than 16 times the Ontario charge.

The province's current approach of attempting to protect aggregate supply in areas where there are strong competing land uses is neither sustainable nor rational. Attempts to develop new resources in areas subject to strong pressures for other forms of development, or where natural heritage, source water and prime agricultural lands are concentrated, can only lead to additional social and political discord.

8.2. Towards an Aggregate Conservation Strategy for Ontario

As recommended by the Environmental Commissioner, and acknowledged in *Places to Grow*, Ontario needs to develop and implement a comprehensive strategy for the management and conservation of the province's aggregate resources. As in the United Kingdom, Sweden and Denmark, such a strategy should seek to reduce overall demand for aggregate resources, and maximize the substitution of secondary materials for newly extracted aggregate.

Without such a strategy, the province will face

increasingly intense challenges to the legitimacy of its efforts to facilitate the development of aggregate resources. Such a strategy is also essential to address the reality, as explicitly recognized by the United Kingdom in its aggregate resource policies, that the areas where aggregate resources can be acceptably developed will become increasingly constrained as a result of development, and the need to protect natural heritage, source water and prime agricultural lands.

A conservation strategy should include the following elements:

- **The provision of publicly available assessments of supply and demand.** The province should develop and maintain up-to-date, publicly available assessments of current aggregate demand and supply and projections of future needs. The assessments should include information on current patterns of use of aggregates, including sectoral and material specific analyses, and examine the potential impacts of future trends on material use. The assessments should also examine the potential for substitution of secondary materials for primary aggregates, including waste rock from mining and construction operations, other construction and demolition wastes, and municipal solid waste stream materials. The potential impacts of demand on changes in infrastructure and building design and more compact urban development patterns should be examined as well. These policy-related research functions should be carried out by the MNR or another agency of the provincial government.
- **The imposition of higher charges for extraction.** The province should adopt higher charges for aggregate extraction. Increased charges, with the revenues flowing to the province, would both provide an incentive to use primary aggregates more efficiently and, as in the United Kingdom, establish a mechanism to fund the development and implementation of a conservation strategy. Higher extraction charges would also help to internalize the costs of the impacts of road infrastructure of aggregate transportation.
- **The reduction of the need for primary aggregates.** The province should review and revise its regulations, policies and guidelines to promote building and infrastructure forms that reduce the need for primary aggregates, such as the use of narrower road widths in new residential developments. The strengthening of provincial guidance and direction to municipalities in this regard

¹¹⁶ MMAH. 2004. *Draft Provincial Policy Statement*, s.2.5.2.1.

should be a high priority, given their leading role in the construction and maintenance of the bulk of the province's infrastructure.

- **The removal of barriers to the use of recycled materials.** The province should review its regulations, policies and guidelines related to construction and infrastructure to remove barriers to the use of secondary materials in the place of primary aggregates, and to maximize the use of non-contaminated secondary materials, where these goals can be achieved without affecting the environment, safety or functionality.
- **The establishment of requirements for the use of recycled materials in public projects.** Wherever possible, the use of secondary materials should be required as a condition of provincial and municipal contracts for road and infrastructure construction and maintenance.
- **The establishment of targets for reduced use of primary aggregates.** The province should establish targets for the substitution of primary aggregates with alternative materials, and for reductions in overall consumption in aggregates, as are in place in the United Kingdom.
- **The establishment of controls on the disposal of potential substitutes for primary aggregates.** The province should restrict the disposal of construction, demolition and other wastes that can be used as substitutes for primary aggregates, or impose a significant charge on the disposal of such wastes in a non-retrievable manner, as is done in Sweden and Denmark.
- **The adoption of policies to promote less road-dependent urban developments.** The province should complete proposed changes to land-use and development policies to promote less road- and automobile transportation-dependent urban development patterns.
- **The completion of a life-cycle assessment of aggregate transportation options.** The province should complete a life-cycle value assessment of options for transporting aggregates over long distances including rail and marine transport and examine the availability of infrastructure arrangements needed to support rail and marine transportation modes. The life-cycle assessment should include external costs such as those associated with air pollution, greenhouse gas emissions, safety and time.

8.3. Updating Policy and Legislation

The overriding priority given to aggregate resources in provincial aggregate and land-use law and policy needs to be replaced with a strategy that provides greater balance between aggregate extraction and other land-use planning objectives. Key reforms would include the following:

- **Modification of the PPS to provide a better balance between aggregate extraction and other land-use priorities.** The PPS should be modified to direct aggregate extraction away from areas where it will compete with other land-use priorities that may better serve the long-term public interest, such as natural heritage and prime agricultural lands, and source water areas.
- **Strengthening of the rehabilitation requirements of the ARA.** The requirements under the *Aggregate Resources Act* for the rehabilitation of pits and quarries should be strengthened. The expansion of existing operations should only be permitted on the basis of substantial progress on the rehabilitation of the disturbed area within the existing licensed area (generally no less than 50 per cent of rehabilitation of the disturbed area).¹¹⁷ In the meantime, the enforcement of the existing rehabilitation provisions of the Act should be significantly strengthened.
- **Adoption of measures to address the backlog of unremediated aggregate extraction sites.** A surcharge should be placed on the province's aggregate resource charges to finance the rehabilitation of the backlog of unremediated aggregate extraction sites.

Such an approach would be consistent with the 1992 MNR study that concluded, "given societal concern regarding the creation of a balance between the environment and development, a continuing and increased emphasis should be placed on a coordinated and balanced approach to aggregate resource management. Strategic long term land planning and management, and successful rehabilitation of pits and quarries should be encouraged to productive, appropriate land uses which achieve no net environmental loss or a net environmental gain whenever possible."¹¹⁸

¹¹⁷ This recommendation would extend the provisions of the proposed Greater Golden Horseshoe Greenbelt Plan regarding rehabilitation (section 4.3.2) to the remainder of the province.

¹¹⁸ Planning Initiatives Ltd. 1992. *Aggregate Resources of Southern Ontario: A State of the Resource Study*.

8.4. Conclusions

Ontario's current policy of keeping aggregate costs artificially low carries with it a wide range of hidden costs: environmental (loss of source waters, natural heritage sites, prime agricultural land, and noise and dust impacts); social (adverse impacts on community quality of life (noise, dust, reduced safety, truck traffic); and economic (impacts on public infrastructure of transportation, forgone public revenues, and inefficient use of the resource). The current policy approach does not support rational choices between competing land uses on the basis of what best serves the long-term public interest.

Higher housing, building and infrastructure costs, and higher environmental impacts of transportation, are not, as suggested by the industry,¹¹⁹ the inevitable outcomes of a policy framework that would attach higher value to the resource, and embody a more balanced approach to decision making among competing land uses. Higher costs for newly extracted aggregate would likely have the impact of reducing aggregate consumption through more efficient building and infrastructure design, and increasing demand for alternatives. Such outcomes have clearly been seen in the United Kingdom, Sweden and Denmark. Reduced consumption would help to balance an increase in cost per tonne. Increased substitution would offer co-benefits in terms of reduced waste disposal as well.

A more balanced approach to land-use planning decisions may have the effect of increasing the role of materials transported over greater distances in southern Ontario. Increased reliance on imports would reinforce incentives to make as efficient use of the resource as possible, and may also have the effect of making energy efficient, non-truck-based transportation options more viable. Southern Ontario is well served, for example, by rail and marine transportation infrastructure that could be used for the purpose of transporting aggregate over long distances. Reduced reliance on truck-based transportation would also reduce stress on public road infrastructure.

The emerging "crisis" regarding aggregate supply in southern Ontario, and the growing conflicts over the status of aggregate extraction relative to other potential land uses in the region, provide an important opportunity for a long-overdue debate on the direction of Ontario's public policies regarding mineral aggregate resources. As recognized by the Environmental Commissioner, and the provincial government itself, it is time for Ontario to seriously consider the alternatives to the current unsustainable policy of attempting to guarantee perpetual access to aggregate resources before all other land-use policy objectives.

119 See, for example, Clayton Research and MHBC. 2004. *The Implications of Restricting Aggregates Supply in the GTA*.