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Stakeholder Attitudes As A Resistance Toward Long Range Management of a Threatened Landscape: A Case Study of Aggregate Use in the Township of North Dumfries

By

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Bachelor of Arts, Wilfrid Laurier University, 1995

THESIS
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The Township of North Dumfries is located in the rapidly expanding Municipality of Waterloo. This Township is in close proximity to Kitchener, Waterloo, Cambridge, Guelph, Hamilton, and is halfway between London and Toronto, with the primary east-west Highway 401 running through the Township. It is an unique area in that it is characterized by an abundance of prime agricultural lands, Environmentally Sensitive Policy Areas, and wetlands. In addition, the Township is underlain with a large quantity of good quality glacially derived aggregate materials.

Land use conflicts have increased as a result of aggregate developers' pressures on the resources of this Township to obtain licences for sand and gravel pits. Area residents and environmentalists are protesting the expansion of this industry any further. They are deeply concerned about the degradation of unique ecosystems, and effects to their quality of life. Little consideration is being given to the long term effects of extensive extraction on the regional landscape of this Township.

The purpose of this thesis was to investigate stakeholder attitudes toward the aggregate industry, including factors that influence the move toward proactive long term landscape planning and design, within the limits of a community based landscape. In this regard, the objectives were threefold:

i) to investigate the existing role, dimension and impact of the aggregate industry;
ii) to investigate the attitudes of aggregate producers, Township councillors, in addition to residents who live within different proximities of an aggregate site; and
iii) to gain an appreciation of the wishes of the rural community concerning the Township's future landscape design

Research methods included the use of historical records, on-site visits, interviews and questionnaires with the aggregate developers, members of the Township Council and Township residents. Additional methods included analysis of existing geological and surficial maps, air photos and Township records.

It was found that each of the interviewed groups felt strongly about the aggregate industry in the Township of North Dumfries. The aggregate producers were certain part of the solution to the conflicting attitudes between the public and the industry is the need for education, illustrating to the public the importance of the aggregate industry. The Township councillors felt they were in a difficult position. The aggregate industry brings revenue and jobs to the community, concern is raised among residents as to the number and operation of aggregate sites in the Township. Interviewed residents of the Township expressed their concern toward the effects that the number of aggregate sites were having socially and environmentally.

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I wish to express my appreciation to several individuals for their contribution, help and support for this, my Masters thesis. A special thank you is extended to those residents of the Township, the Township councillors and the aggregate producers who willingly offered valued information and insight into this research.

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A special thank you is extended to my friends at 'home' and my Laurier friends for their support, encouragement and adding fun to the whole thesis experience. Many thanks also is due to my family and relatives who offered both encouragement, support and understanding throughout the time spent working on this project. Thank you.

APAO	Aggregate Producers Association of Ontario
ARIP	Aggregate Resources Inventory Paper
CAMP	Citizens Against More Pits
ESPA	Environmentally Sensitive Policy Area
LULU	Locally Unwanted Land Use
NIMBY	Not In My Back Yard
OMB	Ontario Municipal Board
PSW	Provincially Significant Wetland
RMOW	Regional Municipality of Waterloo

> *It has often been said that land is the basic natural resource. Over the span of human history, man has drawn most of his sustenance and much of his fuel, clothing and shelter from the land. Land has been man's habitat and living space; land has been a matter of life and death, of survival or starvation* (Mather, 1986, 1).

Land, and its associated ecosystems, is the most important element in the world. The world population relies on 'land' for a variety of resources; shelter, food production, or recreational purposes. The loss of utility, or the reduction of features or organisms on land, which cannot be easily replaced is occurring at a rate that threatens the future potential of that land as a resource. "While the causes of land degradation are diverse and often complex, there are some clear trends. One is that land is being lost from productive use at an alarming rate" (Barrow, 1991, 10). Land degradation is the result of naturally occurring processes, in addition to the human influences. Unfortunately, the degradation of land resources is largely the cause of human actions, reducing the physical, chemical and biological status of the land. "Land degradation is often seen as a consequence or 'side-effect' of development" (Barrow, 1991, 5). Development is a modification of the land to its living and non-living resources, and is the result of the agenda of the human population to satisfy and improve the standard of living (Barrow, 1991, 5).

Land degradation is increasingly occurring without much attention to the cumulative consequences. "Agreement that land degradation is taking place and requires attention is sometimes difficult to achieve, at least in part, because the perception of utility varies . . ." (Barrow, 1991, 4). Exact causes and effects to the land are hard to determine, as are the benefits and the costs incurred from the use of the land and its resources. "It is difficult to establish the costs of so complex a phenomenon as land degradation; it involves external costs and benefits as well as the onsite costs" (Barrow, 1991, 11). In addition, the evaluation of the benefits and the costs depends on the attitudes and values of humans toward land and its resources. Different people view the land in different ways, depending on the particular use of the land and its resources. "Land contains, for example, economic, social and natural environmental values that may conflict and which are certainly complex. How these different

shaping the quality of life for future generations" (Bryant et al., 1982, 3).

1.1 The Aggregate Industry

Aggregate resources are a crucial resource, and there are currently no known substitutes for this resource. With the number of available reserves decreasing and the demand increasing, it is becoming costly and difficult for aggregate producers to find and bring additional deposits into production. Vast amounts of mineral aggregates are required for the construction of structures people often take for granted. For example, 325 tonnes of aggregate are required just for the construction of an average suburban home's foundation, concrete, and mortar. Each kilometre of a two-lane highway requires 10,000 tonnes of aggregate resources for its complete construction, and 31,500 tonnes of aggregate are required for a kilometre of a four lane highway (Gorrie, 1993, 79). In addition, construction of each of these features requires certain 'grades' of sand and/or gravel, which may not always be that plentiful, or readily available. The increased demand for aggregate resources is partially due to the increase in the population, but is also due to the increase in the quality and quantity of aggregate used in the construction of modern day infrastructure.

The nature of the aggregate industry had meant, traditionally, that the extraction operations were located primarily on the urban fringe. The close proximity to the urban market is essential, as the transportation costs involved with this industry make up a large percentage of the total cost of the product (Bradshaw, Chadwick, 1980, 203). "Mineral aggregates are characterized by their high bulk and low unit value so that the economic value of a deposit is a function of its proximity to a market area as well as its quantity and size" (Ontario Ministry of Natural Resources, 1980, 1). As the result of growth in economic activity and population during the 1950s and 1960s, tremendous pressure was placed on the aggregate industry for the raw materials for development projects such as highways, housing, commercial and industrial infrastructure. Due to the fact that aggregate resources are a relatively common raw material, the competition is strong and the price is low. The resources of the cities' urban fringe soon became depleted, and one of the reasons for movement into the 'city's countryside' for additional aggregate resources. The degradation of land as a result of

countryside.

Critical to understanding the conflicts and impacts of the aggregate industry in the rural areas, is an awareness of the source of the land use pressures that occur in rural areas. Dakin et al. (1994) and Bryant et al. (1982) outline factors that have been influential in causing aggregate extraction to encroach on rural areas:

i) aggregate resources have sufficiently decreased in near market areas;
ii) the elimination of potential resources, as they are overlain by other economically and culturally valuable land uses, such as residential developments or parks;
iii) restrictive planning and legislation; and
iv) the poor public image the extraction industry has received; with the negative externalities it generates, municipalities want limited extraction operations in their jurisdiction.

Bryant sums it up:

> The countryside around cities or, as we prefer to refer to it, the city's countryside, has been placed under pressure increasingly as it has been integrated progressively into a particular form of settlement organization characteristic of the post-industrial age - the regional city. The evolution of this broad functional organization of economic, social and, latterly, even political space, has multiplied the demands placed on land and its resources, has created conflicts and stresses, and has stimulated various adaptations of human activities (Bryant et al., 1982, 3).

The increased demands placed on the rural landscapes, by the rapidly growing urban communities, has contributed to degraded and derelict areas found in that same landscape. Environmental awareness and competition for land has prompted an increase in research in terms of effects and mitigation of the aggregate industry on rural landscapes. The aim is to decrease environmental destruction, and at the same time achieve maximum aggregate extraction. "The land-use management and planning challenge is to ensure the industry has access to adequate raw material and that current development patterns do not sterilize reserves, while minimizing the impact of negative externalities" (Bryant et al., 1982, 206). In this regard, it is important to take into consideration the attitudes of the community in which the extraction of aggregate is occurring.

There are a variety of reasons why this economic activity is of importance, not only because of the resources and jobs it provides, but also because of the impacts it has on the landscape, and to the residents of the community. The aggregate industry produces principle raw materials for the development of urban communities and its affiliated infrastructure. However, it is an industry that possesses severe threats "on the natural integrity and future survivability of environmentally significant areas and on the historical and cultural ambience..." of the landscape and community (Skibicki, 1991, 1). It is an activity that leads to major disruption to a landscape during its operation, and following operation if appropriate rehabilitation measures are not taken. Aggregate extraction is not something that will cease over night, or perhaps even stop completely. It is unlikely the conflicts it generates will desist, "as long as society continues to demand new homes, buildings and roads, the need for aggregate extraction will continue" (Dakin et al., 1994, 2). The aggregate industry in Canada has grown into an annual 1.15 billion dollar industry, "supplying a key ingredient to the concrete, asphalt and fill products upon which our infrastructure is built" (McLellan, unpublished manuscript, 1). Approximately 80,000 hectares of land in Southern Ontario are licensed provincially for aggregate extraction (Dakin et al., 1994, 24).

The pressures of the aggregate industry, on the health of the environment, is not just a problem in Canada. In 1980 it was documented that in Great Britain approximately "1000 ha of land are used each year to produce 100 million tonnes of sand and gravel" and in the United States, "800 million tonnes are produced annually from a total of about 7000 different operations" (Bradshaw, Chadwick, 1980, 216). As well, in the London Green Belt, UK, "...it was estimated in the mid-1970s that some 3,320 ha of land were in active mineral workings with another 3,040 ha approved for future workings" (Bryant et al., 1982, 113). The area employed for extraction can often be very large due to the nature of the industry, and thus the impacts are severe in both the short and long term. With such large amounts of land being utilized for extraction, it is bound to have adverse effects on the environment if little is done to deter potential problems.

The aggregate industry has an impact on the agricultural industry. As Dakin et al. points out in the article, "A New Vision: From Barriers to Bridges", "...there is a significant overlap between prime agricultural land and primary aggregate extraction areas in Ontario"

on grade two soils (British Agricultural Classification system) (Bradshaw, Chadwick, 1980, 219). As such, there is conflict between the two competing land uses. With the pressures of the aggregate industry on agricultural landscapes, the protection of prime agricultural land has grown. Canada, currently has an abundance of its prime land under agricultural production, and further pressures may force agriculture to marginal lands. "Ninety-six percent of Canada's soils in agricultural capability classes one to three are already in production, as is most of the class four land in the more favourable climate zones. Continued agricultural productivity in Canada is dependent on the maintenance of the quality of these soils, and not on expansion into virgin areas" (Coote, et al., 1981).

Soils are also affected by the aggregate extraction. Soil compaction by the heavy machinery (trucks, excavation equipment), through repeated application of pressure at a given depth over lengthy periods, affects the soil regime. Soil compaction to the plant rooting zone eliminates pathways for air, water and plant roots if it is to be again utilized following aggregate extraction (Agricultural Canada, Ontario Ministry of Agriculture and Food, 1993, 8).

Soil that is left idle while extraction is occurring, is likely to decrease the composition and stability of soil aggregates. This would increase the occurrence of crust formation, associated delayering of the soil horizons, irregular seeding emergence, and decrease in organic matter (Kay, 1985, 168). This is particularly of concern if the soil is intended to be utilized for agricultural production, the loss of essential nutrients and soil stability will affect the productive capacity of the soil. "Since soil is a very slowly renewable resource, it is important that our usage of soil does not lessen its value to future generations or irreversibly alter its value for other purposes. To achieve this goal, we must understand the physical, chemical, and biological processes and their interactions that make soil resources unique" (Hassett, Banwart, 1992, 2).

With the removal of vegetation from the extraction site, the wildlife and bird species that reside there are threatened, as well as the flora itself. It is possible that with the removal of vegetation a number of functional linkages important for the interaction between natural areas are degraded (Skibicki, 1991, 4). This disrupts commuting routes and habitats for wildlife. When one part of the ecosystem dynamics is tampered with, the effects are felt in

around an optimum state that is best suited for the healthy existence of the living space" (Cunningham, Saigo, 1992, 41). "As the size and number of these natural areas, or 'islands', dwindle, fewer areas are left from which species can recolonize, and local extinctions are imminent" (Dakin et al., 1994, 1).

Aggregate extraction can be in the form of dry or wet pits or quarries. A dry pit implies that deposits are being worked above the water table, and a wet quarry is one in which the aggregates are being extracted below the water table. When pits and quarries are excavated, they are generally done in a strata that is low-lying and permeable. If this is the case, the pits and/or quarries are usually well supplied with water. The groundwater supply of the area could be affected if the pits and/or quarries are allowed to become flooded. Also, the natural barrier protecting groundwater is altered, or even removed, when aggregate extraction occurs.

The 'city's countryside' is often where people retreat to escape the noise and discomforts of the city. Naturally, these people will oppose the unsightliness of pits and quarries in their backyards. With the site of gravel pits, the noise, dust pollution and truck traffic, some local residents are concerned that land values may decrease. A combination of these problems can lead to progressive deterioration in landscapes. "The effect that these have on man can lead to an unfortunate positive feedback: deterioration of the environment engenders a less responsible attitude for the environment in which the community lives, in the form of litter, vandalism and lack of planning. Hence a rapid downward spiral of deterioration takes place. It can involve the land values, housing and job opportunities of a whole region" (Bradshaw, Chadwick, 1980, 9). Residents are beginning to voice their concerns over these matters. They value the area in which they live and rightly so, are concerned about its condition. Once an area is excavated it can never be returned totally to its pre-extracted condition.

A number of negative externalities accompany the aggregate industry. This industry has often come into conflict with other land uses that compete for the land resource. Bryant et al. (1982) sums up some of the impacts the aggregate industry can and has had on communities. Once the material is extracted, it is transported in highly visible truck traffic. This is of concern to residents for the safety of their children. The trucks also increase road

complaint by areas residents. Above all, the disturbance to the landscape destroys its aesthetic value, as well as affecting the quality and quantity of ground water, and prime agricultural areas (Bryant et al., 1982, 114). Aggregate extraction companies can expect increasing public interest in their activities and greater surveillance over their behaviour.

1.1.2 The Aggregate Industry: Future Planning Considerations

While the aggregate industry causes tension and conflict with other land uses, it also presents an opportunity for constructive and innovative landscape planning. Human activities and needs can be incorporated in landscape enhancement, conservation and biodiversity (Dakin, et al., 1994, 44). "The radical alterations brought on by aggregate extraction offer an opportunity to creatively reshape the landscape in ways which enhance the ecological integrity of an area" (Dakin et al., 1994, 13). This can be achieved through proactive planning including methods of landscape rehabilitation and restoration. Conditional to receiving an aggregate extraction licence, landscape rehabilitation or restoration is required as a mitigation measure for preventing adverse impacts on rural areas (Government of Ontario, 1995, 14). Rehabilitation, as defined by the Aggregate Resources Act (1995), "means to treat land .... so that the use or condition of the land, (a) is restored to its former use or condition, or (b) is changed to another use or condition that is or will be compatible with the use of adjacent land" (Government of Ontario, 1995, 5).

In order for useful rehabilitation measures to be carried out, it is important that the impacts the aggregate industry has on the landscape and the community are understood. In addition, it is essential to conduct and understand baseline studies in an attempt to carry out rehabilitation. The understanding of ecosystem dynamics and functions will enable successful rehabilitation. "To be successful , it [rehabilitation] depends critically upon an understanding of the ecological principles governing the habitat to be reproduced, the characteristics of the construction site, the individual species to be introduced, and their mutual interaction" (Buckley, 1989, 2). Rehabilitation, or redevelopment, as some have termed it, has and will have an important role. As the landscape increasingly faces pressures from various land uses, rehabilitation will become necessary as land areas are degraded. In considering the option of

suggested by Regier (1990):

i) seek to reverse the major abuses of the past and present;
ii) foster ecosystemic recovery even in the face of growing abuses;
iii) initiate new practices to take the place of degrading techniques;
iv) adapt as best we can to the irrevocable evils among the consequences of current and past development; and
v) know that some major natural and cultural phenomena of the future are and will remain unpredictable, hence prudence will remain a virtue (Regier, 1990, 68).

In addition, it is also essential that the public is consulted on the rehabilitation issues for their community, as it will be those people that will be most affected by the outcome of rehabilitation efforts. The opinions and choices about rehabilitation measures by the public will depend on the values and attitudes of the community towards nature (Brinck et al., 1988, 88). Opinions presented by the public should be taken into consideration when rehabilitation techniques are decided upon for the community.

McLellan points out that the present surge toward sustaining an ecologically sound environment is chiefly a result of the growing realization of the deterioration of the environment, which in turn largely affects human well-being (McLellan, unpublished manuscript, 2). With regards to the aggregate industry, community members would like to see aggregate extraction restricted or halted because of a variety of concerns, including environmental degradation, aesthetic disturbances to the landscape, noise, dust and truck traffic, concerns for ground water sources and property values (Baker, McLellan, 1992, 162).

McLellan is involved in rehabilitation of degraded areas, particularly aggregate sites, as well as considering the necessity of community involvement in these projects. As McLellan outlines, for these ends to be met, ". . . site specific changes from exploitive development will thus require some compensation in the form of resource enhancement or environmental rehabilitation in other contingent areas" (McLellan, unpublished manuscript, 2). McLellan in "Surface Mining and Ecological Enhancement: Eroding the Myths of Environmental Incompatibilities"(unpublished manuscript) has largely advocated the principles of *Net Community Gain* that can be applied to the concept of landscape rehabilitation. *Net Community Gain* implies placing the notion of redevelopment in the context of the community, in conjunction with utilization of various rehabilitation/restoration

unpublished manuscript, 8). McLellan points out two options when incorporating the principles of *Net Community Gain* with redevelopment:

i) utilitarian landscape; landscapes re-designed to better "fit" future intended land uses (eg. urban, recreational or agricultural uses); or

ii) new landscapes designed at least in part, to replace those valued landscapes and habitats that we have lost as a result of the last two centuries of settlement (McLellan, unpublished manuscript, 9).

This principle stresses the importance of the community involvement in rehabilitation projects. The rehabilitation measures that are chosen and carried out are a function of the attitudes and values of the community. "Therefore, the form of redevelopment techniques will be determined first by community input as to preferred conditions. The continuum of redevelopment actions will then encompass active or passive restoration, rehabilitation or some form of natural regeneration (Brinck et al., 1988, 88)" (McLellan, unpublished manuscript, 3).

Bryant (1991), in his article, "Rural Community Land Use Dynamics and Sustainable Development", also discusses the need for community involvement in decisions that would ultimately have an effect on the community. Bryant has pointed out that there does not have to be conflict of interest between the environment and the community. "On the contrary, the local community should play a central role in the sustainable development of rural regions" (van Oort, G.M.R.A., et al., 1989, 1). Redevelopment, economic development and care for the environment can be integrated through the notion of community interest. With community involvement in planning for the future, the goals, objectives and outcomes are a function of that community involvement. "In this way, sustainable development implicates weighing of culturally, biophysically and economically feasible alternatives for long term community economic development. The heterogeneity of rural areas has to be reflected in the initiatives that are to be taken locally with a broad base of community input" (van Oort, G.M.R.A., et al, 1989, 9). Therefore the results of community input can help to determine what the future will hold for the development or redevelopment of a community and its landscapes.

Bradshaw and Chadwick (1980) discuss measures of rehabilitation, as an option of community enhancement, advocating that while it can be a costly process, in the long run the

biological productivity or to a condition where it can once again be utilized for a range of purposes valuable to a community this will represent a direct improvement of the area on which the restoration has been carried out" (Bradshaw, Chadwick, 1980, 20). When rehabilitation or restoration is practised, the transformation the land area goes through allows communities to improve on other areas, such as social or economic conditions. Once one improvement is completed, it will in turn be followed by another (Bradshaw, Chadwick, 1980, 21). It allows the community to be just that, a community drawn together by the planning for a improved place to live.

Bradshaw and Chadwick also express that a final rehabilitated land use should be compatible with the needs of the surrounding area. "Whatever final landuse is adopted following restoration, it is imperative that it should fit into the needs of the surrounding area and be compatible with other forms of land uses that may occur nearby. It is not sensible to establish grazing areas for sheep close to high density housing where domestic pets are a severe threat to farm livestock" (Bradshaw, Chadwick, 1980, 10). Again, this is where community input can be useful.

Jordan et al. emphasizes "the development of ecological restoration raises certain questions, and these have become increasingly urgent as the practice of restoration has become more and more widespread" (Jordan et al., 1987, 4). By uniting the theory and practice of rehabilitation, the authors have attempted to display the importance and value of this measure. Ecological rehabilitation is essential as a form of environmental improvement, but also as a form of basic research. "The idea here is simply that one of the most valuable and powerful ways of studying something is to attempt to reassemble it, to repair it, and to adjust it so that it works properly" (Jordan et al., 1987, 6). The "tinkering and trial and error" processes are integral to the discovery and verification of problems and solutions in terms of ecological rehabilitation. Humans can learn and understand something about the environment when it cannot only disassemble it, but reassemble it in a useful manner; "ecosystem restoration is an activity at which everyone wins; when successful, we are rewarded by having returned a fragment of the earth's surface to its former state; when we fail, we learn an immense amount about how ecosystems work, provided we are able to determine why the failure occurred" (Ewel, 1989, 31).

planning and managing of a natural resource. With regards to the aggregate industry, "the challenge to landuse planning is to be able to reserve significant resources in the city's countryside, where they exist, for the aggregate industry, while providing a regulatory environment plus control over other land-use developments that permit a harmonious operation of the industry" (Bryant et al., 1982, 115).

Planning for the future, in terms of wise utilization of aggregate resources and minimal pressure to the community is an important strategy. However, as Bryant et al., points out, there are problems that can arise, and the resource manager must take these into consideration:

i) the aggregate industry produces essential commodities for the process of economic growth. As a result, certain components of the process (ie residential development) conflict with the operation of the industry which can lead to the sterilization of valuable resources; and

ii) due to the locational matrix in which the aggregate industry often finds itself in the city's countryside and because the nature of the aggregate industry generates a number of negative externalities (Bryant et al., 1982, 206).

"This implies that a two-pronged strategy is necessary, one dealing with the location and timing of development of the industry and the other dealing with the conditions under which the industry should operate" (Bryant et al., 1982, 206). "The locational aspect to management of the resources demands a substantial data base on the location, volume and quality of the resource base, as well as information on the industry's needs" (Bryant et al., 1982, 207).

It has been shown that while the aggregate industry is essential to the wealth of an economy, it is also a major contributor to the degradation of valued natural landscapes. There are a variety of impacts; noise and dust pollution, reduction in land values, to the deterioration of the natural beauty of the landscape. However, more attention has been given to the rehabilitation of these landscapes realizing that once the landscape is altered, it can never be returned fully to its pre-extraction state. The requirements for the aggregate industry to rehabilitate the landscape after the effects of the extraction allows the industry to give something back to the community and the landscape. It is of growing importance to plan and manage in the long term for the continual existence of natural resources, as well as, gaining the maximum utility from present aggregate resources. "There is now, at the eleventh hour, a

something to halt the decline" (Buckley, 1989, 5).

1.2 Context of the Research

Ten thousand years ago, the last remanent of the Wisconsin Glacier retreated, and its glacial activity shaped the landscape of Southern Ontario to create an environment that many of its inhabitants now appreciate as an amenity. Beneath the layers of soil and overburden, however, lies vast supplies of aggregate resources that are essential to the development and growth of society. It is ironic, therefore, that such an aesthetically pleasing landscape of gently rolling hills, eskers and moraines, are a principle source of valued aggregate resources. This is the case within the Township of North Dumfries, located in the Regional Municipality of Waterloo (RMOW) (Figure 1.1).

The Township of North Dumfries is located in southwestern Ontario and is the southern most township within the Regional Municipality of Waterloo. It is largely characterized by agricultural production, an abundance of aggregate resources, a number of naturally significant areas, and rural residential dwellings. The Township is in close proximity to Kitchener-Waterloo, Guelph and Hamilton. It is half way between London and Toronto, with the primary east-west Highway 401 running through the Township.

The glacial activity that occurred in the Late Wisconsin Substage of the Pleistocene Epoch resulted in the deposition of massive quantities of unconsolidated sediments, such as sand and gravel. Water from the melted ice sheets transported and deposited vast amounts of sand and gravel, forming economically significant aggregate resource areas. There are a number of significant aggregate resource areas within the Township of North Dumfries. Figure 1.2 displays the expanse of designated aggregate resource areas in this Township.

The Township of North Dumfries also supports numerous Environmentally Sensitive Policy Areas (ESPAs) and Provincially Significant Wetlands. Within this Township there are 33 Environmentally Sensitive Policy Areas, which constitutes approximately 42% of the 80 ESPAs designated in the Regional Municipality of Waterloo (Regional Municipality of Waterloo, 1996, 33). In addition, from the time of settlement in this Township, to the present, agriculture has been the most predominant and largest user of land (Dakin et al., 1994, 44). A

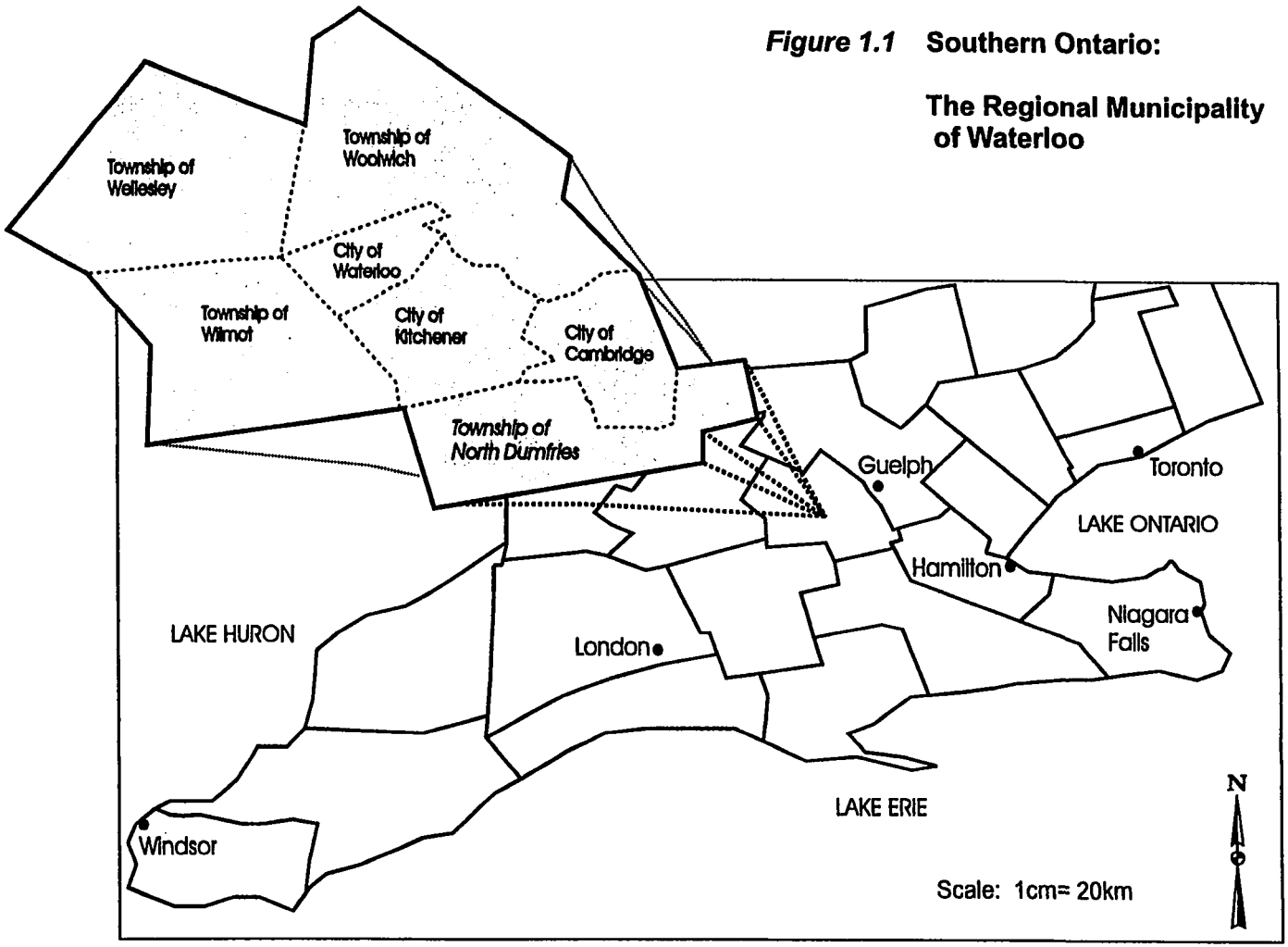


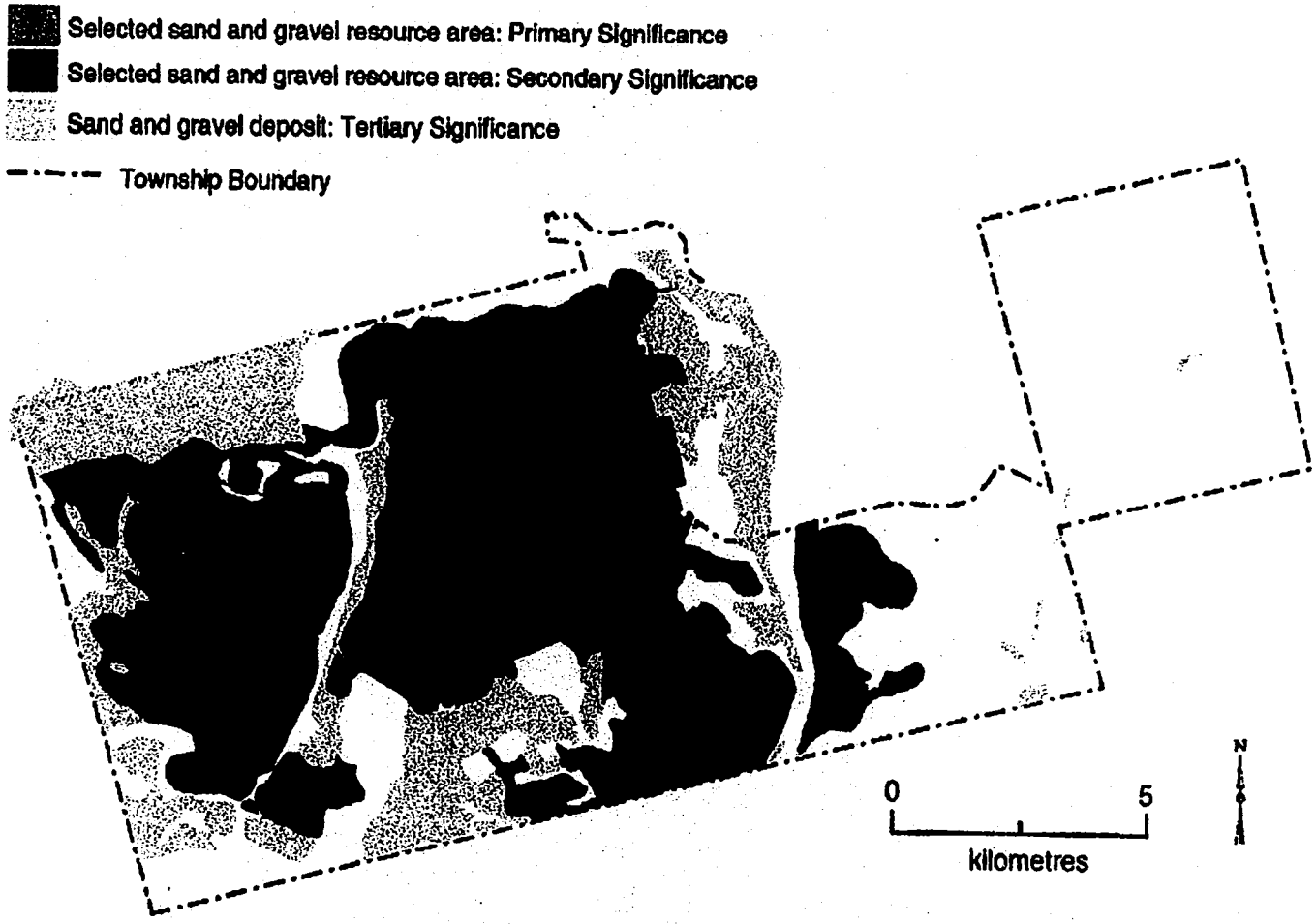
Figure 1.1 **Southern Ontario:**

The Regional Municipality of Waterloo

Source: Regional Municipality of Waterloo, January 1996.

Figure 1.2

The Township of North Dumfries
Mineral Aggreate Resource Areas



Adapted From: Ministry of Development & Mines, 1994

a reflection of the coarse - textured soils (Presant, Wicklund, 1971, 10).

1.2.1 Research Problem

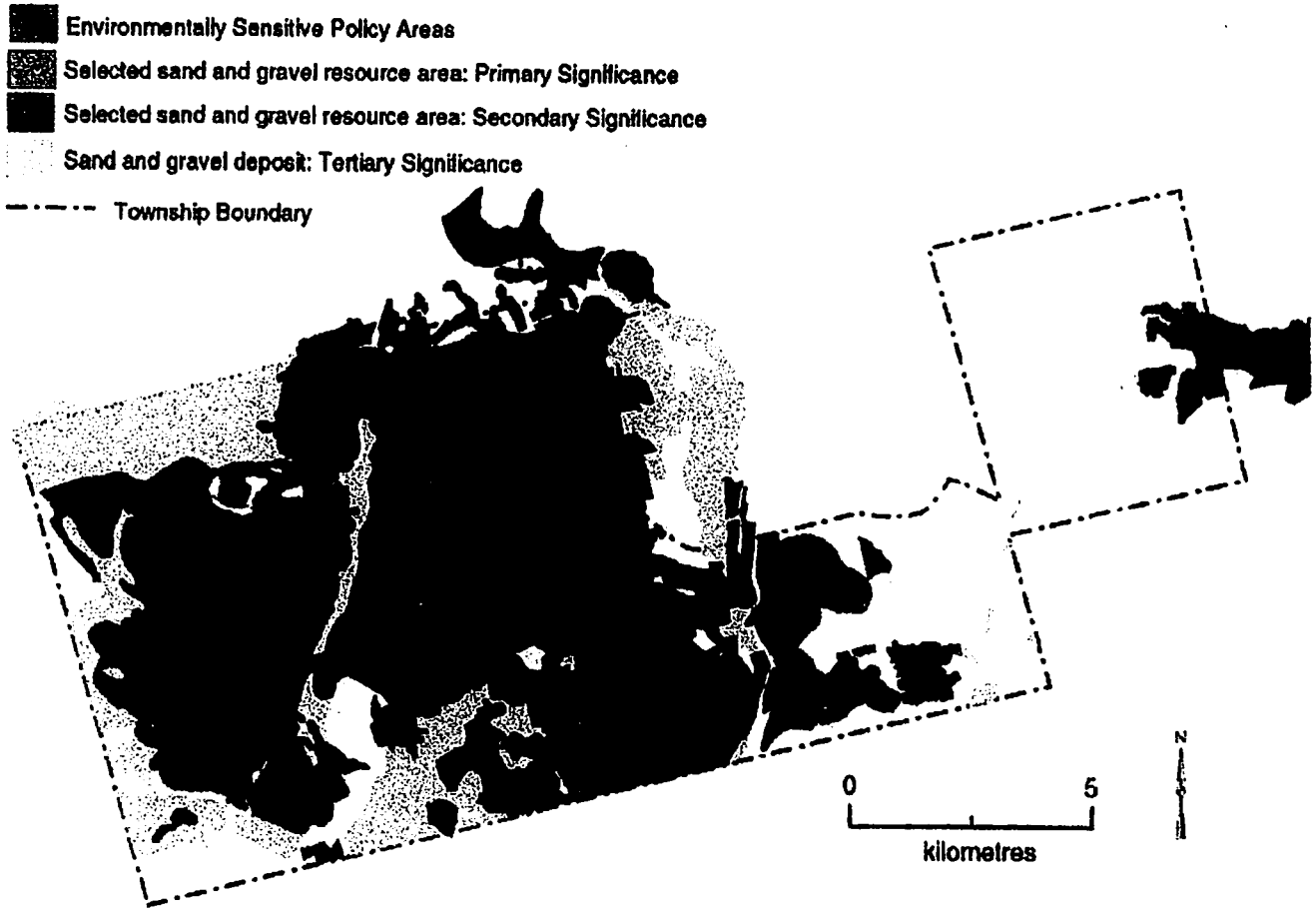
The aggregate industry in North Dumfries Township provides jobs locally, in addition to indirect employment in other industries. It has costs, however, to the community and environment. This being a Township that has large quantities of high quality aggregate resources, in close proximity to or under agricultural land, naturally significant areas, or residential areas; conflict between these land uses does occur. Figure 1.3 and Figure 1.4 illustrate the designated aggregate resource areas in relation to the Environmentally Sensitive Policy Areas and Provincially Significant Wetlands, respectively, in this Township. Due to the nature of aggregate resources, in that they are in a fixed location and non-renewable, extraction can only take place where the resources occur. As such, this Township has been under pressure between competing land uses. Cumulative impacts are threatening the ecological integrity of the Township, its natural areas and community living.

Aggregate resources are needed if the desire to continue development and growth prevails, as such the demands for these resources are largely urban oriented. Due to the fact that mineral aggregates are bulky in nature and have a low unit value, the economic value is a function of the proximity of the pit or quarry to the market. North Dumfries Township, as well as possessing large amounts of these resources, is close to major transportation routes; Highway 401, 24, 97 and 8 (Figure 1.5).

Residents of the Township are concerned about the future of the Township. Increasingly, residents are voicing concerns and strong opposition to gravel pits in their backyards. Residents in the Township of North Dumfries have formed a local group, "Citizens Against More Pits" (CAMP), to protest increased aggregate activity (Burtt, 1994, B3). While they are not against the aggregate industry, they are against the increased proliferation of pits in the Township. These members of the community realize the importance and need for aggregate resources, but are concerned about the operation and numbers of the pits in the Township. "The organizers of CAMP do not believe that municipal, regional, or provincial governments have the interests of the citizens in mind when it comes to the various policies pertaining to gravel pits" (CAMP Fact Sheet, n.d.).

Figure 1.3

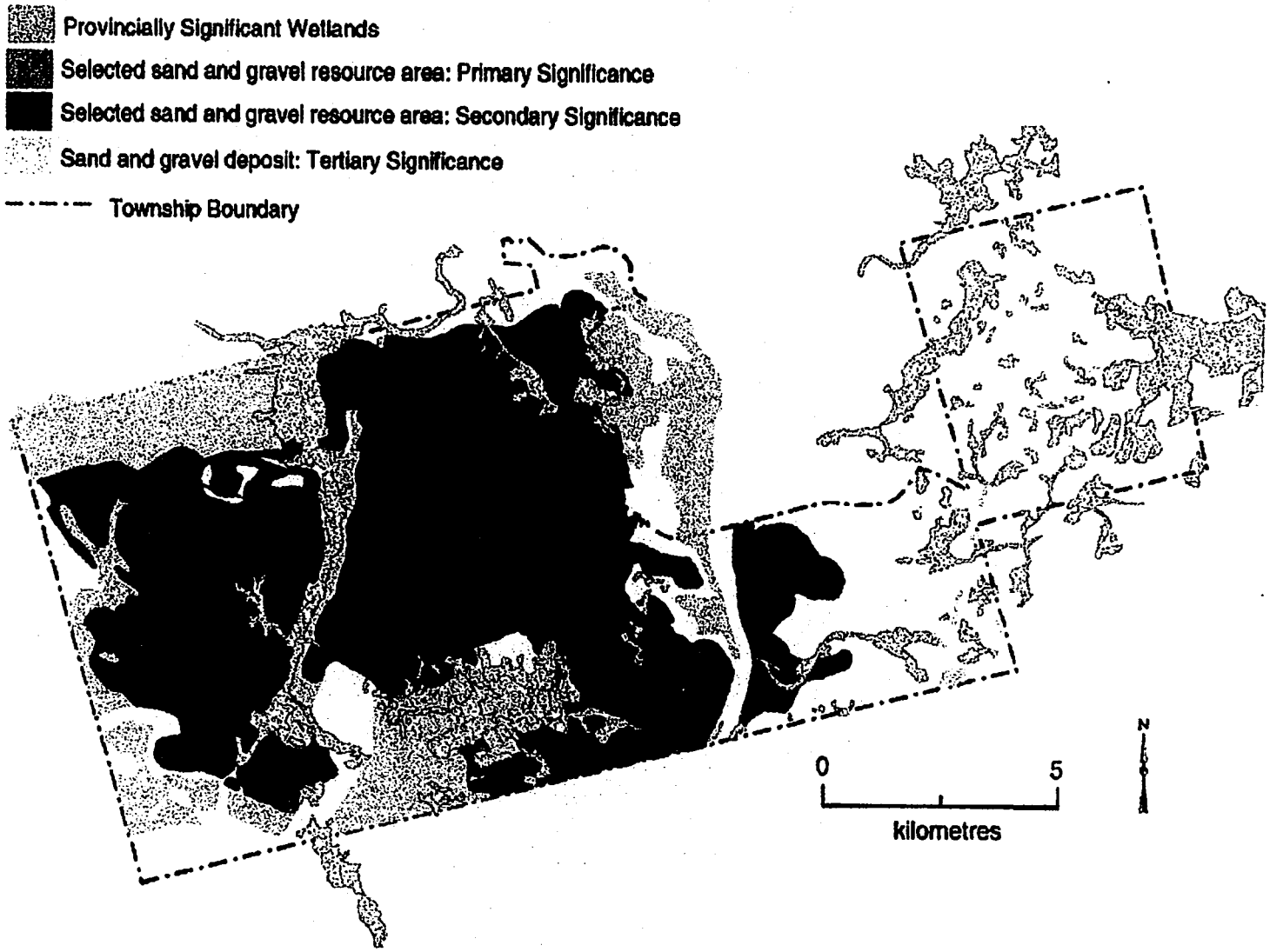
The Township of North Dumfries
Mineral Aggreate Resource Areas & Environmentally Sensitive Policy Areas



Adapted From: Ministry of Development & Mines, 1994

Figure 1.4

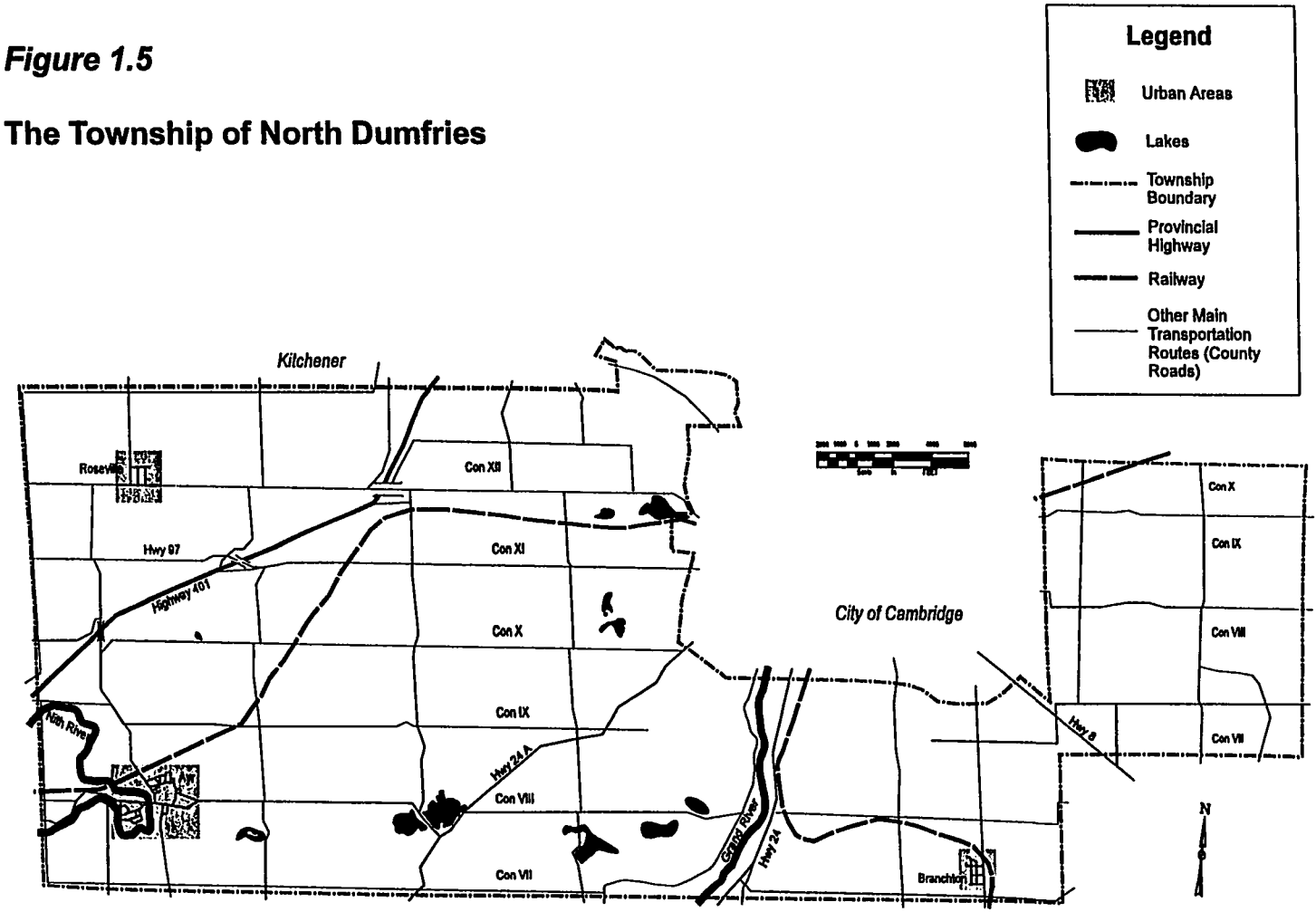
The Township of North Dumfries
Mineral Aggregate Resource Areas & Provincially Significant Wetlands



Adapted From: Ministry of Development & Mines, 1994

Figure 1.5

The Township of North Dumfries



licence is applied for in the Township. Members would like to see more attention given to hydrological issues through studies that will determine long term effects to the water quality and quantity (CAMP Fact Sheet, n.d.).

The Township councillors and aggregate producers also have concern toward the aggregate industry in North Dumfries Township. Township councillors feel the pressure from both the residents of the Township, as well as the aggregate producers. The aggregate producers, as far as they are concerned, are conducting business in the Township, are providing an economically important resource and therefore should not be regarded as polluters to the landscape. As such, conflict and contention around the aggregate industry occurs, ". . . conflict arises because of the divergent values and perspectives associated with the different environment . . ." (Bryant et al., 1982, 20).

With aggregate reserves estimated at approximately 1.4 billion tonnes in this Township, it is highly unlikely that the pressures will cease (Burtt, 1994, B3). The Township of North Dumfries' growth and wealth is overlain by agricultural lands, environmentally sensitive areas, wetlands, and existing and potential residential developments. The problem is the conflict that this initiates; should the Township utilize these resources and sacrifice community living space and the health of the natural environment? The researcher will argue, that although these are both valid concerns, there is a need for compromise. This will entail planning and management in the long term to gain the maximum aggregate extraction, as well as maintaining the environment. This process must include the concerns of the Township community. This is an essential component to the success of long range planning for this Township. In order that demand is met, and care for the environment is maintained and enhanced, a balanced proactive approach is needed.

It is a difficult task to decide what the outcome of a situation such as this will be, it is difficult to create a management plan that will please all parties involved, however, it is of even greater importance that something be done to deal with the situation. This will be a challenge for the resource manager. With a firm understanding of the issues, and a background of the physical properties of the area, it will enable managers to come closer to a plan that considers the importance of the natural areas, the aggregate resources, the

opportunity to bring these issues to the forefront and deal with concerns now, for the future.

1.2.2 Purpose and Objectives

In light of the previous discussion, the purpose of this thesis is to investigate stakeholder attitudes toward the aggregate industry, including factors that influence the move toward proactive long term landscape planning and design, within the limits of a community based landscape. In relation to this overall purpose, the primary objectives are:

i) to investigate the existing role, dimension and impact of the aggregate industry;
ii) to investigate the attitudes of aggregate producers, Township councillors and of residents who live within different proximities of an aggregate site; and
iii) to gain an appreciation of the wishes of the rural community concerning the Township's future landscape design

1.2.3 Methods of Research

The background work involved the examination of historical records, such as survey documents. This provided the researcher with a basis of information of the pre-settlement landscape, which can be incorporated into the creation of rehabilitation options for the future of the Township.

On-site visits to abandoned, rehabilitated, present and proposed aggregate sites provided the basis of the condition of the Township's present state, and served as a means of ground truthing. The examination of aerial photography was also used to ascertain the Township's present dimension and impact of the aggregate industry. Other sources, such as geological maps, surficial maps and Township records were utilized to do this, as well as to predict potential future aggregate production. Potential production was determined by delimiting the spatial dimensions of the resources and reviewing long term licences in the Township.

Input from the community was obtained through questionnaires and interviews with rural residents, Township councillors, and the aggregate developers and operators. This information was then used to determine attitudes and opinions of the community toward the aggregate industry.

There is increasingly a growing concern about the outcome of the remaining land underlain with aggregate resources, and concern for those aggregate sites presently operating. It is important to have an appreciation of the attitudes of the community toward the aggregate industry and opinions of design for a future landscape of the Township. This type of situation has to be planned for, the more land that is licensed for pits and quarries, the less there will be available for the existence of natural areas, or agriculture. With proactive planning, and all parties involved, the competition between the industry and the variety of other land uses could decrease.

As mentioned above, there is a degree of adverse effects on the environment and community. However, "the destruction of the environment can be arrested and indeed ill-effects reversed by sound land use and landscape planning" (Lovejoy, 1973, 4). Proactive planning for the most appropriate and efficient uses of land will offer increased organization of the resources of the Township, and deter the continued degradation of the Township's ecosystems, landscapes and community life.

This is a significant Township with the landscape diversity that it supports, as well as the economic resources that are at its disposal. However, the Township is facing a major dilemma in dealing with these conflicting land uses. It is possible that a variety of land uses such as agriculture, aggregate extraction, natural areas and residential areas can co-exist. This can happen through a long range planning process that includes rehabilitation options that are useful to the community and compatible with the surrounding land uses.

A research project such as this has explored a number of facets with regards to the aggregate industry in a particular Township. Although the research was specific to the Township of North Dumfries, there is potential that the techniques used and the ideas formulated could be adapted in another area that may be experiencing similar situations. In considering proactive planning, it is important to ensure that aggregate resources are available now and in the future to maintain the economic position of Ontario. However, this must be conducted in a socially and environmentally acceptable manner. Starting on a small scale, beginning with a test area in this Township, it could reveal discrepancies in the planning techniques used. These can be studied and solved before larger scale projects are undertaken, deepening our understanding of the number of complex interactions.

information on the aggregate industry, an outline of the research problem, purpose and objectives. Literature has been sited and incorporated into the discussion of these topics. Chapter Two is an extensive explanation of the methods used to undertake this study, and Chapter Three focuses on the geography of the study area - the Township of North Dumfries. Chapter Four deals specifically with the aggregate industry, particularly in the Township of North Dumfries. It focuses on the extent of licenses and extraction, in addition to the various issues that surround the industry. Chapter Five presents and discusses the results from the community questionnaires. Lastly, Chapter Six concludes with a summary of the issues, the conclusions of the research, recommendations and areas for further study.

As outlined in the previous chapter, the purpose of this research is to investigate stakeholder attitudes toward the aggregate industry, including factors that influence the move toward proactive long term landscape planning and design, within the limits of a community-based landscape. In relation to this, the primary objectives were outlined as follows:

i) *to investigate the existing role, dimension and impact of the aggregate industry;*
ii) *to investigate the attitudes of aggregate producers, Township councillors and of residents who live within different proximities of an aggregate site; and*
iii) *to gain an appreciation of the wishes of the rural community concerning the Township's future landscape design*

This chapter will discuss, in detail, how each of these objectives were achieved.

2.1 Background Research

The achievement of the objectives for this research required a substantial amount of background research. The first part of the data gathering process, which was done largely before and during the field work component, was an examination of rehabilitation literature, and literature concerning the Township of North Dumfries in terms of the aggregate industry. This background work involved the examination of historical records, such as surveys and historical writings, government documents and media clippings. The initial document search revealed the past and present socioeconomic, political and environmental situations of the Township. The past and present environments are important components of future land use planning and land use management. The information can be useful in evaluating and predicting land use trends in the Township.

Field work involved on-site reconnaissance to abandoned, rehabilitated, present and proposed aggregate extraction sites. This provided a visual basis of the condition of the Township in its present state. For this Township, being as abundant as it is with aggregate resources, it is critical that the exact locations of the resources are known, and mapped. The areas that are currently under extraction, and those areas of potential extraction were

areas.

The information sources for this data also included the examination of aerial photography. Through the analyses of the aerial photography, general changes that have occurred in the Township over time were observed. Changes and the extent of those changes were noted in land uses of the Township, such as the vegetation cover, agricultural practices, industrial particularly aggregate extraction, and growth of residential areas. Other sources included the Ontario Ministry of Natural Resources' records, and thematic mapping including physiography, topographical and Ontario Based maps.

In economic periods of growth, it is possible that a township such as North Dumfries has and will feel the pressure of the "need" for its aggregate resources. As part of this research, areas of potential for future aggregate extraction were identified and mapped. This was done by delimiting the spatial dimensions of the Township's aggregate resources and reviewing long term licences of aggregate operators in the Township.

In establishing where the aggregate resources exist in this Township, the Ontario Ministry of Natural Resource's publication, *Aggregate Resources Inventory of the Township of North Dumfries Regional Municipality of Waterloo (1980)*, was employed. Additional documentation and maps from the Ontario Ministry of Natural Resources and the Regional Municipality of Waterloo were also used. According to the *Aggregate Resources Inventory Paper* (ARIP), the potential sand and gravel resource areas were defined first by geological boundaries, and classed into levels of importance: primary, secondary, and tertiary (Ontario Ministry of Natural Resources, 1980, 4). The primary areas of significance are identified because a major resource is known to exist at that location, due to quantity of high quality aggregate reserves. These areas may be "reserved wholly or partially for extraction development and/or resource protection within the context of the official plan" (Ontario Ministry of Natural Resources, 1980, 4). The secondary and tertiary areas are sites where the resources are known to exist, however, are not as significant as the primary defined resources. These areas were mapped, and are included in this research paper (Chapter Four). Mapping, through geographic information systems, was done, and is used throughout this thesis to display and aid in explanation of the diversity of the natural resources in this Township.

their significance. The researcher could then see where an operator might apply next for a licence. This took into account various factors: the significance of the aggregate resource area (primary or secondary), the possible extent of the area, its closeness to residents, and environmental factors. On a larger scale, as the ARIP (1980) suggests:

> . . . in selecting sufficient areas for resource development, it is important to assess both the local and the regional base, and to forecast future production and demand patterns. Some appreciation of future aggregate requirements in an area may be gained by assessing its present production levels and by forecasting future production trends. Such an approach is based on the assumptions that production levels in an area closely reflect the demand and that the present production "market share" of an area will remain at roughly the same level (Ontario Ministry of Natural Resources, 1980, 6).

This type of procedure, or prediction, would be useful to the Township in its planning for its "vision" for the future. "The aggregate resources in the region surrounding a municipality should be assessed in order to properly evaluate specific resource areas and to adopt optimum resource management plans" (Ontario Ministry of Natural Resources, 1980, 6). The Township of North Dumfries does have significant amounts of aggregate resources, particularly in comparison to surrounding municipalities, and thus can be considered a regionally significant resource area.

2.2 Community Response

It was imperative that public input be incorporated into the study. This was done through the tool of *interview administered questionnaires.* People of the community including the Township councillors, aggregate operators, members of a concerned citizens group (CAMP), and residents of the Township were consulted. To collect information from each of these groups of key players, three standardized questionnaires were developed to use during interview sessions. These are included in Appendix A. In order to maintain the anonymity of the respondents, each transcript was designated a letter and number; C was used for the Township councillors; A for the aggregate producers and R for the residents. Within this paper, the letter-number combination is the only reference to the respondents that is used.

The council of the Township of North Dumfries has seven members including the mayor. Each member was interviewed in November 1996. The interview took approximately thirty minutes to three quarters of an hour. The questionnaire was four pages long, and included various open-ended questions requiring descriptions, comments or opinions. The questionnaire focused on issues relating to aggregate resources such as aggregate resource availability, transportation concerns, rehabilitation matters and community concerns. Although some questions are consistent among the three questionnaires, there are questions specifically relating to aggregate operation in the Township, and the Township's position on certain issues. For example, questions relating to transportation of the aggregate resources through the Township, and the costs of the repair and maintenance to the Township roads were included. Questions were asked inquiring about the Township's role and capability of controlling and regulating aggregate operations, and community involvement within the Township.

2.2.2 Aggregate Producers

The questionnaire used for the aggregate producers was designed differently from that used for the council members. It was modelled after a questionnaire produced by the *Aggregate Producers Association of Ontario* for the *Oak Ridges Moraine Technical Working Committee* (1994). The objective of the researcher's questionnaire was to comprehend and compile basic information and data on the aggregate industry within the Township of North Dumfries.

This questionnaire was four pages long, and included questions requesting information about license descriptions, resource availability, transportation, and rehabilitation. More specifically the questionnaire asked for information concerning licenses currently and previously held, on-site practices involving washing and crushing gravel, product breakdowns and the rehabilitation of the site(s). In addition, questions were asked regarding the attitudes and philosophies toward rehabilitation of aggregate sites, and interactions between themselves and the community.

The aggregate producers were contacted in November 1996, and responses were received in January and February 1997. A total of ten aggregate operators were notified and

not fully completed, mainly due to confidentiality reasons, or inapplicability to an aggregate producer's particular operation. Understandably, as business operations, the aggregate industry is highly competitive, and operators were reluctant to provide information that could mean an economic advantage to competitors (The Oak Ridges Moraine Aggregate Committee, 1994, B2).

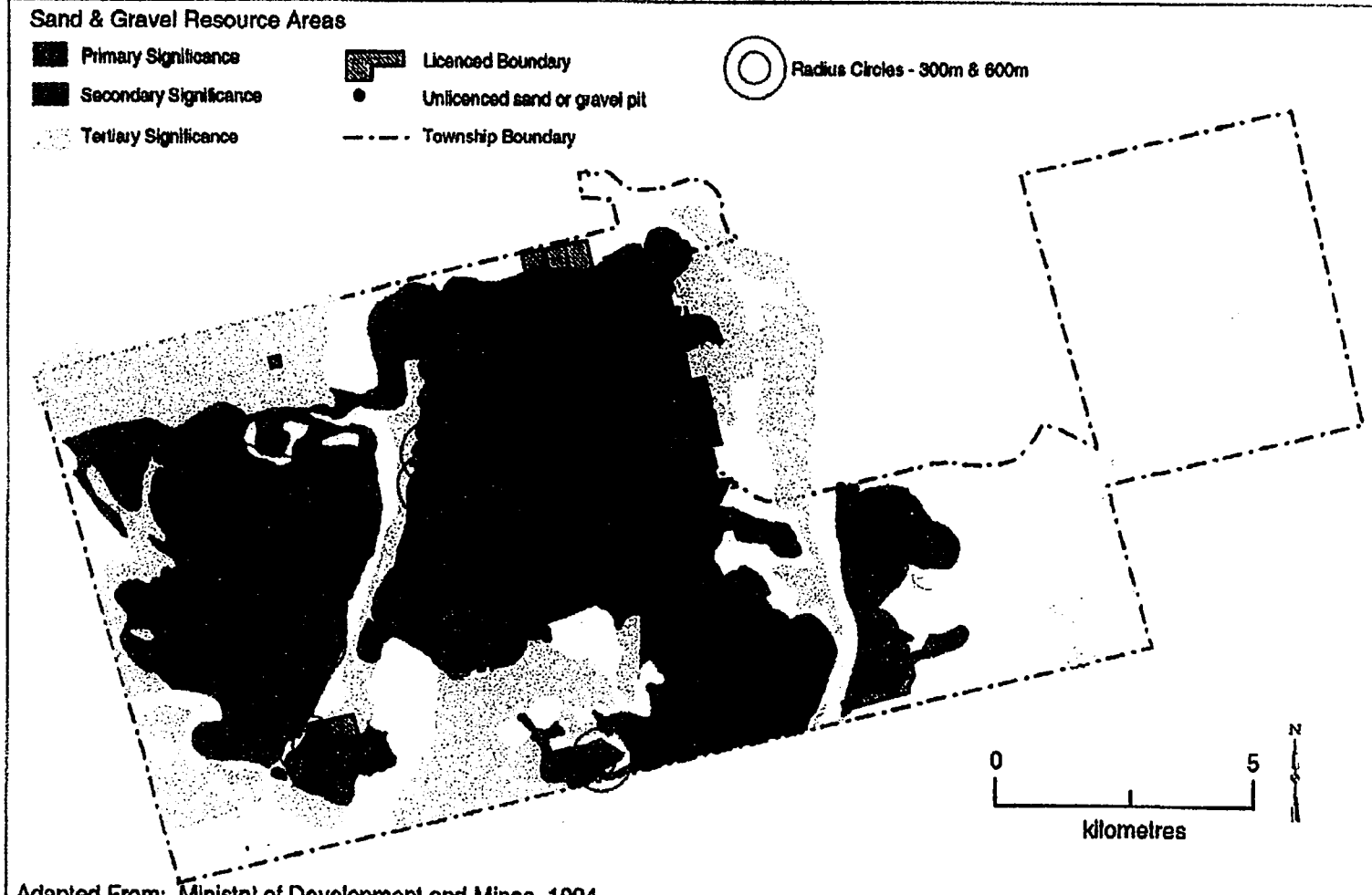
2.2.3 Residents of North Dumfries Township

To understand the feeling the community had toward the abundance of aggregate resources and the aggregate industry in their Township, a different questionnaire was created. This questionnaire addressed issues such as resource availability, community concerns, and rehabilitation of aggregate sites. These questions were in the form of open-ended questions requiring personal description or comments. Specifically questions were asked about the state of the Township (as they saw it), land use options for the future concerning rehabilitation, and pressures and effects that the community could be experiencing. Several questions posed were opinion questions aimed at determining how the community felt about the aggregate issue, and what could or should be done for the future in terms of rehabilitation preferences. In addition, questions were asked requesting general information about participants' place and length of residence, and the reason they had settled or lived in the Township of North Dumfries.

This questionnaire was three pages long and was completed in March 1997. A random sample of 32 people were surveyed, and the response rate was 75%. The residents were selected according to their proximity in and around aggregate operations. Figure 2.1 displays the location of the aggregate sites presently operating in the Township. To select the participants, two radius circles were drawn to scale out from the centre of the specific aggregate sites. These radius circles were drawn out from the site at 300m and 600m, concentration was focused on those areas around the aggregate site. People were selected at random in the area surrounding the aggregate site. In this proximity to an aggregate site, these residents have the most to lose or gain. This random sample was chosen as there were only a certain number of residents next to an aggregate site within these specified distances. The nine aggregate sites were selected on the basis of location and size. Resident participation

Figure 2.1

Township of North Dumfries
Selected Aggregate Sites Used For Sampling



Adapted From: Ministry of Development and Mines, 1994

deal of difference in responses and that opinions would not change significantly from aggregate site to aggregate site.

Within these radius zones, names and address were collected from the tax assessment roll from the Township of North Dumfries administration office. Out of these names, a random selection of names were chosen through a random draw. Selected residents were then contacted by phone and the researcher requested an interview at a time convenient to them. This telephone interview took approximately thirty minutes to three quarters of an hour.

2.3 Data Reliability and Errors

As previously indicated, the method of *interview administered questionnaires* was chosen. Although there are many methods of social research, each with advantages and disadvantages, this method is no exception. The questionnaire is described as a "systematic gathering of information about people's beliefs, attitudes, values and behaviour" (Sommer, Sommer, 1986, 107). This method was chosen for this research because these are the key elements that were being sought in relation to the aggregate industry in the Township of North Dumfries. Through the questionnaire, the researcher could determine the knowledge, ideas and attitudes of the respondents toward proactive long term land use planning, particularly with regards to the aggregate industry. The information obtained from respondents, in terms of opinions and attitudes can aid in land use planning for the future. This information provides a starting point for a more elaborate agenda, one of creating a master landscape design for the Township. With the responses received, one can determine the next steps to be taken. Ideas and concerns can be incorporated and addressed as a plan develops.

This method is beneficial for a number of reasons, and was suitable for this research. Interviewing with a standardized questionnaire for each participant group, allows not only for answers, but observation of participants, and the tone of voice used by participants. It allows recording of intonation and comments. "For example, in a study of needs and preferences, you can engage in personal conversations that follow a person's particular interests and concerns in detail"(Abbey-Livingston, Abbey, 1982, 38). There is strength in this form of interview, it allows the interviewer to "probe" for more information, or further explanation of

manner, the interviewer can gain some sense of the respondents' knowledge of the topic in question. With this form of a public survey, it is less likely to be incomplete, and often accedes a higher rate of return (Sommer, Sommer, 1986, 128). Respondents may be more willing to respond to an interview rather than write out answers to the questionnaire that may require lengthy responses (Sommer, Sommer, 1986, 87).

Addressing this method, Sommer and Sommer (1986) state that "if opinions from only a small number of respondents are needed, the open-ended interview, in which a few general questions are followed by specific questions tailored to the respondents' replies, will be more economical" (Sommer, Sommer, 1986, 128). Open-ended questions were used to:

i) identify respondents' awareness and knowledge of a program and service without prompting;
ii) identify what words, titles, concepts, ideas mean to people; and
iii) obtain problem statements, suggestions, opinions, and issues in the respondents' languages (Abbey-Livingston, Abbey, 1982, 123).

Many questions asked in the questionnaires were open-ended. This format was chosen because the researcher wanted the answers in the respondent's own words and to avoid insinuating answers to the respondent (Sommer, Sommer, 1986, 109). This way respondents had more freedom to reply as they desired, using descriptions and words as they saw fit. Also, as pointed out by Converse and Presser (1986), another special purpose of open-ended questions is their ability to "measure salience, or to capture modes of expression" (Converse, Presser, 1986, 35). In summary, advantages of open questions allow the researcher to understand the terms people use in relation to the aggregate issue, to ascertain information people have and to find out what misinformation people have with regards to this issue (Abbey-Livingston, Abbey, 1982, 123).

This survey method also has disadvantages. For example, how people respond is not always what they do, they may be responding believing that is what the interviewer wants to hear. This form of questionnaire requires much more effort on the part of the respondent than closed questions, it requires the respondent to think about their opinions and beliefs, and how they would like to convey those ideas to the interviewer. In addition, the gathered data can be highly subject to bias that is introduced by human interaction in the interview process. It is

make (Sommer, Sommer, 1986, 104).

This method can be time consuming and expensive. For example, because there are open-ended questions and therefore qualitative in nature, the responses include an almost infinite number of possible responses (Hawtin et al., 1994, 89). Open-ended questions are time consuming in that responses of this nature are more difficult to code and analyse (Hawtin et al., 1994, 99). In this research, these advantages and disadvantages were taken into consideration, and it was determined that this procedure was most suitable to fulfill the goals and objectives of this thesis.

This chapter has discussed the methods used to achieve the objectives of this research, as well as the reliability of the methods used to collect the data. The following chapter describes the study area, the Township of North Dumfries, in detail. The bedrock geology, the soils and vegetation are considered, as well as, the number of natural areas that are present in the Township. The variety of land uses present in this Township are also discussed.

CHAPTER THREE

THE GEOGRAPHY OF THE TOWNSHIP OF NORTH DUMFRIES

A picturesque, progressive community in Ontario's agricultural heartland (Ayr News Ltd.)

North Dumfries Township is located in southwestern Ontario, and is the southern most township within the Regional Municipality of Waterloo (Figure 1.1). This Township is in close proximity to major urban centres such as Kitchener, Waterloo, Cambridge, Guelph and Hamilton. It is located halfway between London and Toronto, with a major east-west artery, Highway 401, passing through the Township.

The Township of North Dumfries covers an area of approximately 18,571 hectares, with a population of close to 7,200 people. This Township is unique in that it is characterized by a variety of land uses and natural resources. It is largely characterized by agricultural land uses, rural residential dwellings, a growing industrial base, it contains an abundance of aggregate resources, and a number of environmentally significant areas. Within the Township are the Villages of Ayr, Roseville, and Branchton, which have and continue to give this Township its distinctive character (Figure 1.5).

3.1 Geology and Bedrock Characteristics

The abundance and significance of various resources are due to the geological past of the Township. This Township is underlain with Silurian dolostone and shales created from the Guelph and Salina Formations, which were formed between 435 and 395 million years ago, in the Ordovician and Silurian Epochs (Ontario Ministry of Natural Resources, 1980, 2). The Guelph Formation is found beneath the eastern three-quarters of the Township. This formation "... consists of massive or thick bedded, fine-to-medium grained, light brown dolostone" (Ontario Ministry of Natural Resources, 1980, 13). It is estimated that the Guelph Formation has a minimum thickness of approximately 40m (Ontario Ministry of Natural Resources, 1980, 13). The drift cover that overlays this Formation is generally greater than 15m, however, there are areas of outcrop or thin drift cover in this eastern section of the Township (Ontario Ministry of Natural Resources, 1980,13).

Formation. This Formation consists primarily of "...soft grey shale and thin to medium-bedded dolostone with numerous seems and lenses of gypsum" (Ontario Ministry of Natural Resources, 1980, 13). Drilling done in this area indicated that the Formation is approximately 100m in depth (Telford in Ontario Ministry of Natural Resources, 1980, 13). The Salina Formation is not exposed, and as such drift cover amounts to greater than 15m (Karrow, 1961, 3).

Ten thousand years ago, the last remanent of the Wisconsin Glacier of the Pleistocene Epoch retreated, and its glacial activity shaped the rolling, irregular topography that exists throughout the Township today. This glaciation period, documented as lasting from 23,000 to 10,000 years ago, was marked with numerous receding and advancement periods by the massive glaciers (Ontario Ministry of Natural Resources, 1980, 9). These movements, and the melted water resulted in the mixture, transportation and deposition of large quantities of sand and gravel, ". . . covering much of the underlying Silurian aged bedrock" (Skibicki, 1991, 13). This involved history of ice movements has meant a complex distribution of various forms of glacial till throughout the area (Presant, Wicklund, 1971, 12).

The bedrock surface can be described as smooth to rolling, with an elevation that varies from approximately 274m above sea level in close proximity to Orr's Lake, to 193m above sea level just north of the village of Ayr (Ontario Ministry of Natural Resources, 1980, 12). This difference in elevation of bedrock surface is due to the abundance and depth of unconsolidated material covering the surface. In the eastern section and some sections of the Grand River Valley of the Township, there is little drift cover. On the other hand, drift cover, over 60m in some cases, is very thick in the buried preglacial valley that "passes southeast through the southern portion of the township, near Ayr" (Ontario Ministry of Natural Resources, 1980, 12). Throughout the remainder of the Township, drift cover of unconsolidated materials usually ranges from 15 to 46m (Ontario Ministry of Natural Resources, 1980, 12).

Of notable variance, where the bedrock surface becomes increasingly irregular, is the northern and western portion of the Township. In these areas, the number of water wells that reach bedrock decreases, this paints a picture of the irregularity of the bedrock around this portion of the Township (Karrow, 1961, 3). "The very generalized pictures these wells create

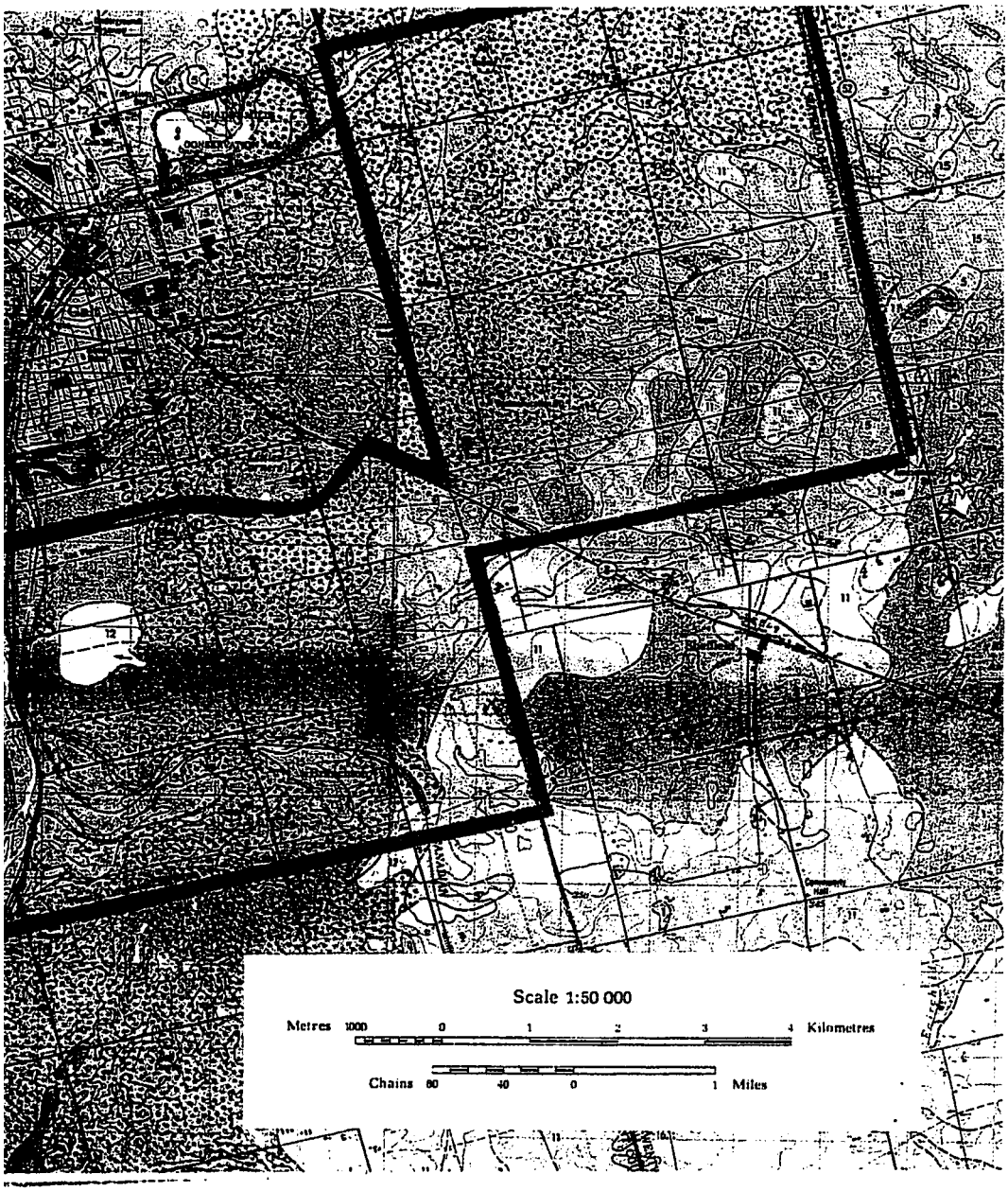
near 600ft" (180m) (Karrow, 1961, 3). In addition, the drift thickness is these areas increase and are thickest here.

With the sequential completion of the continental glacial processes, the physical processes of erosion and alluvial deposition came to play a large role in the creation of the area's landscape. During this time period, stream embankments, lake plain deposits and bog deposits were created (Skibicki, 1991, 13). Some areas being influenced by river erosion, caused removal of overlying glacial debris and outcrops of underlying bedrock become exposed. "Advancing and retreating ice lobes from the Huron-Georgian Bay basin and the Erie-Ontario basin interacted in the region, leaving major deposits as terminal moraines and outwash plains on which kames, eskers and other surface features were deposited" (Ckeskey, 1991, 26). Three dominant and important morainic features were formed as a result of these processes; the Waterloo Sand Hills, the Galt Moraine and the Paris Moraine (Figure 3.1).

Firstly, the oldest, is the Waterloo Moraine (Waterloo Sand Hills). This physiographic region is found in the northwest corner of the Township, and consists mainly ". . . of sandy and silty deposits with occasional layers of clay and gravel, on moderately rolling topography" (Presant, Wicklund, 1971, 14). Documentation suggests that these sand hills were formed by an interlobated moraine, due chiefly to the shape of the glacier, and to naturally occurring processes. "The glacier consisted of several lobes, drainage flowing into the crease between the two lobes brought in sand and gravel, and built moraines" (Chapman, Putnam, 1984, 26). When the glacier melted, the sand and gravel particles that built up over time were deposited to form the Waterloo Sand Hills. "The topography is less rugged than on most kame moraines and the abundance of fine sand and sandy till is unusual" (Chapman, Putnam, 1984, 44). In terms of elevation, much of the Waterloo Sand Hills are greater than 330m above sea level (Karrow, 1961, 2).

The western portion of the Township is largely covered by a pitted outwash plain which was created from melt water, carrying debris, running off the ice margin (Ontario Ministry of Natural Resources, 1980, 9). Subsequent retracting of the glacier lead to several esker and kame deposits to become exposed in the central portion of the Township (Ontario Ministry of Natural Resources, 1980, 9). Additional continual halts during glacial margin retreats, are marked by numerous hummocky ridges composed of silty till, which is

Figure 3.1 Dominant Moraine Features of The Township of North Dumfries



LEGEND

PHANEROZOIC
CENOZOIC
QUATERNARY
RECENT

17 Lake Ontario deposits: stratified sands, grave
Stream deposits: gravel, sand, silt, and clay
Peat and muck

PLEISTOCENE
LATE WISCONSINAN

14 Alluvial fan gravel*
Beach gravel
12 Lacustrine and outwash sand
Lake deposits: stratified to varved clay, silt, a fine sand
10 Halton Till: clay or silt till
9 Outcrop complex: bouldery till and bedrock ridges
8 Ice-contact sand: kames and eskers
7 Outwash gravel
Ice-contact gravel: kames and eskers
Wentworth Till: stony, sandy, silt till
Port Stanley Till: silt to sandy silt till
Maryhill Till: clayey silt till
Catfish Creek Till**: stony, sandy, silt till

PALEOZOIC
ORDOVICIAN AND SILURIAN

Shale and dolomite

Notes:
*Does not occur on this sheet.
**Exposed only in river banks beneath younger tills.
Deposits on this sheet are mapped only where they reach more in thickness. Thinner deposits are not shown.

SYMBOLS

Drumlin
Esker
Outwash fan
Geological boundary, approximate
Bedrock pressure-release ridge
Eroded scarp
Ice-contact face

Gl
Ab sh
Hu top
88 Sa
Sa
Ro

For other conventional signs refer to 1:50 000 National System maps.

Source: Karrow, 1987.

Natural Resources, 1980, 9).

The southeast portion of the Township is composed of laminated lacustrine silt and clay (Ontario Ministry of Natural Resources, 1980, 9). More particularly, the Galt Moraine, which is characterized as a ". . . fine example of morainic topography" (Karrow, 1961, 2). Karrow (1961) describes it as a mass of glacial deposits 30m or more in thickness, and one and a half to three miles in width (Karrow, 1961, 2). This morainic belt is an almost continuous band that runs north and south through the eastern portion of the Township, and ranges in drift thickness of 30m in the north to approximately 60m in the south (Karrow, 1961, 3). The portion of the Galt Moraine that falls within the Township of North Dumfries is described as a rugged stoney ridge of loose loamy till (Chapman, Putnam, 1984, 50). It is hummocky and contains small kettle lakes, suggesting a slow period of ice melting.

In addition, alluvium that exists on the Grand and Nith Rivers, west of the Galt Moraine consists of fine-to-medium gravel. On the east side of the Galt Moraine, rivers and streams consist mainly of sand and silt, due largely to ancient lake deposits (Skibicki, 1991, 25).

Thirdly, the Paris Moraine, which is located in the northeast corner of the Township of North Dumfries. This Moraine is a high bouldery ridge consisting of loose, stoney loam including a considerable amount of coarse outwash (Chapman, Putnam, 1984, 50), and was formed during the receding of the last ice sheet. It contains very similar material to that of the Galt Moraine, however, it exhibits a slightly different topography. "The Paris moraine is characterised by large and numerous kettle lakes such as Bannister and Wrigley and Spottiswood Lakes" (Skibicki, 1991, 19). This suggests that during the formation of this moraine, there was an abundance of the meltwater flowing from glacial ice. To this day, these play an ecologically and socially important role in the Township. Also, the number of large kames that are found within this landform, give the Paris Moraine and the Township its scenic 'rolling hill' topography (Skibicki, 1991, 19).

3.2 Soil Structure

The soil composition and its capacity in any area is largely the result of differences in parent material. The differences in the parent material and the processes involved in the

this Township was formed primarily from the forces of ice movement. "The parent materials from which soils of Waterloo County [RMOW] have developed are almost entirely unconsolidated sediments derived directly or indirectly from the action of continental glaciers several thousand years ago" (Karrow in Presant, Wicklund, 1971, 10).

An inventory of the different soil types of this Township was described by John Marlett, when the first survey was done in 1818 in Dumfries Township. Marlett's resulting survey notes identified and described three types of soils: large amounts of loam, large amounts of sand (further divided into dark sand, sandy loam, and sand and gravel), and small amounts of clay throughout the Township (Wood, 1957, 11). The most recent soil survey identifies three major associations: the Burford, Fox and Dumfries soil associations. The soils can be generally described as loam with a medium to coarse texture. There are also areas of sand, and muck throughout the Township (Presant, Wicklund, 1971, Soil Association Map).

The loam soil type is the most common in the Township, and covers the most area. "The soil parent materials of the end moraines and other areas of loam till in North Dumfries Township has significantly higher sand and lower clay contents than the loam till further north" (Presant, Wicklund, 1971, 17). For instance, the most commonly found soil types are those described as the Burford-Fox Association, which is "coarse and medium textured soils formed on outwash and shallow lacustrine deposits" (Presant, Wicklund, 1971, Soil Association Map). The Burford Series is described as well drained soil that developed in 30cm or less of loam and sandy loam overlying gravelly soil materials. This soil type occupies approximately 3000 hectares in North Dumfries Township, occurs extensively on terraces and outwash areas of the Grand River, and on gravelly outwash and kame areas of Galt and Paris Moraines (Presant, Wicklund, 1971, 26). The Burford Series is derived from outwash gravel on outwash plains and terraces, providing high quality aggregate materials (Presant, Wicklund, 1971, 56).

The Fox Series is similar; developed in well drained, mainly medium and coarse sized sands. The sandy soils in the southern part of the Waterloo Sandhills, and in the Galt and Paris Moraines belong to this Series, and also occur on outwash plains and terraces (Presant, Wicklund, 1971, 30). These soils originated from "coarse and medium outwash sand on outwash plains and in the Waterloo Sandhills" (Presant, Wicklund, 1971, 56). Some

the low fertility and the fact that slopes may be excessively steep, and the are dominant soil texture (Presant, Wicklund, 1971, 26). The soil texture is described as gravelly loam, loamy sand, and sand over gravel.

The third most popular soil type is the Dumfries soil association. It is described as "medium textured soils formed on stony till deposits", with a dominant soil texture of loam (Presant, Wicklund, 1971, Soil Association Map). The soils from this Series were developed on stoney loam and the loam tills of the Paris and Galt Moraines (Presant, Wicklund, 1971, 29). As far as land use limitations, this series has relatively low water-holding capacity, relatively low fertility, slopes may be excessively steep or complex and some areas are rather stoney (Presant, Wicklund, 1971, 29). The Township of North Dumfries does have additional soil associations, however, the extent of them is not as great as those previously mentioned.

3.3 Land Uses

As previously described, the condition of the soils of the Township influences the land uses that take place in any one area. "The character of the soil therefore exerts a major control upon ecosystem processes and, more particularly, upon the productivity of the ecosystem" (Briggs et al., 1993, 530). Two land uses that the condition of the soils greatly influence are the agricultural and aggregate industries. It has been described that the Township of North Dumfries has substantial amounts of rough and stoney land. As a consequence the agricultural capabilities of the Township are limited to certain uses. Table 3.1 gives an indication of the total area of farms. This data is examined for the years of 1971, 1976, 1986 and 1991. Agriculture began in the very early years in this Township, and continues to be a economic and social mainstay. It can be seen from this information that generally, the land area used in farming has gradually increased over time. However, this depends on the amount of reported information. This can be attributed to the fact that family farms are growing into conglomerated operations. The field sizes for crops have grown in area by removing hedgerows between fields to allow for the use of larger sized machinery, and cash crop opportunities.

Table 3.1

Total Area of Farms for the Years 1971, 1976, 1986, 1991
Township of North Dumfries & the Regional Municipality of Waterloo

	1971		1976		1986		1991	
	Farms Reporting	*Total Area (ha)*	*Farms Reporting*	*Total Area (ha)*	*Farms Reporting*	*Total Area (ha)*	*Farms Reporting*	*Total Area (ha)*
North Dumfries	179	11,764	170	11,623	185	12,495	192	14,249
RMOW	1,976	99,620	1,678	96,916	1,642	96,296	1,618	92,862

Source: Statistics Canada, Agricultural, for years 1971, 1976, 1986, 1991

This can also be noticed in Table 3.2, which shows the land in crops for these same years. Due to the change in data recording from year to year, the area in crops is provided. Grain corn is a popular crop in this Township because of the coarser-textured soils and warmer temperatures than those of northern townships in this municipality (Presant, Wicklund, 1971, 10). This Township has a relatively high proportion of land in pasture due also to the rough and stoney nature of the soils (Presant, Wicklund, 1971, 10). Figure 3.2 displays generally the primary agricultural areas in this Township, as defined by the Regional Municipality of Waterloo.

Table 3.2

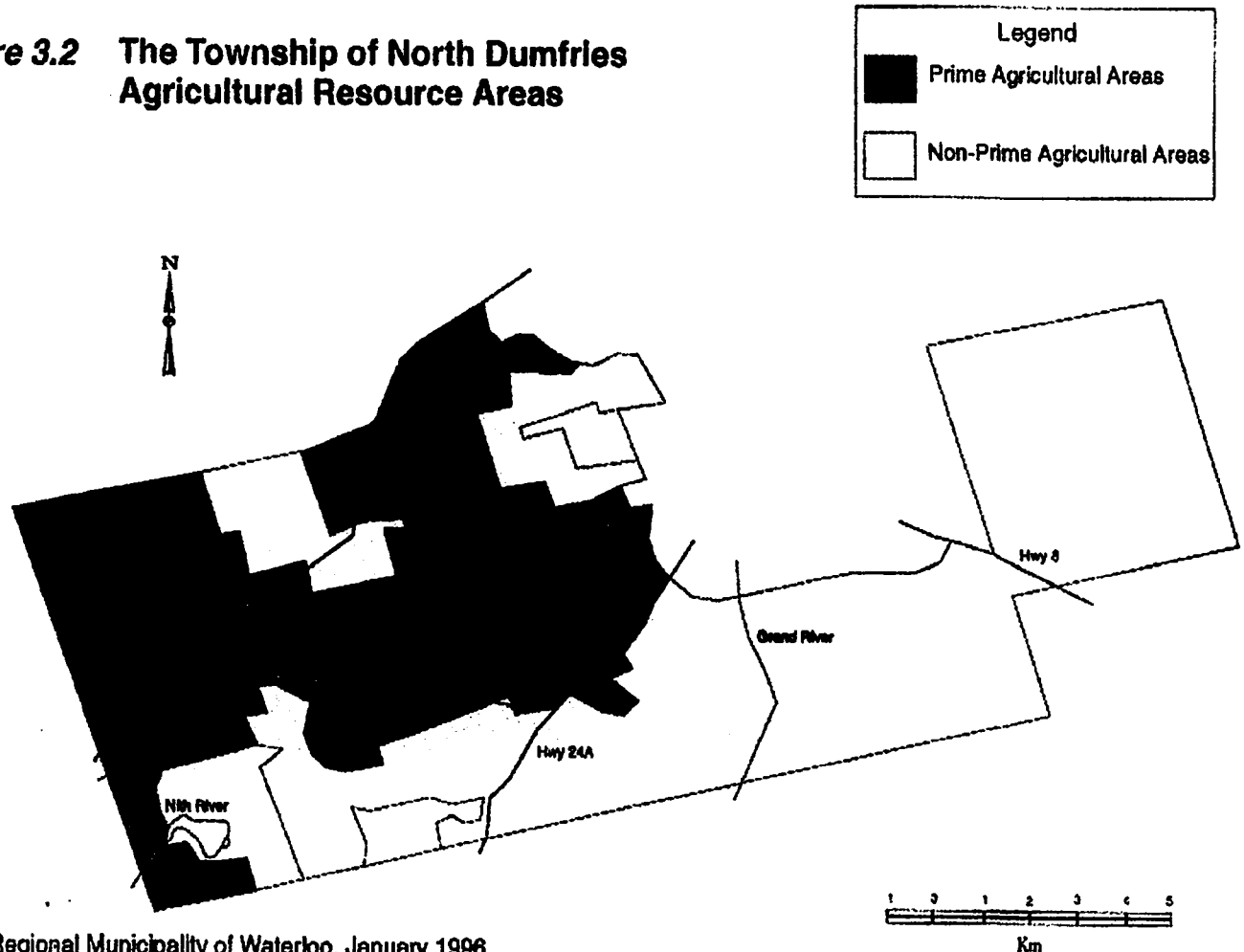
Land in Crops for the Years 1971, 1976, 1986, 1991
Township of North Dumfries & the Regional Municipality of Waterloo

	1971		1976		1986		1991	
	Farms Reporting	*Total Area (ha)*	*Farms Reporting*	*Total Area (ha)*	*Farms Reporting*	*Total Area (ha)*	*Farms Reporting*	*Total Area (ha)*
North Dumfries	179	5,273	170	5,616	185	10,168	157	9,947
RMOW	1,976	50,381	1,678	53,706	1,642	83,837	1,434	71,029

Source: Statistics Canada, Agricultural, for years 1971, 1976, 1986, 1991

Table 3.3 gives an indication of the distribution of the livestock reared in this Township. It can be seen that the numbers of livestock vary from year to year, with hens and chickens being the most pronounced livestock reared, at 22% of the total of the Regional Municipality of Waterloo, in 1971. This is followed by cattle, at 1% in 1971. The "total cattle" category does include the milk cows that are raised in the Township. As compared to

Figure 3.2 **The Township of North Dumfries Agricultural Resource Areas**



Source: Regional Municipality of Waterloo, January 1996

respectively.

Table 3.3

Distribution of Livestock for the Years 1971, 1976, 1986, 1991
Township of North Dumfries & the Regional Municipality of Waterloo

	Township of North Dumfries			Regional Municipality of Waterloo		
Year	Total Cattle	Pigs	Hens & Chickens	Total Cattle	Pigs	Hens & Chickens
1971	8,353	4,824	342,466	83,124	149,990	1,586,492
1976	8,538	5,208	278,538	97,238	143,627	1,699,716
1986	8,651	10,856	----------	85,312	230,449	1,761,778
1991	7,649	18,152	327,949	88,646	226,772	1,739,597

Source: Statistics Canada, Agricultural, for years 1971, 1976, 1986, 1991

In the past decade, the growth of the industrial base of the Township has been substantial. Due to the Township's proximity to the Highway 401, and major urban centres, new industrial and transportation firms have located here. North Dumfries Township is home to nearly fifty business and companies located in the industrial park. In addition to these industries, is one which is prominent in the Township - the aggregate resource industry. Due to the high quality and quantity of glacially derived materials, the Township is an important regional aggregate producer. With aggregate resources estimated at 1.4 billion tonnes, North Dumfries is one of the province's richest aggregate resource areas (Burtt, 1994, B3). Approximately 80% of the area west of the Grand River is designated mineral aggregate resource area (Ayr News, August 23, 1995).

This industry does provide benefits to the Township and the Province, including jobs and an important resource for development of urban communities and its affiliated infrastructure. However, it is not an industry without costs. Externalities occur environmentally, socially, economically and aesthetically. The aggregate industry and the various issues related to the industry are discussed in detail in chapter four.

Just as the industries have grown, so to has the housing and residential areas. The Village of Ayr, the communities of Roseville, Branchton and Clyde are the main residential

This Township is largely a farming community, but has grown with rural homes for people seeking the peace of the country life and, yet are close to the urban centres for employment.

3.4 Natural Areas

> *North Dumfries is a township know for its stability, progress and a financial position of which we are all well proud. It would require a wide leap of imagination to picture anything more beautiful in a landscape than that which North Dumfries possesses. With the Grand and Nith Rivers winding their way through the hills and valleys to the south, this is one of Ontario's most scenic areas, offering a number of conservation areas for your enjoyment (Inter-Municipal Tourism Board Pamphlet).*

The Township of North Dumfries possesses a diverse and scenic landscape, giving this Township its unique character and beauty. This is in large part due to the recognition and designation of a number of natural areas, including the *Environmentally Sensitive Policy Areas (ESPA), Environmental Preservation Areas* and *Provincially Significant Wetlands (PSW)* the Township supports. Each of these natural areas serves an important function. The dynamics, for example, inherent in water quality and quantity, soil structure and surface form, as well as the flora and fauna, all give sustenance to each of these significant areas. These areas are designated as such because they exhibit important ecological functions and/or benefits to humans and the environment. This value can be viewed in two ways. Firstly, contribution intrinsically as biophysical systems, and secondly as anthropocentric value to the residents and visitors of the Township. In terms of the intrinsic values, there are a number of functions and benefits that must be considered, some of which are alluded to here.

The natural areas in this Township support a number of locally, regionally or provincially significant flora and fauna species. Natural areas in the Township provide a unique and specialized habitat for a variety of plant and animal species that are a distinct part of that particular area. Natural areas such as these carry out a number of important functions; hydrological, biological, chemical and socioeconomic benefits. For example, they provide a number of ecosystem values, and play a role in the functioning of necessary natural ecological processes (Williams, 1990, 13).

Such ecosystem values occur within the natural area itself, or in its immediate vicinity. Natural areas include specific characteristics such as primary production, watershed

systems necessary for much of the animal life. In addition, contribution is made to the maintenance of conditions essential for symbioses, natural cycles (carbon, nitrogen, hydrological), provision of species to support food chains, and similar characteristics that provide for higher levels of organization in the terrestrial and aquatic landscape. These factors working together create the composition of each significant area. Considering that all these functions are inter-related, if one function or characteristic is altered the effects will be felt throughout the remainder of the system.

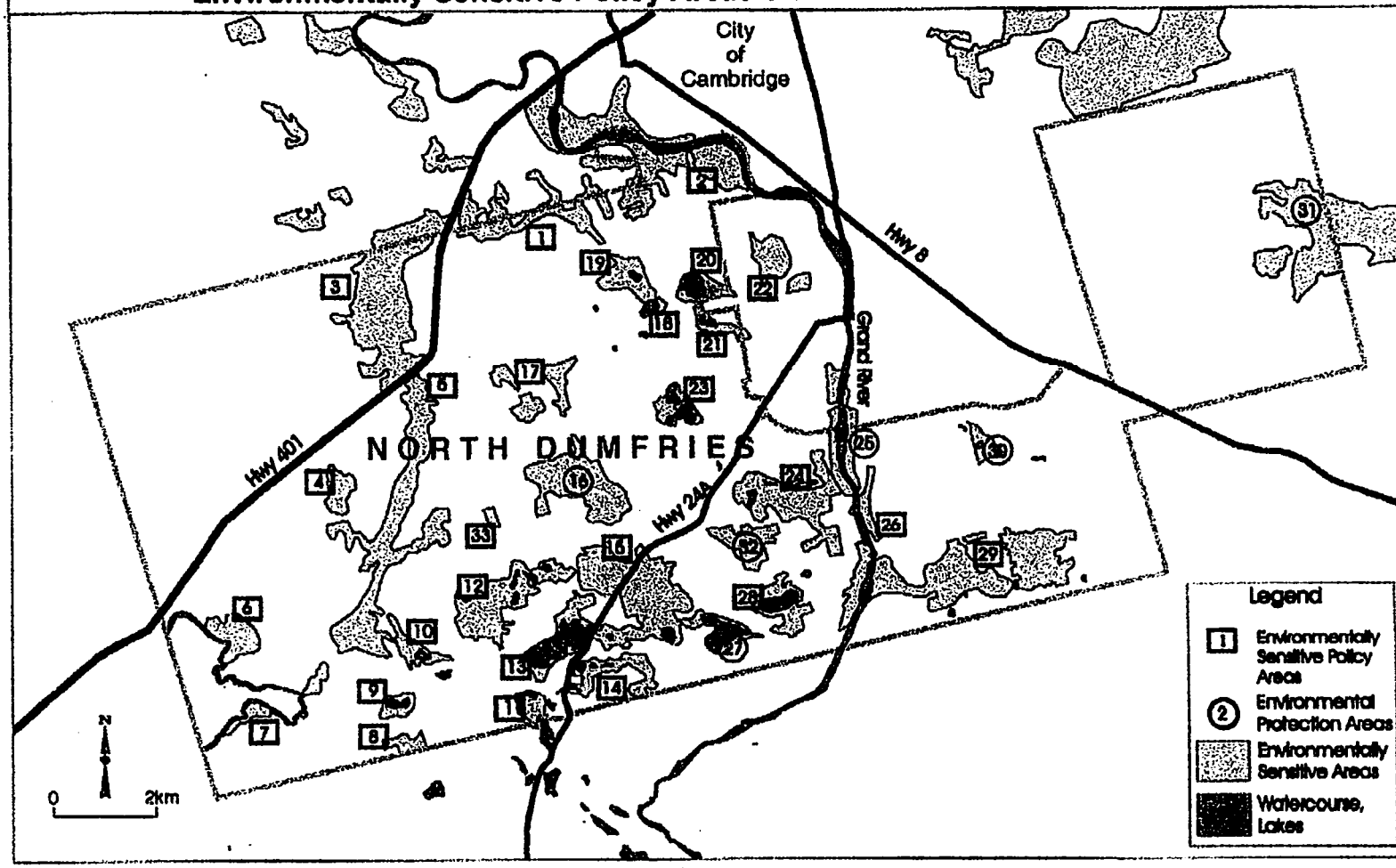
In addition to the natural beauty these areas provide to the Township, they are also important for a variety of socioeconomic values. Natural systems such as these are complex, and therefore provide an accessible model whose dynamic qualities hold potential for increasing human understanding of such systems. There are opportunities for academic and applied field research that can be useful in future planning and management of an area.

As well, these natural areas provide aesthetic and recreational opportunities for residents and visitors of the Township. This enables the community to enjoy themselves, at the same time as learning and caring for their heritage. People learn to appreciate and desire the value these areas provide. Through birdwatching, people gain a sense of the natural environment, as well as enjoying themselves through recreational activity. Conservation Areas in this Township provide a number of recreational opportunities for the community and the visitors to the Township. These are places people can go for leisure activities, such as walking, cross country skiing or birdwatching. In addition to being able to enjoy recreational activities, residents and visitors appreciate the natural environment they are able to carry these activities out in.

Within this Township there are 33 ESPAs out of 80 designated in the Regional Municipality of Waterloo (Regional Municipality of Waterloo, 1996, 13). This constituting the largest number in a township in the Regional Municipality of Waterloo, at upwards of 45% of the total, ". . .an *Environmentally Sensitive Policy Area* is recognized as containing a landscape whose biological and physical integrity and ecological processes should be maintained" (Eagles, 1990, 69). Figure 3.3 displays the *Environmentally Sensitive Policy Areas*, supplemented by Table 3.4, a list of each of the names of those significant areas present in the Township.

Figure 3.3

Township of North Dumfries
Environmentally Sensitive Policy Areas & Environmental Protection Areas



* the *Environmental Protection Areas* are also designated *Environmentally Sensitive Policy Areas*

Source: Ministry of Natural Resources, 1994

Spillway, extending south from Highway 401 to the mill dam in the Village of Ayr, is approximately 265 hectares in size (The Kleinfeldt Group, 1977, 4). It is a ". . . lengthy stretch of mixed forest, often with concentrations of cedar and tamarack parallelling Cedar Creek" (Regional Municipality of Waterloo, 1984, 127).

Table 3.4

Environmentally Sensitive Policy Areas - The Township of North Dumfries

Name	Name
1 - Blair Swamp*	*18 - Orr's Lake*
2 - Cruickston Park	*19 - Altrieve lake*
3 - Roseville Swamp	*20 - Barrie's Lake*
4 - Reid's Lake	*21 - Gilholm Marsh*
5 - Cedar Creek Spillway	*22 - Devil's Creek Swamp and Forest*
6 - Greenfield Swamp	*23 - Milroy Lake*
7 - Ayr Forest	*24 - Taylor's Lake and Galt Ridge*
8 - Turnbull Lake Basin	*25 - Grand River Floodplain Forest*
9 - Little Turnbull Lake	*26 - Galt Moraine Prairie*
10 - McCrone Lake	*27 - Grass Lake*
11 - Dickson Wilderness Area	*28 - Dean's Lake*
12 - Hungry Hills	*29 - Branchton Swamp and Woods*
13 - Bannister and Wrigley Lakes	*30 - Oliver's Pond and Bog*
14 - Miller's Lake and Woods	*31 - Beverly Swamp*
15 - Sudden Tract	*32 - Sudden Bog and Forest*
16 - Alps Woods	*33 - Moore Oak Woods*
17 - Barrie Tract	

* the numbers correspond to those in Figure 3.3

Name	Name
16 - Alps Woods*	*32 - Sudden Bog*
25 - Grand River Forests	*31 - Beverly Swamp*
30 - Oliver's Bog	*27 - Grass Lake/Cranberry Bog*

* the numbers correspond to those in Figure 3.3

This wooded periphery is pivotal for significant plant and wildlife species, and provides a natural corridor for the animal species to commute between Cedar Creek, Roseville Swamp and other ESPA's (Regional Municipality of Waterloo, 1984, 128). It is also the RMOW's finest and largest cold water trout stream (Regional Municipality of Waterloo, 1984, 127). Cedar Creek Spillway is regarded as a local life science area by the Ministry of Natural Resources and is regulated by the Grand River Conservation Authority (Regional Municipality of Waterloo, 1984, 127).

This natural area provides a habitat and breeding ground for a number of wildlife and waterfowl species. In addition, it provides a migratory bird staging area and wintering area for the waterfowl. The area contains a small impoundment which is popular with local residents who come to view and feed the large concentrations of native waterfowl. Natural areas have also been noted for their ability to attenuate and purify water, and reduce sedimentation. Cedar Creek is no exception, the expansive lowland habitat does just this. It ". . . promotes the cooling and filtering of seepage water which ultimately flows into Cedar Creek" (The Kleinfeldt Group, 1977, 5).

In addition to these important natural areas, are the *Environmental Preservation Areas*. These are areas which are identified by the Ministry of Natural Resources for protection because of specified criteria retained by these areas. For example, these may be areas of:

i) Provincially Significant Life Science Areas of Natural and Scientific Interest; and/or
ii) the significant portions of habitat of endangered species; and/or

Policy Plans, 1996, 28).

There are 6 out of the 7 designated *Environmental Preservation Areas* in the Township of North Dumfries. These are illustrated in Figure 3.3, in combination with Table 3.5. The *Environmental Preservation Areas* include both natural forested areas, and hydrologically significant natural areas, such as bogs and swamps.

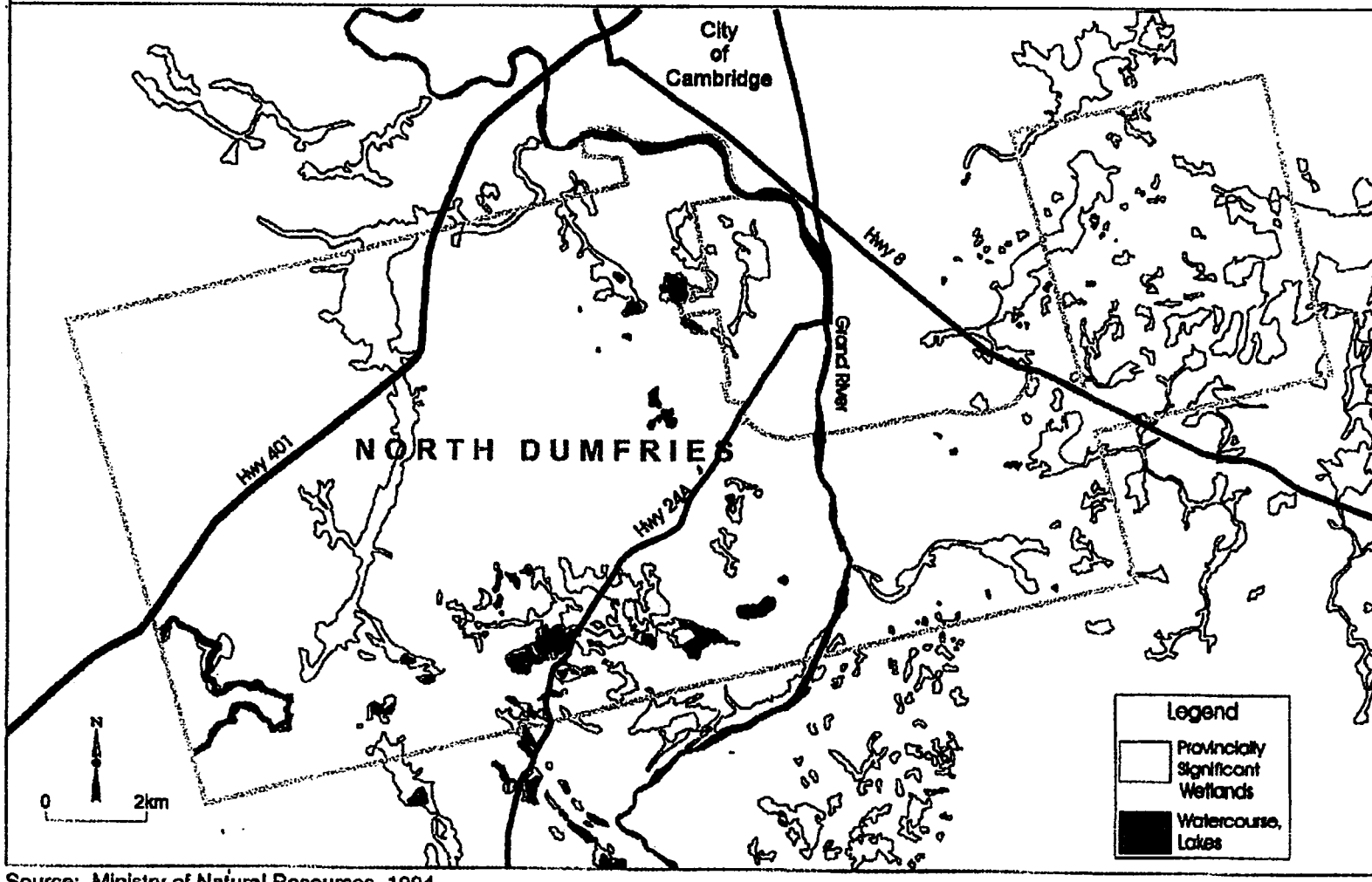
The Grand River Forests, in addition to receiving regional recognition, have been recognized as provincially and nationally significant (Eagles, Beechey 1985, 3). The Forests, possessing natural attributes, were designated as an *Area of Natural and Scientific Interest* by the Ontario Ministry of Natural Resources in the early 1980's. "The Grand River Forests were designated a Carolinian Canada site in 1985, one of seven in the watershed" (Cheskey, 1991, 205). The portion of the Grand River Forests that are in the Township of North Dumfries, begin from the south end of the City of Cambridge, following the Grand River, to the south end of the Township of North Dumfries at the North Dumfries-South Dumfries boundary.

The Grand River Forests, the valley and the related ecosystems embrace "an unparalleled variety of community types" (Balser and Nelson, 1990, 3). "These range from oak savannah and prairies openings, to densely wooded seepage slopes, floodplains, hawthorn meadows, marl bogs, rich Oak-Hickory terraces, Hemlock slopes and Maple-Beech forests" (Cheskey, 1991, 1). This wide variety of habitats contributes to the extraordinarily high levels of biodiversity in the Grand River Forests (Balser and Nelson, 1990, 3).

In terms of *Provincially Significant Wetlands (PSW)*, there is also an abundance in this Township. Illustrated in Figure 3.4, each contributes to the natural integrity and ecological functioning of the Township. Wetlands are natural ecosystems which are increasingly perceived as an environment where water and land, and their fauna and flora, meet in an attractive and delicate way. "If wetlands small and large cannot survive in reasonable abundance across the landscape, their dependent species will decrease in number and eventually disappear. The survival of wetlands helps to preserve ecological processes and functions that secure and protect the quality of the biosphere in which humans and other organisms together must dwell" (Ontario Ministry of Natural Resources, 1993, 1).

Figure 3.4

The Township of North Dumfries
Provincially Significant Wetlands



Source: Ministry of Natural Resources, 1994

Township. It was designated as such because of the qualities and functions it possesses. "The richness of the whole ecosystem also can be explained by the existence of the great number of different plant communities in Oliver's Bog and the uplands" (Posmyk, 1993, 127). This peatland is situated on the Galt Moraine, approximately three kilometres from the City of Cambridge. Oliver's Bog is a valuable and rich ecosystem that does deserve protection because of the variation in plant and animal species. "A number of rare and endangered plant species have been keyed out that are growing in Oliver's Bog. The abundance of some of the species, such as orchids, indicates the importance to protect the area" (Posmyk, 1993, 128).

Natural areas in this Township are abundant, and play important roles in the ecological functioning of the Township's ecosystems. It is frequently the case that a natural area received more than one designation. This is due to the qualities and functions that a natural area possesses. It can be locally, regionally, provincially or nationally significant.

This chapter has described the geography of the Township of North Dumfries, to provide an indication of the diverse land features and land uses in this Township. The following chapter will examine aggregate resource legislation and the aggregate industry in the Township of North Dumfries.

When the glaciers retreated thousands of years ago, they carved out and shaped the landscape that surrounds us today. They left behind rich deposits of sand, gravel and rock - the raw materials which we call aggregate (Aggregate Producers Association of Ontario Fact Sheet-a).

4.1 Aggregate Resources, Their Importance and The Challenge the Industry Faces

Aggregate resources consist of sand, gravel or rock fragments that are used in their natural state or utilized following mechanical processing, in construction, road building and industry (APAO, Fact Sheet-a). An early definition of aggregate describes the resource as ". . . a naturally occurring deposit of pebbles composed either of uniform or diverse rock types, which are usually rounded, incoherent, or loosely cemented with finer material, and for the most part fall within the size limits 2 mm to 64 mm"(Beaver, 1968, 9). Coarse sands are described as those below 2 mm in diameter, while finer sands have grain sizes down to 0.1mm in diameter.

Aggregate resources provide a number of jobs directly and indirectly, as well as needed raw material for a variety of industries. According to the *Aggregate Producers Association of Ontario (APAO)*, more than 7,000 people are employed directly in the aggregate industry in Ontario, and more than 34,000 people are indirectly employed in a variety of service industries. These include industries such as transportation, equipment sales and service, and environmental protection agencies (APAO, Fact Sheet-b). Thus, a large number of jobs rely on the adequate supply of aggregate resources and its products.

The market, and demand, for aggregate resources is enormous. These materials are necessary for the construction of houses, schools, office buildings, hospitals and shopping malls. Aggregate resources are used for road construction, airports and railways, as well as, for effective water and sewage systems, agricultural and recreational facilities. As such, the aggregate industry is essential to the maintenance and the growth of our society. Continually, the standard of living improves. The usage of aggregate resources are at an increasingly higher level then in past years, and usage is likely to continue to grow further in the future. Estimates for annual aggregate consumption indicate that usage could grow "to over 216

Sheet-b). The *Aggregate Producers Association of Ontario* notes that in the Province of Ontario, aggregate resources are being utilized twice as fast as producers can supply adequate resources for present use, and as population grows, so too will the demand for aggregate resources. "Aggregate forms the foundation of Ontario's economy - an economy that depends on maintaining a competitive supply of high quality aggregate at a reasonable cost" (APAO, Fact Sheet-a). The aggregate industry provides a basic, often taken for granted, resource.

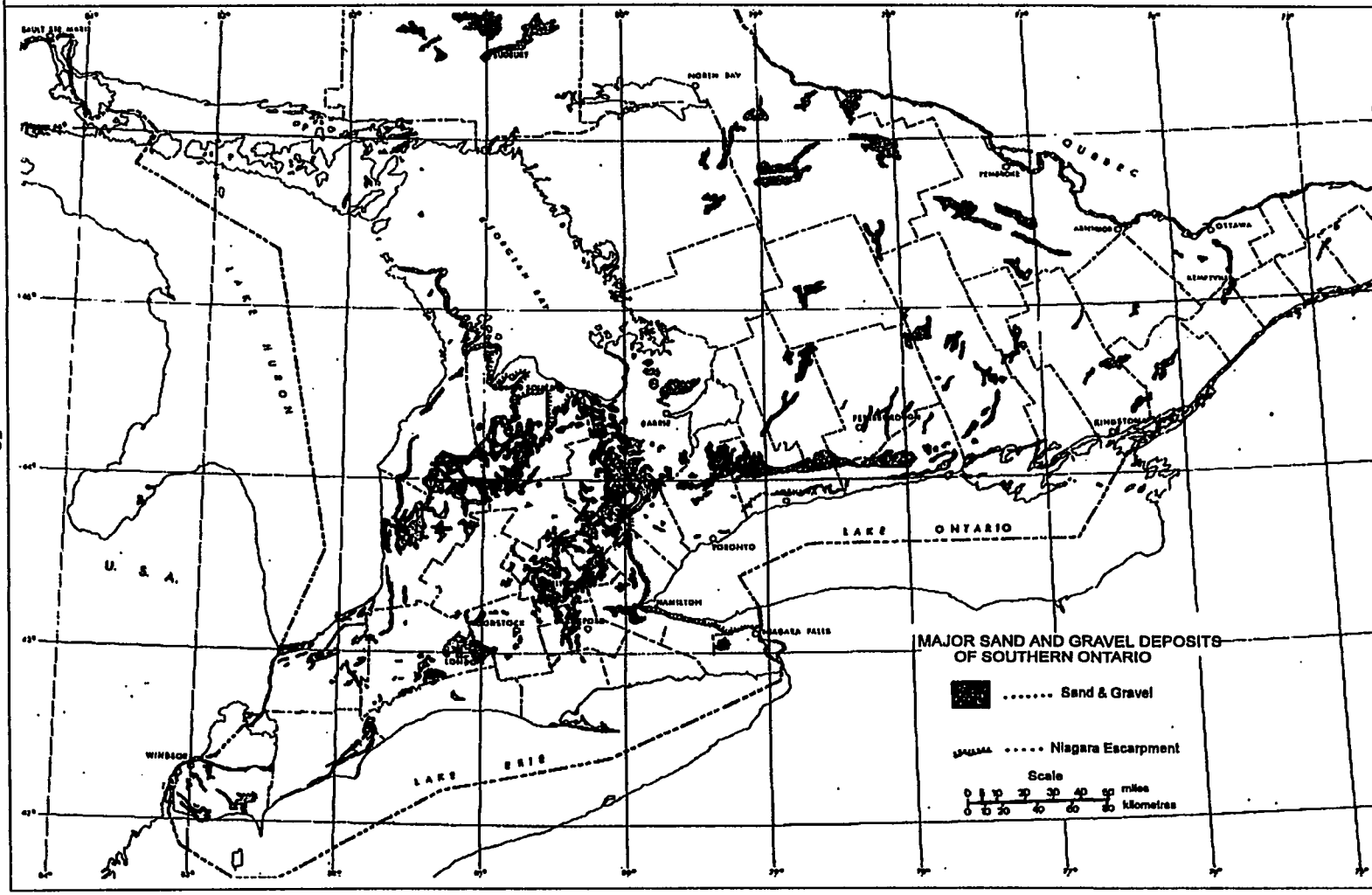
According to the Association of Aggregate Producers, roads and highways account for 53% of annual consumption of these resources, making the transportation sector the largest user of aggregate in Ontario. For example, the construction of one kilometre of a six lane expressway requires 37, 600 tonnes of aggregate (APAO, Fact Sheet-b). For residential development, the construction of every house requires over 440 tonnes of aggregate products.

There are numerous deposits of aggregate resources, however, the ease of obtaining these resources is rapidly decreasing. Figure 4.1 shows the location of these deposits in southern Ontario. The time and cost involved in receiving approval and licensing for an aggregate extraction site is increasing. This can cause strain on meeting the demand for future supplies, and Ontario could face aggregate shortages (APAO, Fact Sheet-a). The result will be a dramatic increase in building costs to Ontario consumers for roads, schools and houses, as well as the industrial and commercial sectors, suppressing their growth.

4.1.1 Limitations in the Aggregate Industry

There are limitations in the aggregate industry with regards to site specific criteria and the assessment of local aggregate resources. In terms of the site specific criteria, characteristics such as *deposit size, aggregate quality,* and *deposit location and setting,* must be considered in the selection of aggregate sites best suited for extraction. With regards to the assessment of local aggregate resources, *quality, quantity*, and *distribution* of those resources have to also be considered in the surrounding area of the municipality where extraction is to occur (Ontario Ministry of Natural Resources, 1980, 5). This assessment is conducted to ensure that there are sufficient supplies of the aggregate resources to meet future demands in that region, it is "... important to assess both the local and the regional base, and to forecast future production and demand patterns" (Ontario Ministry of Natural Resources, 1980, 6).

Figure 4.1 **The Major Sand and Gravel Deposits of Southern Ontario**



Source: Ontario Ministry of Natural Resources, 1979

The deposit size must be such that it contains available and sufficient sand and gravel resources that would support a commercial pit having a processing plant on site (Ontario Ministry of Natural Resources, 1980, 5). Class 1 deposits are the most favourable for commercial development, which include those that are thicker than 6m in depth and contain greater than 35 percent crushable gravel (Ontario Ministry of Natural Resources, 1980, 5). Aggregate quality as another limitation factor, is discussed in further detail in a following section of this chapter.

Third, among these factors is the location and setting of a resource area. Where and how the deposit is located has a direct influence on the value of that deposit for extraction in the future. This evaluation determines the presence of natural or man-made features that may limit or prohibit the extraction of the resource. In addition, the physical context of the aggregate resource must be considered. Permanent man-made features, such as roads, railways, powerlines and housing developments, which are built on or near a deposit, will prohibit its extraction. Deposits that are covered with thick overburden or located above a high water table, would be considered less valuable. The difficulty and cost of obtaining such resources must be considered to determine if it is worth while to continue with the extraction of those deposits.

4.2 Aggregate Resources and the Extraction Process

Prior to aggregate extraction, the operator/producer must obtain licensed approval, through application, from the Ontario Ministry of Natural Resources. This process can be lengthy, taking up to six years for a final decision on the application. Detailed site plans describing the physical and social features of the proposed site, the operation and rehabilitation plans must be submitted to the Ontario Ministry of Natural Resources with the application form. These requirements, as well as the related legislation is discussed in the following section.

An initial step, once the licence is granted, is the establishment of the aggregate site according to the regulations. The selected site must be fenced 1.2m on all sides with a security gate installed at the entrance of the site (Government of Ontario, 1995, (s.16) R1.4). Topsoil and subsoil is then removed from the deposit with a front end loader or scrapper.

stockpiled. Additional overburden is also removed, and also used in the creation of screening berms. Not all overburden on the property is removed at once. Extraction occurs in phases, which are outlined in the site plans prepared before extraction takes place. Following the completion of the berms, seeding and planting of grass and trees take place for the stabilization of the slopes. The tree screens consist primarily of conifer species to serve both as visual and dust screens (Shoemaker, 1994, 153).

The position of the processing plant and equipment must also be determined. This selection is based on two key factors: the phases of excavation, and the consideration of the noise direction of the processing equipment. Once these are considered, the position of the processing plant, the office and weigh scales, fuel pumps, and stockpiles are determined (Shoemaker, 1994, 153). The placement of the processing equipment is located below the work face to abate noise levels. As the final step in the establishment of the surface mining operations, internal haul routes are created on the pit floor.

Extraction of the material is done using a front end loader or an excavator. When extraction takes place, shallow excavation benches are created, and are generally no more than 10m in height. There may be a number of excavation faces active at once to allow for blending of different forms of aggregate (Shoemaker, 1994, 154). The aggregate producer is required to adhere to an excavation setback. Fifteen metres from the boundary of the site is not to be excavated. Should the site abut a highway or land in residential use, the required excavation setback is 30m (Government of Ontario, 1995, (s.18(1)) R1.5). The excavated material is hauled from the excavation face by conveyor, or gravel trucks, to the processing plant, which may or may not be on-site. At the plant, the material is screened by its particle size, separating the sand and gravel, to meet end-use specifications. Figure 4.2 outlines the typical process that is involved in the extraction of aggregate resources.

The larger materials are immediately sent to be crushed, while the smaller particles are screened a second time into more precise categories. Sand is sorted by size using a classification tank. Operating similar to the action of a river, the heaviest materials settle first, while the finer particles float further down the tank (APAO, Fact Sheet-c). Depending on which category these particles fall under, dewatering, classifying or washing takes place. The particles in the category 'less than 55 mesh', are small enough, and no further sorting is

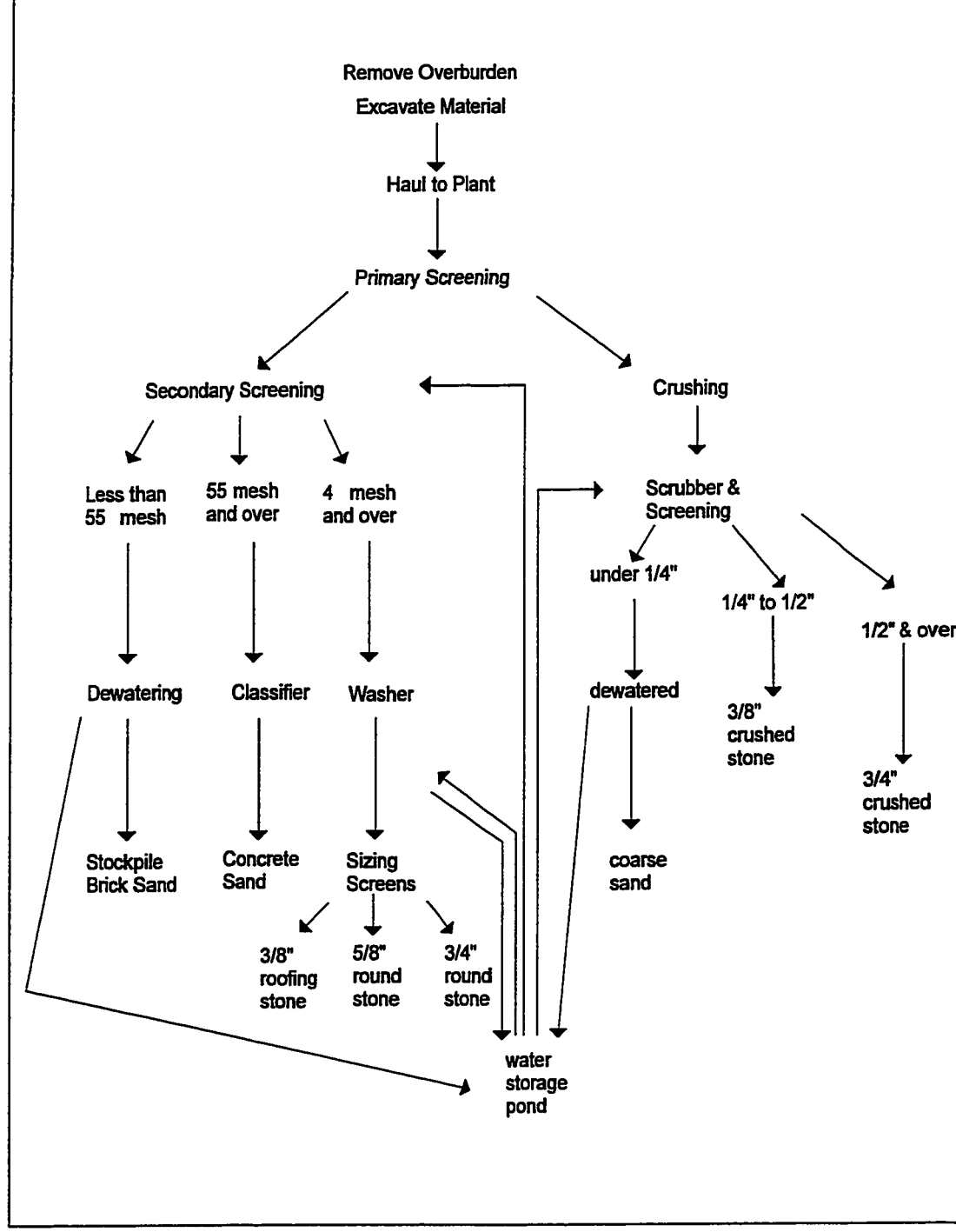


Figure 4.2 Flow Diagram for a Typical Sand and Gravel Extraction Process

Adapted From: Proctor, Redfern, 1974

falling within the category of '55 mesh and over', are sent to a classifier or are used in concrete sand. The materials that are sorted as '4 mesh and over' are sent to be washed to remove silt or clay. Particles are then sorted according to size and the designated final end-use (Proctor, Redfern, 1974). The water that is used in the cleaning processes is sent to a water storage or siltation pond, while the final sorted product is set in stockpiles to dewater. Once dry, the material is transported to market.

The larger material, as mentioned, is sent to the crusher, where the material is reduced in size by a number of vibrating screens which the material passes over. This sorts the particles by size. The reduction of aggregate material is done using crushing and grinding machines that operate on the principle of direct impact or nipping of the rock. Hammer mills are an example of the type of grinding machines used, while gyratory and jaw crushers are the forms of 'nipping the rock' machines that are used (Collis, Fox, 1985, 59). Generally, particles less than 4.75mm are considered as sand, and those greater than 4.75mm are considered as stone (APAO, Fact Sheet-c). Again, depending on the particle size, the material is left to dewater or is crushed a second time, following scrubbing and screening. The final step in the process is delivery of the aggregate to the market, whether it is a local or regional destination.

4.3 Aggregate Resources Legislation

The previous section has provided a description of the concept of aggregate resources, their importance and the challenge that the industry is faced with. In addition the processes used to extract this resource were discussed. Considering the importance and challenges the industry faces, aggregate resources legislation was developed to try and meet these challenges.

Aggregate resources in Ontario are regulated under three key pieces of legislation from the Provincial to the local level. Each will be discussed in turn in the following section. These pieces of legislation include the Aggregate Resources Act at the Provincial level in conjunction with the newly approved Bill 52, the Regional Official Plan Policies for the Regional Municipality of Waterloo, and thirdly, the Official Plan for the Township of North Dumfries.

Currently, legislation for the regulation of aggregate resources in Ontario falls under the Aggregate Resources Act. This Act replaced the Pits and Quarries Control Act, which was implemented in 1971. Concern was recognized for the need of control of these non-renewable resources. Demand for construction materials such as sand and gravel increased as the Canadian economy expanded in the 1960s and early 1970s (McLellan, 1985, 15). In addition, the offensive social and environmental impacts of aggregate extraction and the consequent public concern resulted in Provincial Government intervention, and the implementation of the Pits and Quarries Act (McLellan, 1985, 15). Since 1971, aggregate legislation has evolved, Government again realized the growing demand for aggregate resources, and the need to address concerns raised by the public. As McLellan addressed, "instead of treating Ontario's land resource with some dignity, we were creating enormous despoiled, degraded and derelict acreages" (McLellan, 1995, 110). It appeared that in pursuit of a valuable resource, there was a depletion of a number of other valuable resources such as wetlands, forests, habitats for flora and fauna species, and agricultural lands (McLellan, 1995,110). Therefore, "the cumulative experience of inadequacy with the Pits and Quarries Control Act and a sense of a need for greater public involvement, monitoring scrutiny, and penalties and a considerable shortfall in public expectation resulted in the imposition of the replacement Aggregate Resources Act in 1990" (McLellan, unpublished manuscript, 4). The complete evolution of aggregate legislation in Ontario is illustrated in Figure 4.3.

The purposes of the Aggregate Resources Act, 1990 are:

(a) to provide for the management of the aggregate resources in Ontario;
(b) to control and regulate aggregate operations on Crown and private lands;
(c) to require the rehabilitation of land from which aggregate has been excavated; and
(d) to minimize adverse impact on the environment in respect of aggregate operations (Government of Ontario, 1995, (s.2), 6).

Policies and regulations have been designed in accordance with these purposes. A person/company cannot operate a pit or quarry in Ontario unless proper licencing is obtained. This is done through an application for licence. Two different types of licences can be applied for; a *Class A* licence and *Class B* licence. A *Class A* licence is one in which the operator is licenced to excavate greater than 20,000 tonnes annually of aggregate from a pit or

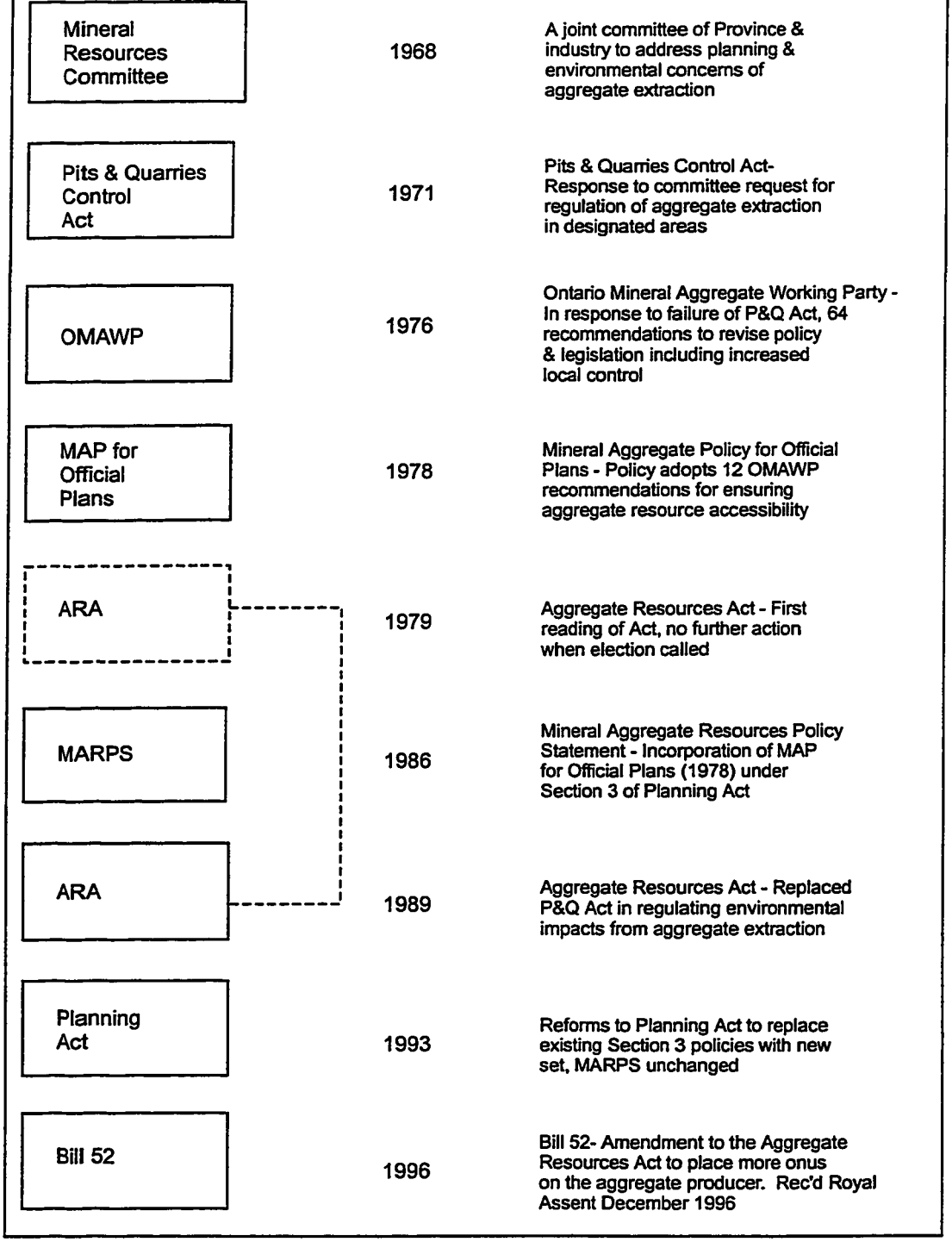


Figure 4.3 The Evolution of Aggregate Legislation

Adapted From: Shoemaker, 1994

from a pit or quarry. Site plans must also be accompanied with the licence application, detailing the location of the site, the site description and dimensions, land use, location of the portion to be excavated, and the rehabilitation agenda (Government of Ontario, 1995, (s.8(1), 9). The information required under section 8, subsection (2) of the Aggregate Resources Act, must be presented in at least three separate drawings under the headings (Class A):

(a) existing features;
(b) operational plan; and
(c) progressive rehabilitation and final rehabilitation plans (Government of Ontario, 1995, (s.8(2)), 11).

Figure 4.4 outlines the steps an application for an aggregate licence would follow.

For a Class A licence, the licence application must also be submitted with a written report outlining the environment that could be affected by the aggregate operations, the remedial actions involved, social and economic effects, the haulage routes and the size and location of the stock piles. In addition, the suitability of the progressive rehabilitation, with regard for adjacent lands and further use of the rehabilitated site must be explained (Government of Ontario, 1995, (s.9(1)), 12). This discussion of the legislation will focus on Class A licences. Out of the 33 licences in the Township of North Dumfries, 31 are Class A licences for pits.

The applicant is also required to submit proposals to change the designation and zoning of the potential aggregate site if it is not already designated and zoned *mineral extraction*. The designation and zoning must be in accordance with the Regional Municipality of Waterloo's and the Township of North Dumfries' Official Plans and Zoning By-Laws. The proposals also go through review by various agencies and public meetings.

Subsequent to the completion of the initial research of the site and the finalization of site plans and supporting documentation, the package of information is submitted to the Minister for review. Following the Minister's review of the application, a copy is served, for comments, to the clerk of the regional municipality, and to the clerk of the local municipality in which the site is located. At this time, there are no provisions for the public. The only public consideration has been for those residents who live adjacent to the site. Residents are notified of the applicant's intent to extract aggregate resources. The general public is notified only after the licence application is accepted by the Minister. Following the notice in the

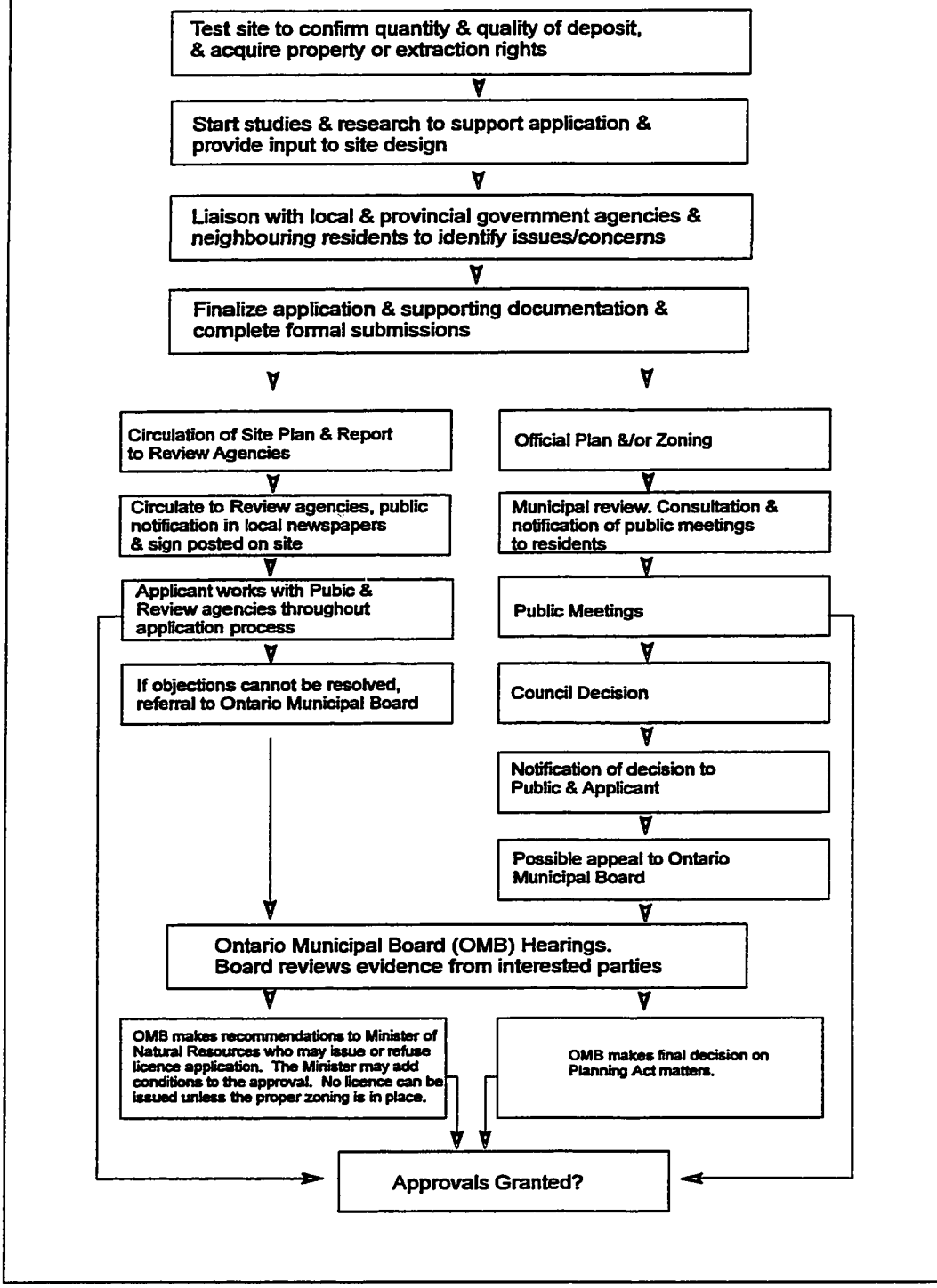


Figure 4.4 Process for Establishing a New Aggregate Site

Source: Aggregate Producers' Association of Ontario, Factsheet "Aggregate and The Law"

the proposal. It is possible, if objections are strong enough, that the application could be forced to go to the Ontario Municipal Board for a hearing (Government of Ontario, 1995, (s.11(4)), 14).

Should an application be referred to the Ontario Municipal Board, the Board considers only planning issues that are referred to in the Planning Act. At the conclusion of the hearing, a report is written and served to the Minister and each party involved in the hearing. This report outlines the recommendations of the hearing. Upon receiving the report, the Minister takes action as seen fit, and serves notice to all parties involved of the final decision. The Minister in reviewing an application, or proceedings from an Ontario Municipal Board Hearing, considers a number of factors in deciding whether to accept or reject a licence application. These various factors are listed below in Table 4.1. The decision made by the Minister is final.

Table 4.1

Ministerial Considerations Under the Aggregate Resources Act

12. The Minister in considering whether to issue or refuse a licence shall have regard to,

(a)	the effect of the operation of the pit or quarry on the environment;
(b)	the effect of the operation of the pit or quarry on nearby communities;
(c)	any comments provided by the municipality in which the site is located;
(d)	the suitability of the progressive rehabilitation and final rehabilitation plans for the site;
(e)	any possible effects on ground and surface water resources;
(f)	any possible effects of the operation of the pit or quarry on agricultural resources;
(g)	any planning and land use considerations;
(h)	the main haulage routes and proposed truck traffic to and from the site;
(i)	the quality and quantity of the aggregate on the site;
(j)	the recommendations of the Board under section 21, if such a recommendation is made; and
(k)	such other matters as are considered appropriate.

Source: Government of Ontario, 1995, (s.12), 14

On the condition that the licence application is accepted, the licensee is responsible for payment of annual fees. The annual fee required under the Aggregate Resources Act is 6 cents per tonne of aggregate extracted. The revenues of these annual fees are distributed in

located. For the Township of North Dumfries, which is particularly rich in aggregate resources, 4 cents per tonne is a large source of 'free' revenue that can be expended at the discretion of the Township (McLellan, 1995, 115). One cent goes to the Province of Ontario for administrative purposes, while ½ cent goes to the region/county also for administrative purposes. The remaining ½ cent goes to the Provincial abandoned pit and quarry rehabilitation fund. This is allocated towards rehabilitating pits and quarries that have been left as a scar on the landscape (Shoemaker, 1994, 110). In addition to this, the licensee is required to deposit eight cents per tonne to a rehabilitation fund, regulated by the Province. This deposit is returned only when the proper progressive rehabilitation procedures have been completed (Government of Ontario, 1995, (s.8), R1.2).

An inspection, which is required under the Aggregate Resources Act, is conducted to ensure that compliance of the Act, its regulations, the site plan and conditions relevant to the licence are meet. This inspection is conducted at least once a year by the Ontario Ministry of Natural Resources (s.17(1)) (Government of Ontario, 1995, 16). The inspector is responsible for the compilation of a written report detailing any practice which may be in contravention with the Aggregate Resources Act. Every fourth review an operator receives, the Minister requests, within forty five days of the review, written comments from the region and from the township where the aggregate site is located.

Every licence holder is responsible to preform progressive rehabilitation and final rehabilitation on the extraction site in accordance with the Act, the regulations and the site plan. Table 4.2 outlines what each licensee is responsible for, in terms of regulations for rehabilitation, on the extracted site. These regulations address issues such as topsoil handling and placement, vegetation and slope angles (Government of Ontario, 1995, (s.23) R1.6).

23. Every licensee and permittee shall ensure that,

(a) no material except topsoil or subsoil is brought onto the site for sloping, grading and other rehabilitation of the site unless the overburden from the site is insufficient for those purposes;
(b) all topsoil and subsoil stripped in the operation of the site is used in the rehabilitation of the site;
(c) adequate vegetation is planted and maintained to control erosion of any topsoil replaced on the site;
(d) when the site is finally rehabilitated, the excavation face,
(i) of any pit has a slope that is at least three horizontal metres for every vertical metre, and
(ii) of any quarry, has a slope that is at least two horizontal metres for every vertical metre;
(e) the rehabilitation of the site is in accordance with recommended practices and procedures; and
(f) no aggregate, overburden, topsoil or subsoil, except material in an earth berm, is moved from the excavation setback area defined in subsection 18 (1).

Source: Government of Ontario, 1995, (s.23) R1.6

The handling and use of the topsoil and overburden is stressed in these regulations. The licensee must ensure that all previously removed topsoil and subsoil is utilized in the rehabilitation of the site. Any soil used cannot be taken from setback areas of the site. The excavation face of the extracted site must be rehabilitated to a 3:1 slope to allow adequate use of the rehabilitated land. Finally, it is required by the Act, that the land is suitably returned to its former use or a land use that is compatible with the adjacent land use (Government of Ontario, 1995, 5). Efforts must be made to compile with these regulations or the licensee will not receive the entitled rehabilitation deposit.

4.3.2 Bill 52 - Amendment to the Aggregate Resources Act, 1996

The Aggregate Resources Act has recently been amended with Bill 52, the *Aggregate & Petroleum Resources Statute Law Amendment Act*, 1996. This bill received Royal Assent on December 19, 1996. Changes include restructuring of the fee schedule, redirection of delegation duties, changes in procedures for licence and permit applications, and the time period for prosecution of offences (Government of Ontario, 1996, i). The objective statement of this amendment is stated as such: ". . . to promote resource development, conservation and environmental protection through the streamlining of regulatory processes and the

(Government of Ontario, 1996, 1).

The restructuring of the fee schedule contains the inclusion of an additional section (s. 6.1). This section outlines the purpose of the new Aggregate Resources Trust Fund. The Trust Fund is to be utilized for the rehabilitation of a site where the licence has been revoked or rehabilitation has not been preformed. In addition, monies from this fund are to be directed toward the regional and local municipalities, and to research on aggregate resource management, and rehabilitation. The portions of the six cents divided among each party has not been altered.

The Ministry of Natural Resources no longer conducts yearly site inspections. This responsibility now lies with the aggregate operators to report compliance or non-compliance with the Act. Each licensee is required to submit an annual compliance assessment report to the Minister of Natural Resources. In this way the licensee's compliance, or contravention, with the Act, regulations and site plan, can be determined.

It is the responsibility of every licensee to complete a three page Compliance Assessment Report each year during the summer months (June, July, August), whether the pit is in operation or not. This practice places ". . . the responsibility of reporting non-compliance items and remedial work on the licensee and permittee to self-assess their operation on a yearly basis" (Government of Ontario, 1996, ii). These forms require the licensee to state whether or not they are in compliance with such issues as site access, site protection, operational details and rehabilitation. If a licensee is not in compliance, it is to be stated on these forms the reason for contravention, and what and when the remedial action will be done. Within 90 days after the report is submitted to the Minister, the licensee should take the necessary procedures to rectify the situation (Government of Ontario, 1996, 9). The mitigation is evaluated by the Ministry of Natural Resources to ensure the situation has been rectified. On the condition that a licensee does not submit an annual report, or is found in contravention without mitigation, the licence is suspended. This licence will be reinstated at such time when the licensee submits the compliance report, or is no longer within contravention of the Act (Government of Ontario, 1996, 9).

As a supplement, and guideline to Bill 52, the Ministry of Natural Resources has prepared a draft report of Proposed Provincial Standards for Bill 52 under the Aggregate

Petroleum Resources Statue Law Amendment Act. The report is divided into three categories:

1) Licences - subdivided into eight categories with respect to Class 'A' & 'B' applications;
2) Aggregate Permits - subdivided into six categories; and
3) Wayside Permits - one category
(Ontario Ministry of Natural Resources, 1996, i)

These categories were developed to provide more concise, 'user friendly' requirements for the fulfilment of the Aggregate Resources Act regulations. The staff of the Ministry of Natural Resource, due to fiscal constraints, no longer facilitate the aggregate process.

Six topic areas are described in the standards for each licence or permit type. These include:

1) Site Plan Standards;
2) Report Standards;
3) Prescribed Conditions;
4) Notification and Consultation;
5) Operational Standards; and
6) Annual Compliance Reporting

For example, for a 'Class A' licence for a pit operation above the water table specifics are outlined pertaining to these six previously mentioned topic areas. Due to the fact that Bill 52 has repealed section (s.8), which described the required contents of a site plan, these detailed standards are useful. Depending on the category of the licence or permit applied for, the required information is specifically outlined. Much of these outlined regulations are similar to those that were previously expected of a licensee, aside from the *Annual Compliance Reporting*.

This previous description provided an explanation of the provincial legislation involved with the aggregate resources industry. This legislation is the basis of the development of Regional and Township level legislation. The following sections discuss the legislation of the Region Municipality of Waterloo and the Township of North Dumfries.

4.3.3 Regional Official Plan Policies of the Regional Municipality of Waterloo

The *Regional Official Plan Policies* are those that are governed by the Regional Municipality of Waterloo for the planning and management of resources within the

Resources Act. These policies detail the responsibilities of area municipalities with regards to the incorporation of the Regional Official Plan Policies in the Official Plan of the Municipality.

With respect to the aggregate issue, it is the responsibility of area municipalities to have the designated Mineral Aggregate Resource Areas outlined in the Official Plan. These areas represent the location of good quality aggregate where the potential for extraction is high. Mineral aggregate resources are regarded as an important natural resource, and are likened to the importance of other existing natural resources such as agricultural lands, wetlands or woodlands. Through these policies, the aim is to conserve all natural resources ". . . for the sustained health of the regional ecosystem and results in significant long term ecological, economic and social benefits" (Regional Official Policies Plan, 1996, 45).

This piece of legislation outlines policies municipalities are to establish for the purposes of protecting aggregate resource areas from land uses which may hinder or prohibit future extraction. In addition, these policies permit accessory uses on aggregate sites that are related to extraction processes, and prohibit ancillary uses that could threaten significant areas such as sensitive ground water zones, or *Environmentally Sensitive Policy Areas* (Regional Municipality of Waterloo, 1996, 45).

The *Regional Official Plan Policies* also outlines when and where mineral aggregate extraction can occur in relation to extraction below the water table, in agricultural areas, and in what proximity to the Grand River Corridor. For example, extraction below the water table can only occur if certain criteria are met. The *Regional Official Plan Policies* (Policy 5.3.8) outline these criteria:

(a) it is demonstrated to the satisfaction of the Ministry of Natural Resources that a significant quantity of high quality mineral aggregate resource is located below the water table;

(b) the Region and affected Area Municipality are satisfied that other alternatives have been considered by the applicant and found unsuitable. Other alternatives include resources not on Prime Agricultural Lands, resources on lands committed to future urban uses and resources on Prime Agricultural Lands where rehabilitation to agriculture is possible;

completion of other subwatershed scale hydrogeological studies have demonstrated to the satisfaction of the Region that the removal of the resource and the subsequent rehabilitation of the lands will not negatively impact the quantity and quality of groundwater resources; and

(d) where feasible, post-extractive drainage is directed away from the resulting pond, the slopes of the pond are stabilized with appropriate native species, and a pond planting plan is to be prepared and implemented to the satisfaction of the Region.

The subsequent policy (5.3.9) states that when there is a proven reserve of high quality aggregate below the water table that cannot be extracted because it does not meet the criteria of policy 5.3.8, then the reserve is protected from land uses that could hinder its extraction in the future (Regional Official Policies Plan, 1996, 57).

The Regional Municipality views aggregate extraction as an interim land use, and thus aggregate extraction is permitted on agricultural land provided certain criteria are met. An important factor is the rehabilitation of the site to agriculture following extraction. Aggregate extraction can occur on Prime Agricultural lands (5.3.12) given that the quality and quantity of aggregate is high, alternate locations were considered and deemed unviable, hydrogeological studies illustrate rehabilitation "is not feasible due to groundwater protection requirements", and an alternative final use has been determined (Regional Official Policies Plan, 1996, 58).

Policy 5.3.15 states that to avoid overlapping information on the licence application with regards to the environmental study, hydrogeological, transportation and archaeological requirements, and those studies required under the Aggregate Resources Act, applicants are encouraged to participate in pre-consultations. Pre-consultation with various professionals avoids the duplication of information, and ensures the necessary information is included.

The Region also encourages area municipalities to establish and complete long term strategies "to assess the potential land use, environmental and social impacts of proposed mineral aggregate extraction operations" in the future (Regional Municipality of Waterloo, 1996, 58). Following completion of these strategies, updated policies should be incorporated into area municipality official plans.

The Official Plan of the Township of North Dumfries ". . . is intended to form a policy framework to guide the future growth and development of the North Dumfries Planning Area" (Township of North Dumfries, 1985, 3-1). In a summary statement of the Plan, it is outlined that it will provide, among other goals, ". . . for the utilization of sand and gravel resources but establishes policies to assure, insofar as possible, control of the opening of new pits, assurance of the highest possible standards of operation of pits and progressive rehabilitation of pits. The policies of the Plan assure, insofar as possible, public participation in any application to open or operate any new pit or quarry except a wayside pit or wayside quarry" (Township of North Dumfries, 1985, 3-2). The Official Plan has also adopted policies pertaining to the protection and provision of prime agricultural areas, water resources, and *Environmentally Sensitive Policy Areas* (Township of North Dumfries, 1985, 3-2).

The Official Plan outlines a number of policies created relative to the overall goals of the Township based on in-depth study and consideration of physical, economic and social factors of the Township's Planning area. Policy 4.1.8, related to aggregate extraction, aims "to provide for the proper utilization of natural resources (particularly sand and gravel) in such a manner as to minimize any undesirable effects during the utilization period and to assure site rehabilitation" (Township of North Dumfries, 1985, 4-2).

Chapter 11 of the Township's Official Plan goes into further detail on the legislation and regulations of aggregate operations. North Dumfries Township recognizes the need for it's abundance of aggregate resources locally, regionally and provincially. However, ". . . the Township recognizes at the same time that unlimited and uncontrolled mining of the large total resource areas could effectively destroy large portions of the Planning Area for other uses" (Township of North Dumfries, 1985, 11-1). In this regard, the Township aims to ". . . balance the need to extract gravel against the possible effects of unlimited mining on the remainder of the Township and its residents" (Township of North Dumfries, 1985, 11-1). This document has the potential for the Township to ensure proper utilization of aggregate resources now, and in the future.

In amendment #20 of the Official Plan of North Dumfries, additions were made to Section 11 (11.4.5, 11.4.6). The purpose of these additions was to ensure that development of any type would not have any adverse impacts on aggregate deposit areas. For example,

permitted only if:

i) resource use is not feasible; and
ii) existing or proposed uses serve a greater long term public interest than does the resource use" (Official Plan Amendment - s.11.4.5).

As well, through policy 11.4.6, the Township has the authority to protect aggregate deposits from incompatible land uses that could hinder extraction. This is advocated through the following policy: "Development on lands adjacent to aggregate resource operation, or adjacent to areas of deposit will be permitted only if:

i) the development would not preclude or hinder the continuation of the existing operations;
ii) the development would not preclude the development of resource; and
iii) issues of potential public health and safety and environmental protection are addressed" (Official Plan Amendment - s.11.4.6).

The point at which public participation takes place, and may be the most effective, is the point prior to passing an amending By-Law. Notification is made about the public meeting and its purpose in the local paper, the Ayr News. When the public meeting is held, the applicant or the consultant representing the applicant makes a presentation of the intentions of the licensee, illustrating the site plans and other relevant documents. Following this, there is opportunity for the public to ask questions and provide input to the matter. On completion of the meeting, public concerns are compiled, and are considered by Council in the decision making process (Township of North Dumfries, 1985, 11-8).

In terms of rehabilitation of existing extraction sites, the Official Plan also denotes policies for the procedures for the completion of rehabilitation. "It shall be the policy of the Township to encourage by means of co-operative effort with owners, regional authorities and provincial authorities, the rehabilitation of existing and/or abandoned pits and quarries with a view to reducing or eliminating dangerous or hazardous conditions and returning the pit site to useful land use" (Official Plan Amendment - s.11.10.1). The Township, through its Official Plan, also strives to rehabilitate those pits and quarries that have been left abandoned. The Township will consider and determine rehabilitation proposals with available monies when, where and how abandoned pits might be rehabilitated. As stated in Section 11.10.2(b), "the use or uses proposed shall be agriculturally related and compatible with neighbouring land uses. Proposal for rehabilitation which would have the potential to conflict with

- s.11.10.2).

Chapter 13, Environmental Policies, of the Official Plan recognizes the need to minimize the damage to the environment of the Township. Although, many of the responsiblities for protection of environmental areas and pollution control fall under other Provincial and Federal ministries, the Township has developed policies to aid in the regulation of these areas. It is the intent of the Township, to ensure the protection, conservation and wise management of the environment (Township of North Dumfries, 1985, 13-1). The Township's Official Plan outlines environmental policies relating to water protection, and ESPA preservation (Township of North Dumfries, 1985, 13-2). "Where possible" the Township through the policies, will try to do what they can to minimize effects or damage to the environment (Township of North Dumfries, 1985, 13-2).

4.3.5 Aggregate Resources Legislation: A Critical Analysis

While it is the goal and purpose of these three pieces of legislation to avoid abuse to the environment, and to govern extraction of aggregate reserves, there are apparent weaknesses to the legislation. With three levels of government in Ontario, each responsible in some form for the regulation of aggregate resources, overlapping and uncoordinated efforts result. "Few would argue against creating appropriate standards of safety and performance, and effective monitoring of the same by government agencies" (McLellan, 1987, 189). However, one should not accept this form of problem-solving without some criticisms. McLellan (1987) suggests ". . . that without flexibility and creative reassessment such institutionalized control can become a sterilizing obstacle to achieving the very objectives of the regulations" (McLellan, 1987, 189). This section will discuss these issues, analysing each piece of legislation in terms of its role, weaknesses and benefits.

4.3.5.1 Aggregate Resources Act

"The provincial government has the responsibility of providing the framework within which planning takes place. It is responsible for the legislation that provides municipalities with the authority to plan and sets out procedural requirements to ensure equity and due process in planning decisions" (Commission on Planning and Development Reform in

involvement in the planning of the local areas, in this case the Township of North Dumfries. The majority of the local planning for a Township is done through the Regional and Township planners (McLellan, 1987, 191). As mentioned the piece of legislation that governs aggregate resource extraction is the Aggregate Resources Act, and the newly incorporated amendments to the Aggregate Resources Act, Bill 52. These regulations are the basis of the creation and control of the regulations of the lower tiers of government, and are the primary source of legislation for Ontario's aggregate resources. However, in most cases, aggregate operations have an operating lifetime of at least 25 to 30 years, and therefore generally extend beyond the planned timeframe of an Official Plan at the local level. It makes it difficult for local planners to, for example, decide upon rehabilitation landscapes that would meet future land use needs when those future needs are not entirley known (McLellan, 1987, 191).

Similarly, it is also difficult to adopt one piece of legislation and create a long term official plan for a local area when government offices are continually changing the mandates. This places increased pressure on the Township when planning for long term protection and development within the Township. It is important to critique and evaluate current legislation in order that improvements can be made for the benefit of all involved. However, these should be improvements for the better of the environment, the industry and the public. The changes should not be made based on a government official's legislation venue or campaign.

It is surprising, also, the lack of public input that can be contributed prior to the licencing decision. It is true, that the public can express their concerns at the stage of the zoning amendment By-law application. Only from experience and involvement does the public realize that this is the point at which their concerns can be most strongly be considered. Once the zoning By-law amendment is accepted, there is little chance the licence for a pit will not be accepted. The public can, as the Aggregate Resources Act outlines, object within forty five days of the notice being served to the Minister, detailing concerns toward the newly approved licence application.

An Ontario Municipal Board hearing may be required if public objection is strong enough. This raises another issue. Township officials, in North Dumfries, often feel it is not necessary to take an application to the Ontario Municipal Board. These hearings can cost a substantial amount of time and money. Township officials look to other cases that have been

Puslinch, and worry about the costs involved. Like the Township of North Dumfries, aggregate extraction is a major industry in Puslinch Township. "The extraction of this natural resource over the years has proven to an irritant to Township residents and to their council" (Ontario Municipal Board Report, Puslinch Case, 5). The aggregate resources of Puslinch Township are a major source of raw materials for the construction industry in the greater Toronto Area (McLellan, Baker, 1994, 343).

The MNR and aggregate producers of the Township appealed to the OMB because of the Official Municipal Plan of the Township of Puslinch. "Five site specific proposals for aggregate extraction appealed the Official Plan on the basis of 'inadequate designations' and 'overly restrictive zoning policies'" (McLellan, Baker, 1994, 343). The community, special interest groups and the Township, through this Official Plan, aimed to curb the expansive growth of the aggregate industry. The Township and community were concerned about the social and environmental impacts of this industry to their Township. This 1989 OMB hearing lasted a total of 161 days, at an estimated cost of 5 million dollars (McLellan, Baker, 1994, 343). As mentioned, a concern with the aggregate industry is the varying levels of government control over the aggregate operations. Baker (1993) states, "the differences in planning objectives at the municipal and provincial levels, and the means of carrying out the objectives, contributed to much of the conflict between the different planning jurisdictions in Puslinch Township" (Baker, 1993, 29).

Puslinch Township, representing concerns the community had toward cumulative effects to the environment, was involved little with the sectoral objectives of the Province (represented by the Ontario Ministry of Natural Resources) (Baker, 1993, 29). In fact, the provincial mandate ". . . dictated that provincial need for aggregate resources ruled out municipal control and made no provisions for municipal input other than protection of aggregate resources" (Shoemaker, 1994, 194). The differing interests, between the Township and Province, led to the lengthy OMB hearing, with a final ruling in June 1990. The ruling meant that the Township of Puslinch would not have authority in the regulation of the aggregate industry in their Township (McLellan, Baker, 1994, 342).

The Aggregate Resources Act makes it clear that evidence and decisions made have to be relevant to a planning matter (Government of Ontario, 1995, (s.11(9)), 14). Concerns

those that can be addressed and dealt with through the Planning Act, for example, noise or dust control. Emotional considerations, such as how the noise and dust effect the quality of a resident's life cannot be the basis of one's objection. These are costs to the public which cannot be priced in monetary terms. Residents are warned of the time and cost factors that can occur as a result of going to the Ontario Municipal Board for a hearing. One must consider however whether a hearing will be more costly than the negative effects that can be felt by the public in the long run from the aggregate operations?

For the aggregate producer, profit is a key concern. Producers do not want to be spending money or time at an Ontario Municipal Board hearing if it can be avoided. It would be an additional cost producers would rather not incur.

The Minister of Natural Resources, when considering whether to accept or reject a licence application, has a number of criteria to consider (s.12, Table 4.1). The Minister must take into consideration the effects to the environment, to nearby communities, comments from the municipalities (which would include those from the public), the plans for progressive rehabilitation, effects to groundwater sources, effects to agricultural resources, the haulage route for the trucks, and the quality and quantity of aggregate. There are a plethora of issues to consider, and these are issues that are continually raised by the public, in terms of negatively effecting the environment. Yet, there have been a number of licences passed in the Township of North Dumfries. The resource is considered by the Province as a provincial 'need'. This accounts for the ever increasing proliferation of aggregate pits in North Dumfries despite the continued objections by the public.

In section s.13 of the Aggregate Resources Act, it states ". . . the Minister may include in the licence such conditions as he or she considers necessary" (Government of Ontario, 1995, 15). Despite the considerations the Minister must have regard for in s.12, this clause appears that those concerns may be overridden to the Minister's discretion. This appears contradictory to the purpose of s.12 of the Aggregate Resources Act. Although the Aggregate Resources Act is designed to manage aggregate resources and minimize impact to the environment, legislation should also account for the loss of significant areas and additional creative mandates for rehabilitation of exhausted aggregate sites.

take the time to rehabilitate, what is it worth to aggregate producers? Rehabilitation is required through the legislation. However, this is an area of the legislation that could be improved. As McLellan states: "they [regulations] constrain activities, they limit the extent to which activities proceed. All too often they are specific and rigid and reflect the limited vision of regulatory control agencies. This vision is generally focused on past failures" (McLellan, unpublished manuscript, 4). McLellan stresses two main problems with regulations:

i) regulations do not stimulate and demand creative, imaginative and innovative solutions; and
ii) regulations rarely exhort the proponent of landscape change to see in the "new landscape" an opportunity to create one which better fits our future intended uses (McLellan, unpublished manuscript, 4).

To illustrate the rigid complexities of the aggregate legislation, operators are required to return an extracted site to agricultural land. When doing this, a licensee is required to grade the slopes of the site "at least three horizontal metres for every vertical metre" (Government of Ontario, 1995, (s.23(ii), R1.6). While this is an improvement from the 1:1 slope requirements in the Pits and Quarries Control Act, it is still possible that given the opportunity certain final rehabilitated uses may not be compatible with this required slope grade.

The main premise of the Aggregate Resources Act ". . . is that if the developer is going to profit by the use of the landscape, then those aspects of it that the public cherishes should not be imperiled" (McLellan, unpublished manuscript, 4). This is be referred to as the *No Net Loss* principle. For example, aggregate producers must follow regulations for the protection of Provincially Significant Wetlands, Environmentally Sensitive Policy Areas, Class 1-3 agricultural fields, groundwater aquifers, or fish habitats. For an individual aggregate site, adverse effects to the environment are generally not significant. However, in a Township such as North Dumfries where a number of pits are located in close proximity to each other, cumulative adverse effects can occur. "In Ontario, the most evident controversies have focused on cumulative effects of land-use changes resulting from approval and implementation of many individual undertakings" (McLellan, unpublished manuscript, 5). The problem, then, with the regulations for rehabilitation of an aggregate site, is that with its

important that in townships such as North Dumfries, that alternatives are determined for land to be restored to something useful that can be given back to the environment, and the community. It is also important, that North Dumfries take into their own hands the responsibility of updating the Official Plan to incorporate these concerns. The Township is aware of the issue, and thus should deal with it on its own terms.

However, there are obstacles to overcome before creative and innovative rehabilitation can become reality. As McLellan (1987) states: "it is very clear that government agencies and staff are not stimulating new creative designs for rehabilitaiton performance" that can be successfully incorporated into legislation and Official Plans. Instead, there are standarized regulations creating standarized rehabilitated sites. "It hardly comes as a surprise that landscapes rehabilitated to meet government regulation similarly fall short when these regulations do not require rehabilitation to consider future use" (McLellan, 1987, 189).

When an aggregate site is returned to an agricultural use, the monitoring program that is set in place by government authorities ". . . does not evaluate restored land from a farmer's point of view, or consider subsequent agricultural fertility, modified opportunities, and constraints (McLellan, 1987, 190). Rather, the government authorities in charge of the monitoring of rehabilitated sites has no mandate in the regulation of agricultural areas (McLellan, 1987, 190). In this way, land that could be productive as an agricultural use, or an alternative use, could become a missed opportunity because of a lack of coordination between governmental agencies. As McLellan suggests, "without integrated government activity to overcome the obstacle imposed by individual mandates of different agencies, and to offset the narrower viewpoints of the lead agency, the restoration and the fertility of rehabilitated agricultural lands will remain incomplete and inadequate, and the cost of the program may be higher than necessary" (McLellan, 1987, 190).

Another issue raised from the Aggregate Resources Act is the sterilization of land that can arise. While regulations require aggregate operators to progressively rehabilitate the aggregate site for further use, legislation also requires operators to fence off the site, thus "rendered inaccessible to the public or to the market". Therefore a number of aggregate sites

inaccessible for public use (McLellan, 1987, 191).

4.3.5.2 Regional Official Policies Plan

The *Regional Official Policies Plan* of the Regional Municipality of Waterloo, in the opening statement of the 'Preamble' for the *Natural Resources* section states "ecosystem-based planning promotes a sustainable human community in harmony with it physical environment" (Regional Official Policies Plan, 1996, 45). The policies in this section are to ". . . provide a framework for conserving and enhancing the irreplaceable natural resources that contribute to our survival and well-being. These natural resources include agricultural lands, groundwater and surface water, mineral aggregates, and woodlands. All these components are inter-related, with the needs of the human population intimately dependent on their continued vitality" (Regional Official Policies Plan, 1996, 45). In the subsequent paragraphs of the policies, it is stated that all agencies, governmental and non-governmental and the community must cooperate in the protection of the Region's valuable natural resources. "These partners must work together to promote responsible stewardship of natural resources, and shape the environment in a way that will enhance the quality of life of this and future generations" (Regional Official Policies Plan, 1996, 45).

These previously mentioned quotes express logical, but ambitious goals on behalf of the Regional Municipality of Waterloo, and other participating parties. As the policies outline, the goal is to "conserve and enhance" the natural resources of the Municipality. One might ask how this can be done through the ecosystem approach when the Provincial legislation does not lend itself to this type of approach or thinking.

It is advocated that protection of important resources is a primary goal of the policies, however, this does not appear to be the case. Granted, mineral aggregates are an important and essential resource, but because of the increased proliferation of pits in the Township of North Dumfries, residents are not experiencing an enhancement of the quality of their lives, but dissatifaction with the handling of expressed concerns. The environment, apart of the aggregate resources, is not benefiting. Environmentally Sensitive Policy Areas and

under pressure, and agricultural areas are diminishing.

In section 5.3 on aggregate resources, policies outline where aggregate extraction can occur, for example, on prime agricultural lands which can be above and below the water table. These policies are designated as such because of the assumption that the land can be successfully returned to prime agricultural land. However, this is a generalized statement. From year to year, and site to site, the water table varies. It is possible that land extracted within one to two metres of a depressed water table, could result in a "swampy wetland of little agricultural utility" when rehabilitated (McLellan, 1995, 114).

In addition, these policies (5.3.12) state: ". . . new mineral aggregate extraction on Prime Agricultural Lands may be permitted without rehabilitation to agricultural use . . ." given certain conditions. This is not in accordance with the Region's overall purpose (Regional Official Policies Plan, 1996, 57). For a municipality that is rich in productive agricultural areas, the extraction of aggregate resources on these areas does not portray the dedication to the protection of these valuable lands. If prime agricultural lands are going to be employed for extraction, one would hope the desire to return the lands to productive agricultural land or a beneficial use would be just as strong as that for protecting aggregate resource sites. Population growth will require more aggregate resources for construction and maintenance, however it will also require land for the production of crops and livestock.

4.3.5.3 Official Plan for the Township of North Dumfries

The Township of North Dumfries is concerned about aggregate producers adhering to procedures outlined in the Aggregate Resources Act. When procedures are not followed, problems arise within the community. The public express their opinions and demand something be done. The Township, through legislation is not in a position to pressure the producer due to legislation legalities, and "provincial need" for the resource. Instead, higher government must be contacted, and this process can be lengthy before the problem is resolved. This take times and money. It also relates to the amount of control the Township has with regards to the aggregate situation. The control of an aggregate extraction site ". . . lies almost exclusively at the Provincial level and that the only real control available to the Township is the section of Provincial legislation that provides that no licence shall be

by-law of the municipality in which it is located" (Township of North Dumfries, 1985 ,11-1). This allows the Township some input with regards to the licensing of pits and quarries in the Township.

4.4 Aggregate Resources and The Township of North Dumfries

The Township of North Dumfries is aware of the contention and friction that can arise from aggregate operations, and thus is well in tune with the aggregate resource industry and its legislation and regulations. This Township, possessing approximately 1.4 billion tonnes of aggregate reserves, is bound to feel pressure from each side of the spectrum, the community and the aggregate producers. The following section will describe the existing and potential areas of resource extraction in this Township.

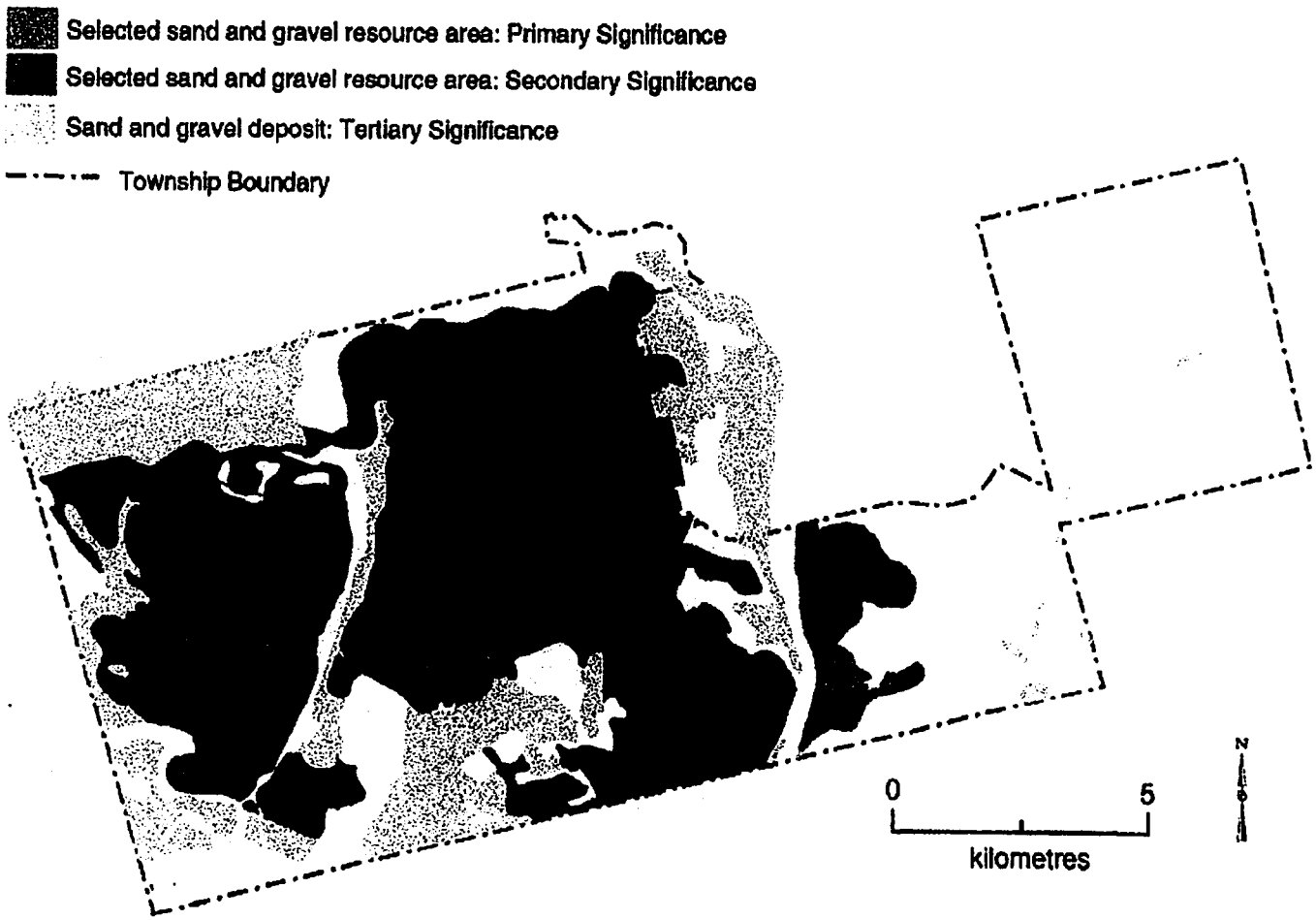
Figure 4.5 shows the extent of designated mineral extraction sites, primarily sand and/or gravel, in the Township of North Dumfries. This figure illustrates the extent of sand and gravel deposits within this study area, as well as serving as a base for the calculation of the total sand and gravel resources available for potential aggregate extraction.

These resource areas were first delineated by geological boundaries, and then classified into levels of significance from primary, to secondary and tertiary levels of importance. These designated areas cover approximately 12,183 hectares in the Township of North Dumfries. The aggregate resources areas selected as primary significance "are not permanent, single land use units which must be incorporated in an official planning document" (Ontario Ministry of Natural Resources, 1980, 5). These areas are designated as such because they represent areas where a 'primary' resource is known to exist, and therefore ". . . may be reserved wholly or partially for extractive development and/or resource protection within the context of the official plan" (Ontario Ministry of Natural Resources, 1980, 5). The total area designated as primary significance in the Township of North Dumfries amounts to 7,045 hectares, approximately 38 percent of the Township's land area.

Selected aggregate resource areas designated as secondary significance are considered to have substantial amounts of sand and gravel, however, these deposits are not considered as the 'best' aggregate resource areas in the Township. As such, because of the large quantities, the resource can be of significant value to supply the municipality for its needs. These

Figure 4.5

The Township of North Dumfries
Mineral Aggreate Resource Areas



Adapted From: Ministry of Development & Mines, 1994

land area.

The resources designed as tertiary significance, 3,376 hectares (19 percent) of the Township, are considered low in availability, and/or highly difficult to extract. If these resources can be extracted, they could serve the local market, as the supplies would not be sufficient for any large scale development (Ontario Ministry of Natural Resources, 1980, 5).

Mapping for the Township contains known information about the quality and quantity of aggregate contained in the selected aggregate resource areas. This information is displayed in Deposit Symbols on the mapping. The information contained in the Deposit Symbol include the gravel content, the thickness of the material, its origin and the quality limitations of a specific deposit (Ontario Ministry of Natural Resources, 1980, 4). The Deposit Symbol is represented as such:

gravel content	thickness class	geological type / quality indicators
G	1	OW / CO

The example above is identifying an outwash deposit greater than 6m in thickness, which contains more than 35 percent gravel. The main quality limitations include significant quantities of clay and/or silt and the presence of oversize particles in the deposit.

The components of 'gravel content' and 'thickness class' are the criteria for differentiating the different deposits. For example, the upper case 'G' represents the fact that the aggregate deposit contains more than 35 percent gravel. The 'S' indicates that the deposit contains less than 35 percent gravel, and is generally sandy (Ontario Ministry of Natural Resources, 1980, 4).

The purpose of the 'thickness class' is to indicate a depth range of the deposit, which in turn is used in relation to the tonnage amount available in that resource deposit. There are four thickness classes ranging from greater than 6m (as class 1) averaging greater than 18,500 tonnes per hectare, to less than 1.5m averaging less than 4,500 tonnes per hectare as class 4. These four thickness classes and descriptions are shown in Appendix B.

geologic deposit type. A summation of the various types are provided in Appendix B. The lower set of letters describe limitations in terms of quality that could be present in the deposit (Ontario Ministry of Natural Resources, 1980, 4). Limitations of this non-renewable resource result primarily from variations that may occur in the lithologies of the materials making up the deposit, as well as from variations in the size distribution of the particles (Ontario Ministry of Natural Resources, 1980, 5).

To indicate the quality of an aggregate deposit, four symbols are used. The aggregate quality can be described by gravel content (G or S), fines (C), oversize (O) or lithology (L) (Ontario Ministry of Natural Resources, 1980, 5). The first three of these indicators deal with the grain size distribution. For example, with the case of the gravel content, the purpose is to indicate the suitability of the aggregate deposit for various uses. Deposits that "contain more than 35 percent crushable gravel are considered to be favourable extraction sites, since this context is the minimum from which crushed products can be economically produced" (Ontario Ministry of Natural Resources, 1980, 5).

High silt or clay content (excess fines) in a deposit can greatly limit the potential use of aggregate from that deposit. For example, as the Ontario Ministry of Natural Resources notes, silt or clay content greater than 10 percent in a deposit can "impede drainage in road sub-base aggregate and render it more susceptible to the effects of frost action" (Ontario Ministry of Natural Resources, 1980, 5). In addition, asphalt aggregate with excess fines limits the bonding potential of particles. Those deposits that do have high fines content, in the Deposit Symbol, is represented by a 'C'.

If a deposit contains greater than 20 percent of 'oversize' particles, defined as more than 10cm in diameter, there is potential for limitation as well. For example, materials that are considered oversize are unacceptable for use as road building aggregate and concrete aggregate. It is therefore crushed for further use or removed during processing (Ontario Ministry of Natural Resources, 1980, 6). These types of deposits are indicated by an 'O' in the Deposit Symbol.

The fourth limitation indicator of aggregate quality is that of lithology. If lithologies such as shale, siltstone or chert are present in a deposit, the value of the aggregate will be reduced in terms of its value for end uses. Even if the presence of these lithologies are in

Deposits that contain amounts of lithologies are represented by an L in the quality section of the Deposit Symbol.

With these factors in mind, Figure 4.6 gives an indication of the present level of extractive activity in the Township of North Dumfries. There are currently 33 active licences in this Township, with new licences being applied for on a continual basis (Ontario Ministry of Natural Resources, July 1996). The total area of licensed property in the Township presently is 1,377 hectares. Table 4.3 gives an indication of the number and area of licences in each selected aggregate resource area.

Table 4.3

Area and Number of Licences in Each Selected Aggregate Resource Area

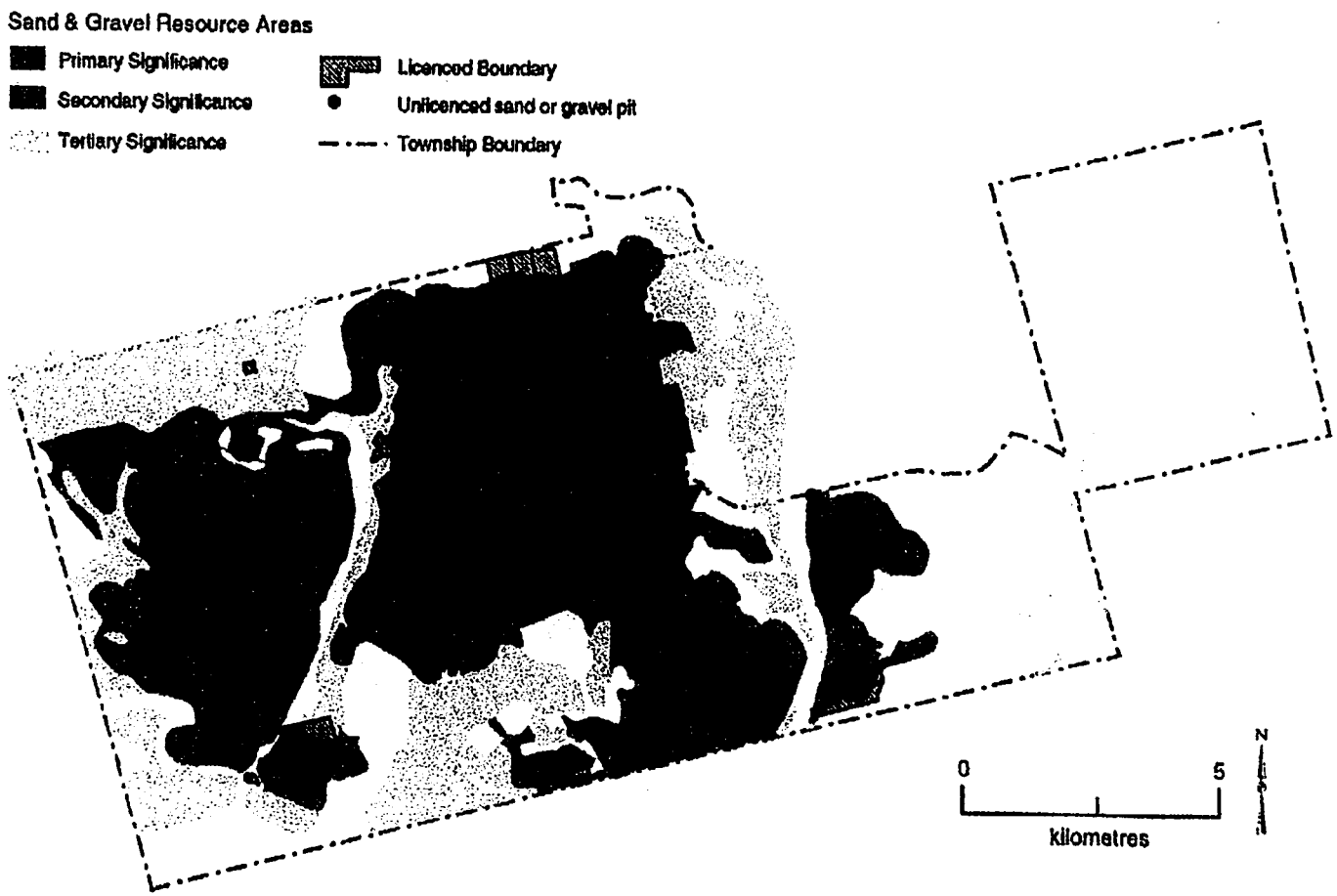
	Total Area (Hectares)	Total Percent (%)	Total Number
Primary	1304.18	95	30
Secondary	69.23	.05	2
Tertiary	3.60	.003	1
Totals	1377.01	100	33

A number of unlicensed sand and gravel pits are also identified in Figure 4.6. These 17 sites are abandoned or wayside pits that can only operate on demand, or under permit, administered by the proper authority.

Of this 18, 571 hectare Township, 7.3% of those hectares are licence for a total tonnage of 13,344,000 tonnes. The top five aggregate producers account for 74% of the total tonnage limit allowed for extraction, while the top five producers also account for 80% of the hectares that are licensed for extraction. Figure 4.7 illustrates the total area, in hectares, of each licensee in the Township of North Dumfries. It should be noted that a licensee may have more then one active licence at any given time. If this is the case, the total hectares are added together for that particular operator. Figure 4.8 shows the number of active licences and the total tonnage limit per licence(s) for each operator. Again, if a licensee is operating more then

Figure 4.6

Township of North Dumfries
The Present Level of Extraction



Adapted From: Ministry of Development and Mines, 1994

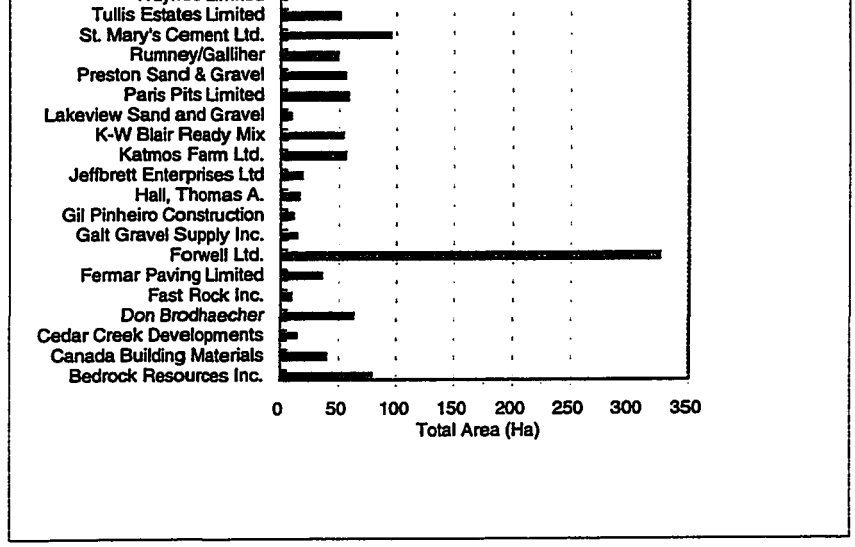


Figure 4.7 Total Area, In Hectares, of Each Licensee

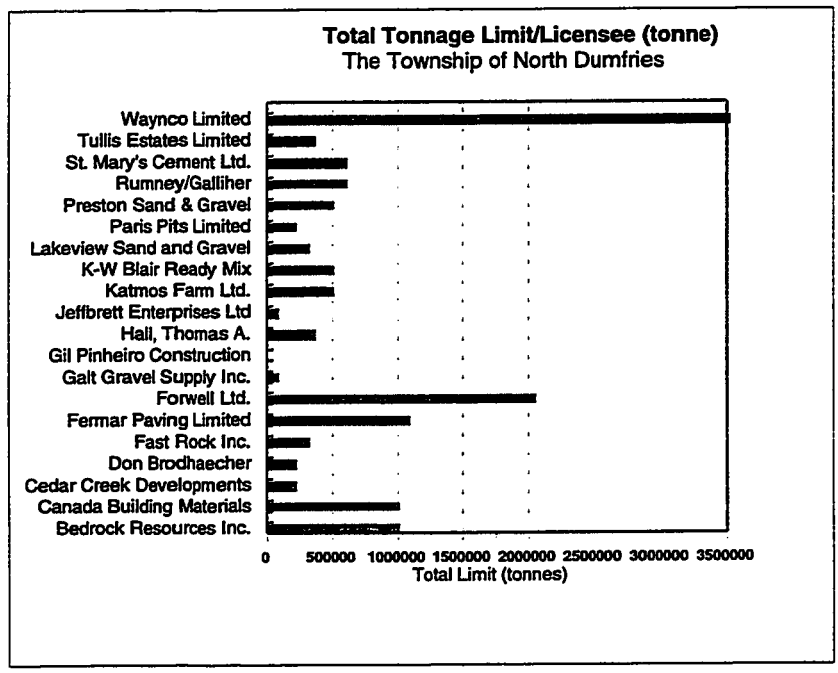


Figure 4.8 Number of Active Licences & Total Tonnage Limit Per Licence(s)

various dimensions of the aggregate industry. The process an operator must conduct from the licence approval stage to the actual extraction, gave an indication of the timeliness of this industry. The pieces of legislation that involve the regulation of aggregate resources were discussed. As noted, there are drawbacks to the legislation which must be addressed.

The aggregate industry creates adverse impacts and presents conflict. Impacts to the environment are seen, and socially affects are felt. The following chapter explores the conflict and contention that arises as a result of the aggregate industry and its operations. Chapter Five discusses concerns felt by selected Township residents, and the conflict that can arise due to a lack of concern for the community, and proactive planning.

This chapter builds on the closing remarks of the previous chapter, in that the community residents have expressed growing concern toward aggregate operations, particularly the role the Township, and aggregate producers play. Focusing on the community's perspective fulfills one of the objectives outlined in Chapter One. This chapter provides the results and discussion of the opinions and attitudes of the residents of the Township. Questionnaires and interviews were undertaken as a means of determining residents' opinions of aggregate operations in the Township, and to acquire an appreciation of the wishes of the rural community concerning the Township's future landscape design, in hopes that concerns may become amendable by local land use planners. Responses and concerns expressed by the Township councillors and the aggregate producers are also addressed in the discussion of the results to act as a tool to illustrate difference in views and positions relative to the opinions expressed by the residents. This method of research was undertaken as a means to determine residents' opinions of aggregate operations in the Township, and to acquire a sense of the factors that influence a move toward proactive long term landscape design.

5.1 Results of the Residents' Questionnaires

5.1.1 Examination of Data Collection

A random sample of residents of the Township of North Dumfries was selected to administer questionnaires through telephone interviews. These residents were selected based on the proximity in and around aggregate resource areas. As there are a number of aggregate sites in the Township, not all were chosen as a sample area for the telephone interviews to be conducted. The aggregate sites chosen range in size, and the number of years they have been operating, ie, newly opened verses a grandfather (old) site. There were eight aggregate sites used as sample areas, some falling in close proximity of another. A preliminary study suggested opinions would not change a great deal from aggregate site to site. As was shown in Figure 2.1, radius circles were drawn out from the areas at 300m and 600m. Names,

delineated areas. Potential participants were selected at random in the delineated area surrounding the aggregate sites, there was only a certain number of residents around and next to an aggregate site with these specified distances.

An interview administered questionnaire, in a standardized format was used to address a number of issues. The questionnaire was designed to collect a combination of socio-demographic data and subjective information, useful for investigating the feeling of the residents in this Township with respect to the aggregate issue. This questionnaire consisted of four sections, each containing various open ended questions pertaining to general respondent information, resource availability, community concerns and rehabilitation (Appendix A). The first section on *respondent information* requested the name and address of the participant. As well, respondents are asked for the length they have been a resident of the Township, and why they live in the Township.

The section on *resource availability* addressed respondents' opinions on the abundance of aggregate resources, and in this regard, what changes participants have seen in the Township. *Community concerns*, as the third section, addressed a number of issues. The researcher was interested in obtaining information on how the respondents felt about public involvement, and the barriers that might be faced when dealing with the aggregate issue. Residents also provided their greatest concerns about the aggregate industry in their Township, their opinion on effects the industry might have on the Township, and more specifically, to the value of their homes.

The fourth, and final section, dealt with *rehabilitation* matters. Specifically, participants' opinions on rehabilitation, the Township's and community's involvement with rehabilitation, and more importantly, what the community envisioned as the future landscape in the Township.

Thirty two people were contacted with a response rate of 75%. Of the thirty two people contacted, twenty four people were willing to response to the telephone interview while eight were not, for specific reasons. Of those that did respond, 41.7% were located within the first radius circle (300m), while the remainder (58.3%) were located within the second radius circle (600m), in the delineated areas. These percentages indicate that while 7 out of 10 respondents talked to in the first radius circle were concerned about the aggregate

industry in their Township. Figure 5.1 displays the response rates for the questionnaire for the Township of North Dumfries residents.

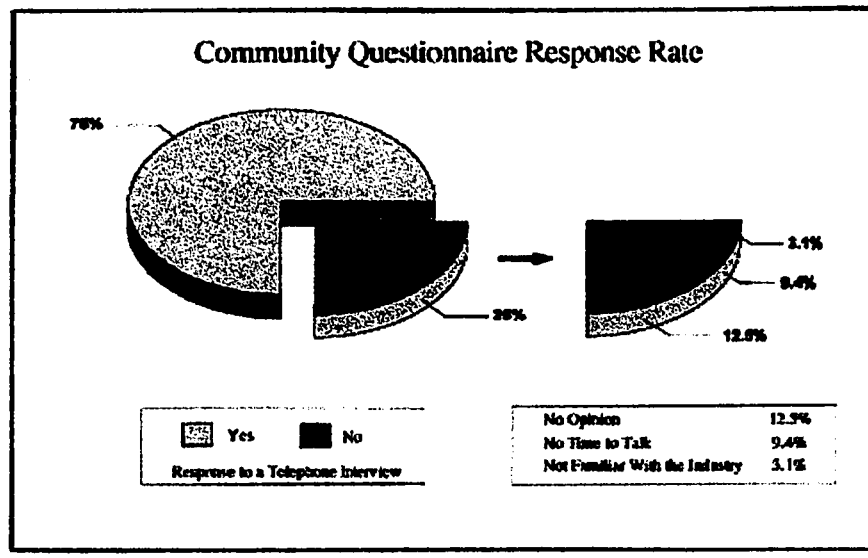


Figure 5.1 **Representation of the Response Rates of the Community to the Questionnaire**

Those who did not respond also provided some insight. When the 25% of the people who did not respond were asked the reason for preferring not to participate in the questionnaire, responses varied, as can be seen in Figure 5.1. Of those residents who did not participate in the questionnaire, all were located within the second radius circle delineated around the aggregate site in their particular area. Four out of the 8 people stated that they had 'no opinion', and thus they may not have any concerns or feel threatened by the aggregate industry.

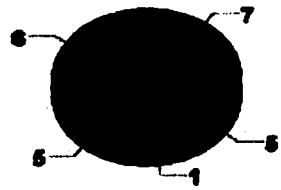
The 9.4% of the people that responded 'no time to talk', could be interpreted in different ways. For instance, the time and day the call was made could have an influence on a person's willingness to participate. In particular, one respondent replied that, although this was a very important topic, it was not a good time for her to discuss the issues. Only one person who chose not to respond to the questionnaire felt that their familiarity with the

fact that the family had recently located to the Township of North Dumfries.

The responses of the twenty four respondents provided valuable information and insight in terms of people's attitudes and opinions toward the aggregate issue. These people were willing to respond to the questions asked, whether it seemed in a positive or negative way. In a number of cases, people were impressed with the idea of gaining community opinion, and on occasion provided the interviewer with additional information. The details of those responses are discussed in the following section.

5.1.2 Responses and Results

Upon making contact with a respondent, each person was informed of the purpose of the research and was assured that information provided through their cooperation would be keep completely confidential. Following this, the interviewer proceeded with the first question. Respondents were asked how long they had resided in the Township of North Dumfries, and why they chose to live in the Township. Aside from those who have lived in the Township of North Dumfries their entire life, there were other reasons given by respondents for residing in North Dumfries. Figure 5.2 and Figure 5.3 display the categories of the length of time lived in this Township, and the reason for living in North Dumfries, respectively. It should be noted that the category of greater than 20 years, in Figure 5.2, obviously contains a large range of the number of years a resident has lived in the Township. For example, one resident has lived in North Dumfries his entire life, 78 years, while another has lived in the Township her entire life at 27 years. The mode, the single most common response, occurred in the category of *1-5 years*, with 29.1% of the respondents living in the Township this length of time. Category *6-10 years* follows closely behind with a 25% response rate, and categories *11-15 years* and *greater than 20 years* are the third most popular responses.



< 1 | 1 to 5 | 6 to 10
11 to 15 | 16 to 20 | > 20

Number of Years	Number	Percentage
< 1	0	0%
1 to 5	7	29.1%
6 to 10	6	25%
11 to 15	5	20.8%
16 to 20	1	4.2%
> 20	5	20.8%

Figure 5.2 **Respondents' Length of Residence in North Dumfries Township**

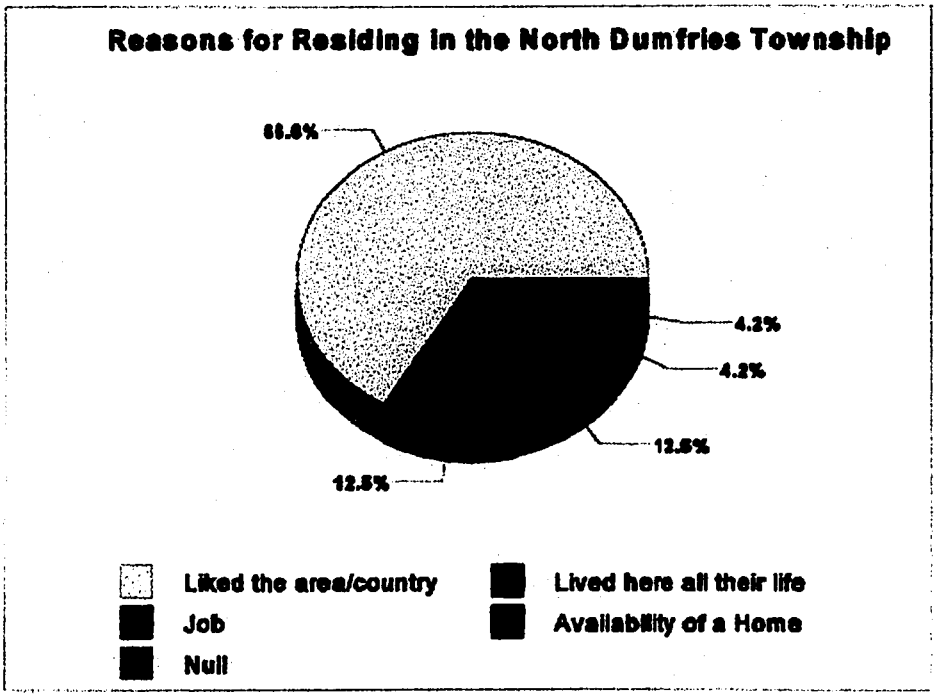


Figure 5.3 **Respondents' Reasons for Residing in North Dumfries Township**

response was that respondents liked the area, whether it be the scenic landscape, the country life, or the small community feeling. Figure 5.3 illustrates this information, and it can be seen that at 66.6%, it was the most popular response. The next most common response was the fact that people had lived in North Dumfries all their lives, or were re-located to this area because of a employment. This too could be synthesised further, in that, as a few respondents stated, this area was close enough to the new job location that they could still enjoy the benefits of country living and a rural community. "We really liked the area, the fact that it was in the country, yet still close enough to his [her husband] place of work" (Interview, March 1997, R-18).

The remainder of the questions were asked to gain a sense of the community's feeling toward the issues of the aggregate industry, and rehabilitation. Generally, many of the concerns put forward were very common among the respondents. Specifically, when residents were asked what changes they had seen in the Township, which very much depended on the amount of time they had lived in North Dumfries, apart from two participants, all responses were similar. Those two people who had resided in the Township of North Dumfries for three and nine years, respectively, felt there had not been much change. The respondents live within the second and first radius circle respectively.

The remaining respondents stated that the greatest change had been the growth in the number of aggregate sites. Although community involvement and pressure was increasing, residents felt that there was little control by the Township as to the number of aggregate sites that have been licensed, and that continue to litter the Township landscape. As such, respondents have also noticed an increase in the noise and dust pollution, and truck traffic throughout the Township.

Participants expressed a noticeable increase in the number of housing developments in the last five to ten years. In addition, residents have noticed a decrease in the land that is utilized for agricultural production due to its conversion to alternative uses, such as aggregate extraction sites. Some expressed more concern that others, questioning what state this would leave the Township in, one that is so rich in agricultural resources and an abundance of natural areas. Many were concerned about the long term effects it could have on their children and their children's children.

the community and the aggregate issue, a number of responses were received. Respondents did not hesitate to express their feelings and most were very passionate in their answers. For example, when asked, if as a community, they were fairly considered and have a public voice when, for example, a new licence for extraction was submitted, responses varied. For the most part, 37.5% of the residents felt that they are not fairly considered (Figure 5.4).

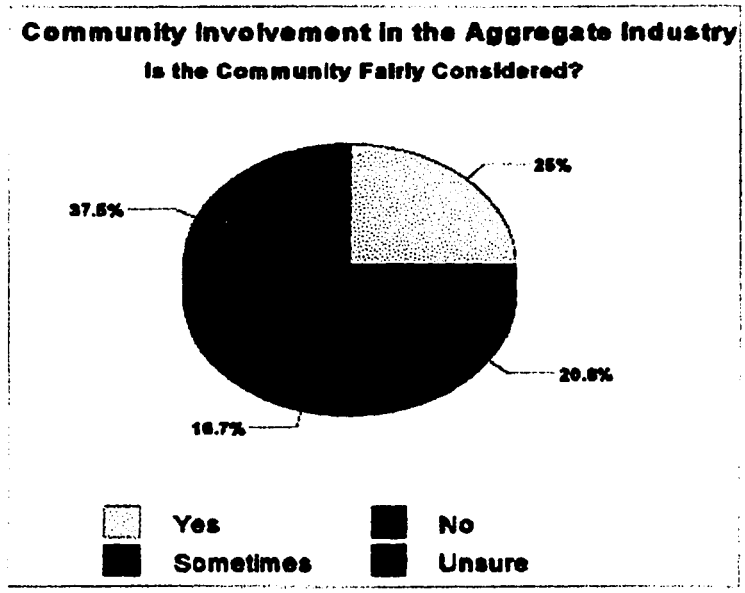


Figure 5.4 **Consideration of the Community's Involvement in the Aggregate Issue**

A number of reasons were provided as to why the public felt this way. The more prevalent responses are listed below in Table 5.1.

Table 5.1 **Reasons for Public Feeling that Consideration in the Aggregate Issue Needs to be Improved**

Is the community fairly considered, and have public voice?
• It does not matter what the public thinks, the "almighty dollar" rules the decisions
• "Provincial Need", there is little to be done to stop aggregate from being extracted
• The public has tried to speak out, but the Township claims the situation is "out of its hands"
• Can see the power of politics at work, and find it demoralizing
• Some people do not realize until it is too late
• Suggestion of Ontario Municipal Board Hearing receives a response that it is too costly to undertake such a task

Respondents expressed concern that it did not appear to matter what concerns the community shared, the 'almighty dollar' always seems to be the deciding factor in the eyes of the aggregate producer and the Township. While a number of respondents felt this way, some were also aware of the fact that aggregate resources are recognized as a 'provincial need', and there is little that can be done to deter extraction of an aggregate site.

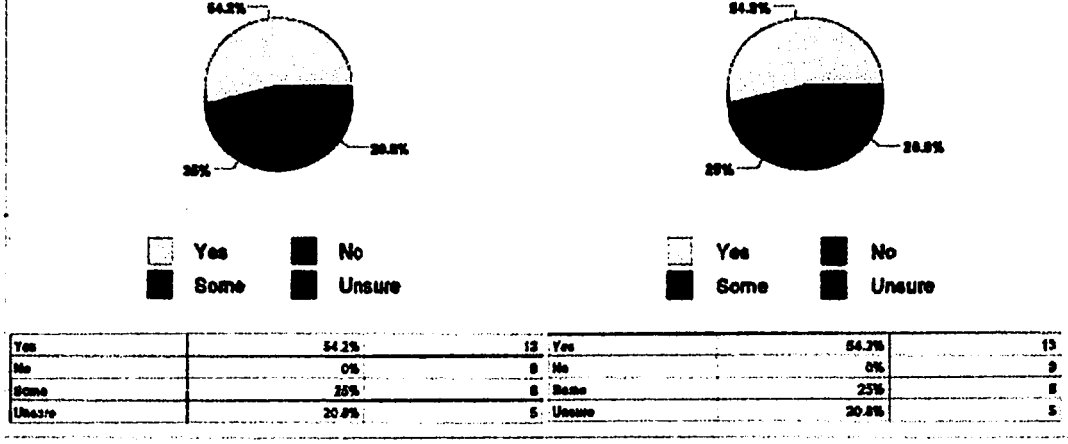
Residents felt there were a number of situations that inhibited the community and the Township from further involvement in the decision making of licensing or rehabilitation of an aggregate site. The public were also quick to lay blame on the Township, as the Township claims the situation is out of its hands, and there is very little it can do to combat the increasing proliferation of pits. One resident states: ". . . there is a lot of hand palming, its sad and frustrating. . ." (Interview, February 1997, R-08), another resident explains, "regulations need to be enforced, people must speak up, and there is a lack of authority that must be strengthened" (Interview, March 1997, R-15). In public meetings, concerned citizens have suggested Ontario Municipal Board Hearings, but are continually told it is too big of a risk in terms of the time, money, and there is low probability of winning a case.

Of the people interviewed, 25% felt that the public were and are fairly considered with regards to the aggregate issue. Respondents stated that through notice in the Ayr News, people were informed of zoning changes and applications for licences, and thus have the opportunity to attend public meetings. At the public meetings, concerned residents have an opportunity to express their views, ". . . public meetings are held for people to come forward with their concerns" (Interview, February 1977, R-07). Two of those people felt that there

and thus, in the decisions made. Thirdly, 20.8% of the respondents were unsure. They were unaware of the extent of the public's involvement, and for the most part had never been part of the process, whether it be attending a public meeting or applying for an aggregate licence.

There were also people who felt that at times the community was considered, and at others they were not. This 16.7% of respondents felt that public voice was increasingly being heard as more people were becoming aware of the aggregate industry and the issues surrounding this industry. This increased concern has meant people have gained a sense of the potential problems, and are therefore, as a community, gathering and organizing to put forward their concerns at public meetings and open houses. Although it was felt that a genuine effort was being made by the public to be heard, only to be ignored by Township officials, consultants and operators, small steps were made each day in the transfer of information, knowledge and concerns to all involved.

The respondents were asked if the Township and the community should have more say with regards to the final use of an extracted property, in terms of its rehabilitation agenda. This was asked in two separate questions, one in relation to the Township, and the other with regards to the community. However, the percentage values calculated for each question were the same. Figure 5.5 displays this data. In terms of the Township's involvement, and whether or not they should have more say in the final use of an extracted property, 54.2% of the respondents felt that the Township should have increased involvement in the final use of the property. This was followed by 25% who felt the Township should have some say, while 20.8% were unsure about the situation and thus, unsure about a response. The most popular responses given as to why there should be more say on behalf of the Township are included in Table 5.2.



Yes	54.2%	13
No	0%	0
Some	25%	6
Unsure	20.8%	5

Yes	54.2%	13
No	0%	0
Some	25%	6
Unsure	20.8%	5

Figure 5.5 **The Amount of Input Toward the Final Uses of Extracted Property**

Table 5.2 **Reasons Why Township Should Be More Involved**

Should the Township Have More Say in Terms of the Aggregate Issue?
• The Township represents the community of North Dumfries
• Planning must be done properly, must consider the long term
• Consider the restriction of the Ministry of Agriculture, are these necessary for all cases?
• Aggregate sites are an eye sore, and therefore must be planned for in terms of rehabilitation so that the exhausted land can be useful
• It is a complex issue, but all people's rights must be considered, "something good should come out of something so bad"

Although the percentage values are the same regarding community involvement, some of the responses as to 'why' differed. These responses are listed in Table 5.3.

Should the Community Have More Say in Terms of the Aggregate Issue?
• Small steps can be made with the public's involvement and cooperation
• The community can provide the Township with input and ideas
• Community participation is important, the issues effect the people who live here
• Rehabilitation is important, and the community should be part of it
• The community would like to see the exhausted land returned to something beneficial

Residents were asked to list their three biggest concerns as a resident of the Township of North Dumfries. This question synthesized the responses into a manageable format so that this information might be displayed. Table 5.4 illustrates the results. The most common response concerned truck traffic considerations (16%). The truck traffic was mentioned in a variety of regards, including the safety of children in the villages and in school zones. Residents were concerned that the increased number of sand and gravel pits has meant an increased proliferation of trucks and drivers who have little regard for the roads and road signage. In addition, respondents addressed the issue of increased costs to road maintenance because of the increased truck traffic, and further more they were concerned about the possible increase in Township taxes to fund the repairs.

Table 5.4 The Primary Concerns of the Residents of the Township of North Dumfries

Community Concerns
Truck Traffic • safety of children • increased road maintenance • increased traffic through the Village
Noise and Dust Pollution
Environmental Issues • water quality and quantity • impact to soil resources • effects to the flora and fauna species • aesthetics of the landscape
The Overall Effect to the Quality of Life in the Community
Lack of Public Voice
Property Values

aggregate operations in the Township, at 14.5%. A number of people have moved to this area to escape the noise and traffic of the city life, only to find the noise and dust pollution of the aggregate pits in this Township. Residents have found that it is increasingly becoming a nuisance to them, and many have had to stay inside and keep their windows shut because of the continual collection of dust and the noise that is created. As one respondent stated, "I have put in air conditioning, my windows have had to be kept closed because of the accumulation of dust, and the noise that is created by the processing equipment . . .", from an aggregate site just metres from her house (Interview, March 1997, R-09).

The environmental impact and the loss of quality of life follows closely behind this concern at 12.9%. In this category, there were a number of concerns, from the water quality and quantity of lakes, wetlands and domestic wells to the impacts of the aesthetics of the landscape. These respondents were concerned about the aesthetics of the landscape, and the loss of the unique scenery and natural habitats in the Township. Many treasured the landscape, and now find "the silence has been broken in the countryside" (Interview February 1997, R-10). A number of respondents summed up their concerns as an overall effect to the quality of their life and life in the community. Respondents expressed concerns that they had spent time and money building a house and making it a home, only to be effected by the abuse of the aggregate sites.

As was seen in a previous question, the lack of public voice with regards to the aggregate issue was a concern. This too is evident, as 8.1% felt that there should be more public voice, and a decrease in the political battles that occur at public meetings. People with no concerns with the aggregate issue accounted for 8.1%, while 6.5% could not think of concerns other than one or two issues.

As a separate question, residents were asked about the value of homes, and if they felt that the aggregate industry did and could effect housing values. In the previous question, only 1.6% of the respondents felt this was an issue, but when the public was specifically asked this question, results obviously differed. It would appear that this was not a issue of priority in terms of the three biggest concerns residents had with regards to the aggregate industry in this Township. Figure 5.6 illustrates this information. Options that people were given were that 'yes' home values are and would be effected, 'no' they would not, 'possibly' and 'unsure'.

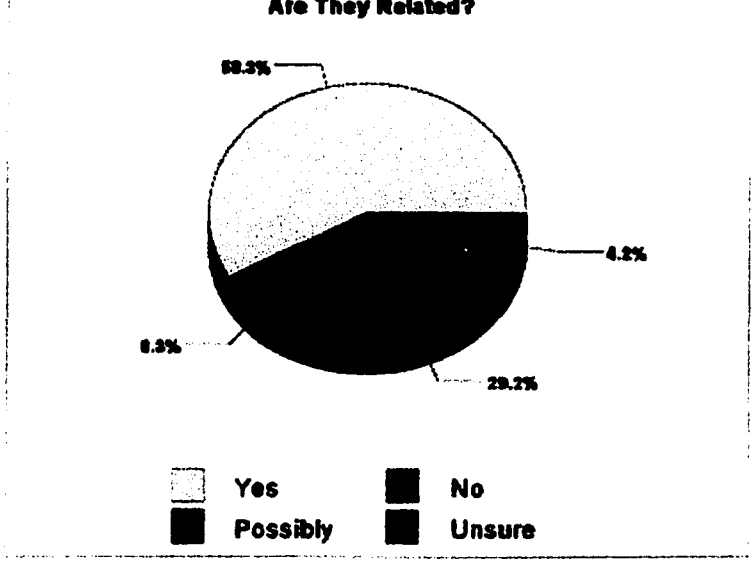


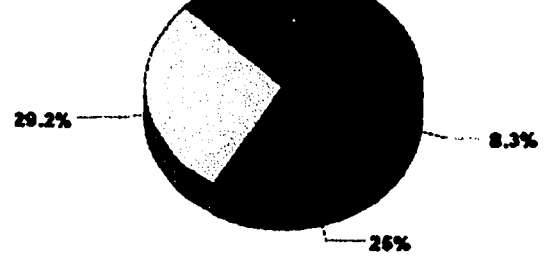
Figure 5.6 **Aggregate Resources and the Value of Homes in North Dumfries Township**

Fourteen of the respondents, or 58.3%, felt that 'yes' the values of homes are effected by the aggregate industry, ". . . yes, definitely, homes are devalued up to a 1/3 of their price" (Interview, March 1997, R-02). The reasoning was that no one would intentionally locate next to a pit where there is such a high chance of being effected by noise and dust pollution, and increased truck traffic. One residents was quite adamant, "yes, definitely, people wouldn't buy near pits, with all the noise, dust and aesthetics of a site. . ." (Interview, March 1997, R-05). Therefore, if a person were trying to sell a home, chances are a home of the same value not located next to an aggregate site, would sell for its value, whereas one next to a pit would sell for a reduction in value. The primary worry respondents had was, if in the future, they were to try and sell their home, they would not receive the value of their home, or even that they would experience trouble selling it. "Who is going to buy a home near a noisy and dust polluting pit, someone is more likely to buy a home away from a pit", another resident comments (Interview, February 1997, R-18).

Second, 29.2% of the respondents felt that it was a 'possibility' that the value of homes are and could be effected, while 8.3% said 'no' and 4.2% were 'unsure' of the consequences.

what people would do, if given the opportunity, if they had an abundance of aggregate resources on their property. It was indeed interesting to see what people really felt about the issue, and whether or not the lure of the financial gain would persuade them to develop the resource. As Figure 5.7 shows, the responses between developing versus not developing are fairly close in number. Of those questioned, 37.5% stated that they would not develop their property, "never, I value the environment too much, we have spent so much time making our house, and property, our home" (Interview, February 1997, R-01). Conversely, 29.2% replied that they would extract the resource. One participant relied, ". . . yes, definitely, it is a way to make money" (Interview, March 1997, R-22). Twenty five percent were unsure what they would do, stating that they would have to consider all aspects of the project before going ahead with developing the land. The remaining 8.3% stated that they have already developed a portion, or all of their property. This represents two people, one having completed successful rehabilitation to productive farmland, while the second has not had rehabilitation completed on the extracted property.

The next issue addressed in the questionnaire pertained to rehabilitation of exhausted sites, and the opinions of the community toward this issue. Residents were asked what they pictured the Township would look like in 20 to 50 years. Table 5.5 outlines those thoughts according to which opinion had the greatest number of responses. Responses varied and answers depended on people's attitudes and opinions toward the issue, which were a function of their knowledge and education about aggregate resources and rehabilitation issues. For the most part, respondents were certain that in time, the Township would be "one big mess", because there would be continual proliferation of aggregate sites in the Township. "There is a lot of prime aggregate in this Township, there is and will continue to be pressure to develop it . . ." (Interview, March 1997, R-05).



Option	Percentage	Number
Develop	29.2%	7
Not Develop	37.5%	9
Developed Already	8.3%	2
Unsure	25%	6

***Figure 5.7* Community Choices in Excavating on Their Property**

As Table 5.5 shows, the second most popular response was that people felt more rehabilitation would be done in the future to combat the negative effects that the Township is presently experiencing. This may appear ironic that many felt the deterioration will continue, while some also felt rehabilitation practices will grow. These people expressed hope that rehabilitation plans would be more seriously considered, and take an increasingly important role in Township planning.

Many of these concerns, in one way or another relate to the economy, the environment, or both, but too many people have seen the economy take precedent over the environment and its effects to the community. Respondents felt that the community would become more aware of these issues, and become increasingly vocal. In addition, a number of respondents felt there would be an influx in population and thus in housing, and therefore a loss of the small town feeling. Due to the increase in the number of aggregate sites, there would be a loss in the beauty and scenic nature of the Township's landscape.

Next, there is some indecision as to whether the Township will exhibit more or less control with regards to the aggregate issue. While some were positive toward the idea, others are not as sure. Residents have seen how the situation has been handled to date, and they are

respondents see the loss of necessary agricultural land, and the increase in excavation resulting in a final land use of more residential, commercial or industrial uses in the future.

Table 5.5 **Respondents' Envision of the Landscape of North Dumfries Township**

What do you picture your Township looking like in 20, 50 years?
• more gravel pits, a big mess, a sad state of affairs
• rehabilitation will become more of a priority
• economy over environment
• community will become more vocal
• more residential development
• lose small town charm
• loss of landscape, aesthetics
• less control by the Township
• more timber resources
• more excavation with final land use resulting in development (residential, commercial, industrial)
• loss of agricultural land
• more industrial development

The next question asked people their opinion on the technique of progressive rehabilitation. Progressive rehabilitation, refers to the extraction and rehabilitation that is done sequentially, or in phases, in addition to incorporating new innovative and unique ways in which aggregate extracted sites can be rehabilitated. As Figure 5.8 illustrates, 83.3% of the respondents were receptive of progressive rehabilitation. Respondents felt progressive rehabilitation would be beneficial to North Dumfries Township, as it would displace some of the unsightliness of aggregate sites, and return to the land to a usable parcel of property. They were concerned that there should be more of a push for this type of landscape management practice. On the other hand, 16.7% felt also that it was a good idea, however, were sceptical of how huge holes could be filled and become a productive and beneficial land use in the future. This is a key response relative to residents' knowledge of rehabilitation options and therefore education needs with regards to the rehabilitation issue. The potential is high that these respondents require additional education about the opportunities rehabilitation of aggregate sites presents. It is evident that people are ignorant of these opportunities, in that

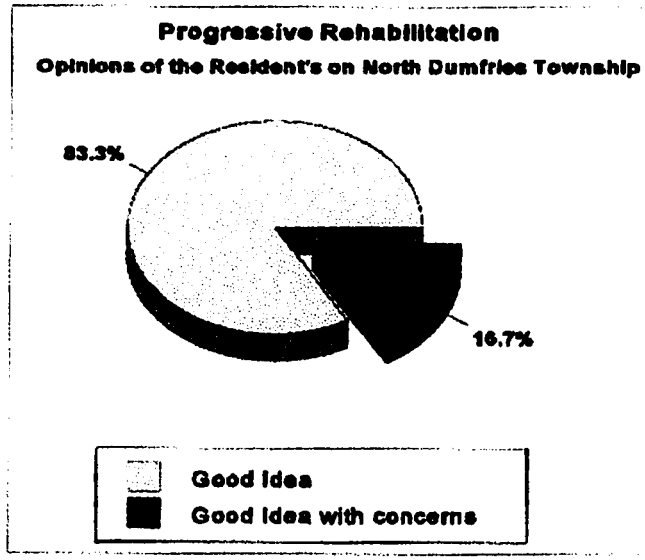


Figure 5.8 **The Respondents' Opinions Toward Progressive Rehabilitation**

A key component of the questionnaire included the following question: "Considering your Township, its residents, the abundance of various resources (aggregate, agriculture) and environmentally sensitive areas, what would you consider viable rehabilitation options that you would like to see in your community, or that aggregate producers might consider?". Again responses varied, people provided three possible ideas, and if they did not it was recorded in the null/unsure category. Figure 5.9 illustrates this information.

In terms of rehabilitation options, while the aggregate industry causes tension and conflict with other land uses, it also presents an opportunity for constructive and innovative landscape land use planning and design. Human activities and needs can be incorporated into landscape enhancement, conservation and biodiversity. This can be achieved through methods of landscape rehabilitation and restoration.

Recreational areas were the most popular suggestion, at 20.8%, as a rehabilitation technique for exhausted aggregate sites. This category included recreational ideas such as golf, swimming areas, hiking, skiing, ball diamonds, or an arena, listed in order of popularity.

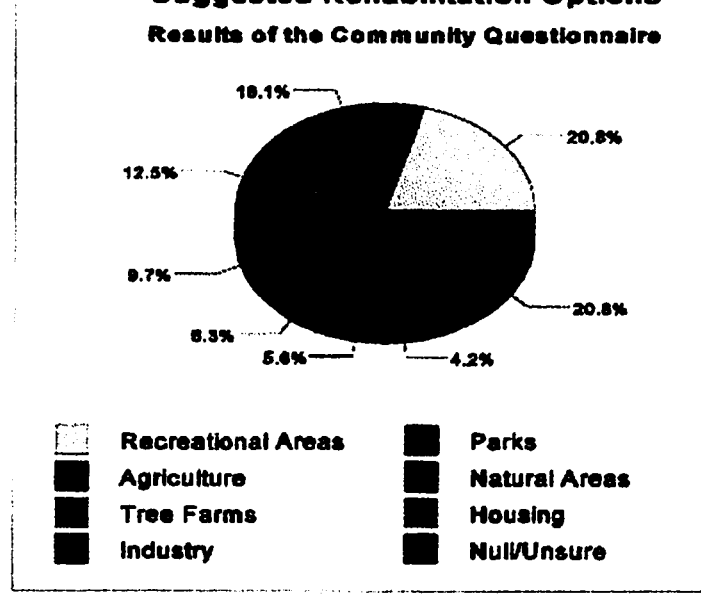
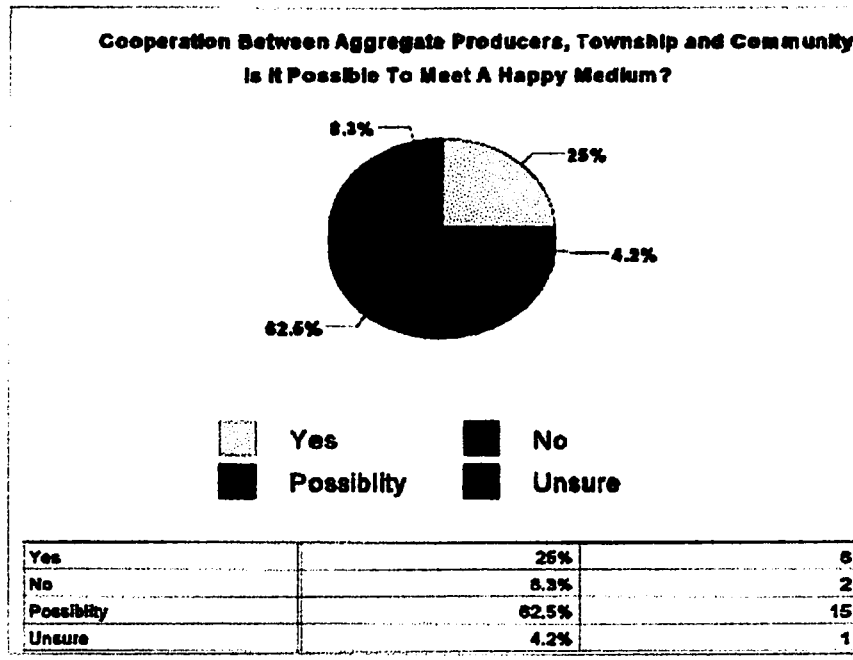


Figure 5.9 **Suggested Rehabilitation Options on Behalf of the Respondent**

Secondly, parks received a 18.1% response rate in terms of popularity, following closely by agriculture at 12.5% and natural areas at 9.7%. Tree farms, housing and industry follow at 8.3%, 5.6% and 4.2% respectively, in terms of options the community were interested in seeing. In addition, 20.8% of the respondents were unsure of any further ideas other than one or two of those suggested above. They did, however, state that they did not want to see anymore housing development. Again, concern was also expressed how a landscape influenced by gravel extraction could be rehabilitated to some of the above mentioned options.

Finally, residents were asked, considering their previous responses and the situation of the Township and the aggregate industry, if they felt that it was possible to meet a happy medium between the community, the Township and the aggregate producer. Figure 5.10 provides the responses, and it can be seen that of the four possible options, 62.5% of the respondents felt that it was a possibility that a compromise could someday be meet, and that all parties could work together to achieve this goal. Twenty five percent of the respondents were sure that a happy medium could be meet, even if it did take some time, in the end everyone would be able to work together and understand the point of view of others. Thirdly, 8.3% were

terms of more aggregate sites being licensed, and that it was too late to even think that something of this sort could happen. Lastly, 4.2% were unsure of what the future held in terms of these three parties being able to compromise, or a "happy medium" being accomplished.



Yes	25%	6
No	8.3%	2
Possibility	62.5%	15
Unsure	4.2%	1

Figure 5.10 **Opinion on the Degree of Cooperation Between The Three Parties**

Those residents that responded "no" or "unsure", corresponded to those who had little knowledge of the opportunities rehabilitation methods presented. These respondents were adamant that the three parties were to far from compromise for steps in the right direction to be taken. One might suggest the focus of these respondents was just as far as the animosity between the three contributing parties, and did not go beyond to realize the potential for beneficial landscape rehabilitation this Township exhibits.

Interview after interview when residents were asked how they felt about the aggregate industry, continually the response was the "yes, it is good for the Township and the people

landscape and the remaining natural resources - how are these benefiting?" (Interview, February 1997, R-03). Residents expressed strong concern about the impact to the environment, and thus to the quality of their life. Residents commented that the Township is a lunar-like landscape, and many expected it would only get worse. As one resident comments, ". . . this surely cannot be good for the environment or the community" (Interview, February 1997, R-09).

When this issue was discussed with the people, there were many that were very concerned about the aggregate industry, and thus were intense with their responses to the questions. Respondents felt so strongly about what could be the eventual loss of their Township, their homes, and their quality of life, that it has heightened the tension in the Township between residents, the Township and the operators.

The primary reason being that the public feels they are not really being listened to when concerns are expressed. When asked if the residents were fairly considered at public meetings when a new licence was being applied for, respondents felt their voices were increasingly being heard, that the community was making more of an effort in coming together as a community, but it never seemed to matter. It appears to be more of a formality to them. To quote, one resident responded, "it doesn't matter what they think, the almighty dollar rules", and another, "we are making steps to gain attention, but they are *small*" (Interview, February 1997, R-01, R-02).

This has left many people sad and frustrated. To the residents it appears the Township and operators have little respect for the public's rights. They wonder if the community can really do anything, or if anyone has enough energy to deal with this issue on a continual basis.

Some of the local residents have formed a local group called CAMP. As was pointed out in Chapter One, these members of the community realize the importance and need for aggregate resources, but they are concerned about the operation and the number of pits in this Township. The CAMP members were of the opinion that the various levels of government do not consider the community when dealing with an aggregate licence. In addition to concerns on hydrological standards, CAMP members have addressed concerns with past records of pit rehabilitation, methods of rehabilitation and financial compensation for those affected.

licence in the Township of North Dumfries, the past records of existing pit rehabilitation should be screened carefully before new licences are granted to those same owners. Members also felt there should be a diversion from the standard rehabilitation practices, incorporating new and exciting ideas. In this regard then, "recognition should be accorded to owners of old gravel pits who develop new and innovative forms of rehabilitation" (CAMP Fact Sheet, n.d.).

Concerns were also addressed with regards to the devaluation of homes, and it was felt that "financial compensation or tax concessions should be made to those people whose property is devalued" (CAMP Fact Sheet, n.d.). The group has raised the awareness of the aggregate issue in the Township, and the effects it can have. They feel they have made small steps in this regard, but feel it is only a start. Today, CAMP is not as prominent as they have been in the past. One member felt that this was likely due to the fact that some people have become discouraged after spending so much time and effort voicing concerns, and then see that very little is done.

In addition to informal gatherings to discuss their concerns, residents are increasingly voicing their concerns at public meetings. For example, when a licence was being applied for just outside the Village of Ayr, residents went to great efforts to spread the word through flyers and newspaper articles. Community members have also made formal presentations of their concerns at the two public meetings for this particular licence application. Residents are very adamant about their position and wish their concerns be addressed by the Township or involved consultants.

5.2 Additional Responses and Results

5.2.1 Township Councillors

As was illustrated in the previous section, the responding residents of the Township of North Dumfries were concerned, and willing to express their concern publicly toward the aggregate issue in this Township. Although, the Township council members are also residents of the Township, each were asked to express their views regarding aggregate operations in their Township, and their roles and responsibilities, as councillors. However, it should be noted that, of the six council members, three live within close contact of an

the third has lived in the Township for thirty years.

The Township councillors were receptive to being interviewed, and provided information from their position as a councillor toward the aggregate industry. Out of the six council members, four of them were concerned with the aggregate issue in terms of the impacts it was having on the Township, environmentally and socially. These council members felt that there was little benefit to the community, and benefits only accrued to those selling the resources and those hauling them out of the Township. Three of these respondents are those which live in close proximity to an aggregate site (600m). However, the councillors stated that as councillors, they are only allowed to carry out certain procedures. The Township has control over the property outside of the aggregate site, and not within the pit. This control is subject to the Aggregate Resources Act, Provincial regulations. Councillors felt their hands were tied in this regard.

The remaining two councillors felt that the aggregate industry was good for the Township in terms of the economic benefits it provided and continues to provide, such as lower taxes compared to other townships in the same municipality. These councillors felt that residents should appreciate the economically valuable resources in this Township.

In terms of transportation issues, the researcher was interested about the costs and funds involved in road maintenance, and if the public was largely concerned about this issue. The majority of the roads in this Township are paved, which is funded primarily by Township taxes and the $0.04 levy the Township receives from the Ontario Ministry of Natural Resources for aggregate resource production (Interview, November 1997, C-01). Two of the councillors felt there was enough funds at this time to cover the cost of road maintenance. The remaining respondents felt it was debatable whether the funds generated from the aggregate industry, used for road maintenance, were adequate. As mentioned, the majority of roads in this Township are paved. These roads are paved because of the heavy truck traffic in and out of the Township. Road maintenance and repairs are costly because of the impacts the truck traffic has on the roads.

When councillors were asked about the rehabilitation of the aggregate sites in the Township, they agreed that more needed to be done. In terms of options that pits could be rehabilitated to, agriculture was the primary response. This was due mainly to the fact that

farming, natural areas, golf courses, and one councillor suggested housing and industrial areas. Each councillor also stated that rehabilitating the land to something other than agriculture would depend on a variety of factors, such as land ownership, zoning, adjacent land uses, and public concern.

In addressing the concerns raised by the public, each councillor was aware that tension was increasing in the Township with regards to the aggregate issue. They also felt the public should be further educated on the issue, as well as the role the Township played in what they can and cannot do.

5.2.2 Aggregate Producers

The aggregate producers, although few responded, also had their views and opinions toward the utilization of the aggregate resources in North Dumfries Township. The aggregate producers agreed with the procedure of progressive rehabilitation, and all stated they have and would practise it in terms of returning the land its original land use. Many were not overly enthusiastic about turning the site to another land use because of the temporal and financial constraints. This would mean operators would have to apply for a zoning by-law change, attend public meetings and generate a landscape plan. In addition, it could require more funds then the operators traditionally set aside.

Half of the aggregate operators felt that the public should not have concern for the final uses of the property, while the remaining respondents felt that the public should have some input in the final uses of extracted property, but should not have the final decision (Interview, November 1996, A-01). One producer did respond that the final land use ". . . should be a compatible land use, with *some* public input, and the Township should plan accordingly to make use of the land once it is depleted" (Interview, November 1996, A-02).

All respondents felt that the public needed to be better educated with regards to the aggregate industry. In this way, the community would have greater consideration for the industry, and realize that ". . . aggregate is regarded as a provincial resource and 'need' within a community is not a consideration" (Interview, November 1996, A-01). One must understand, as well, the position of the aggregate producers. This is an industry with low returns, and therefore, the more problems that can be avoided, the better for the aggregate

In the case that there are problems with the community, there is a chance that the income of an aggregate producer could be reduced because dealing with the public induces extra costs.

Aggregate producers did feel that a compromise could be met in the future, that people would become better educated, and there would be less tension between the community, the Township and the aggregate producers. There is currently an association that was set up to better educate the aggregate producers and the public on the aggregate issue and the importance of the industry. This association has shown leadership initiative in this industry, it promotes ". . . a wider understanding to its members of the current situation, and also in finding means of better informing the public" (McLellan, 1979, 34). This association is called the Aggregate Producers' Association of Ontario, and its members include a number of aggregate producers, consulting firms and equipment supplying companies. The APAO and its members ". . . are committed to the concept of sustainable development and recognize the necessity of pursuing aggregate resource development within an environmental management framework" (APAO, Factsheet-d). The APAO has outlined a number of 'guiding principles' with regards to sustainable development and aggregate extraction. This are included in Appendix C. In addition the Association has developed a number of factsheets and information that is available to the public for information purposes.

5.3 Discussion of the Results

The previous section has demonstrated the results obtained from the questionnaires administered to the community of the Township of North Dumfries, including the Township councillors, aggregate producers and the residents of the community. Given the form of the questionnaire, in that the data collected was of a qualitative nature, the results were presented in a way that generalizations and key themes could be extracted. The data was organized in a fashion to present a coherent picture of the aggregate resources situation in North Dumfries Township.

5.3.1 Community Responses and Concerns

The results of the questionnaires answered by the residents portray the general feeling that there is room for improvement with regards to the handling of the aggregate situation.

Residents strongly felt there needed to be an improvement to the regulations in the aggregate industry, in terms of applying for a licence and control of the operations once the licence was granted. Residents felt that the Township should be doing more to improve the situation. Respondents realized, for the most part, that aggregate was an important resource, however, expressed concern of the number of aggregate sites in the Township and the closeness of those site to the residents of North Dumfries.

Common reactions such as those described above, essentially constitute the LULU and NIMBY phenomena, or the community's reaction to this type of industry in the Township. LULU, or "locally unwanted land use", ". . .can be any of a wide range of public and private facilities that are the seemingly inevitable trappings of our modern, technologically advanced and welfare-oriented society . . ." (Brion, 1991, xi). These public or private facilities might include aggregate sites, landfill sites, toxic waste dumps, prisons or shelters for the homeless (Brion, 1991, xi). LULUs have one common attribute, whatever the harm might be; smoke emissions, noise, dust or the notion of 'differentness', each can, or is thought to cause discernible and considerable impairment to the people and/or property of the residential neighbours. It may be the case that these uses will serve and benefit the 'greater society', but for those people at the local level - the Township of North Dumfries - the aggregate sites are not appreciated as bringing benefit to the community. Therefore, in many cases, inimical reactions are incited (McLellan, Baker, 1994, 336).

NIMBY, or "not in my back yard", consequently is the common reaction by residents who could have a LULU for a neighbour, in this instance, an aggregate site. NIMBY a relatively new phenomenon, has made strides in the reconsideration of the placement of an 'invading' LULU, due mainly to people increasingly voicing their concern. This creates paralysis in the decision making which will allocate the use of this non-renewable resource. NIMBY is described by Brion as ". . . a culmination of several large trends" (Brion, 1991, xi). He notes that the technological change has meant ". . . an accelerating shift in the spatial pattern of enterprise as production facilities for new products and new production processes for existing products are located to take advantage of evolving patterns of transportation networks and consumption markets" (Brion, 1991, xi). This concept is evident in the Township of North Dumfries, where a number of aggregate operators reap the benefits of the

located the Township, adding to its growing industrial base, such as cement companies. In response to this economic situation, there is increased housing developments in the Township, in addition to residential areas closing in on Township boundaries from surrounding cities.

The location and number of aggregate sites in North Dumfries Township has created, among other effects, a social impact to residents of the Township. As was shown in the questionnaire responses, residents were focused primarily on the number of social impacts (noise, dust, truck traffic, value of homes etc) as it was affecting them at the present time. It would appear there is a resistance to thinking in a proactive manner, and planning ahead for the future. The attitude held is one of "here and now", there is friction in leaving what is happening at the present to look toward the future.

5.3.1.1 LULU, NIMBY, Residents and the Government

Inherent in these aforementioned concepts, is the increasing complexity of the role of government. As Brion points out, the government is often a part of the operation. Government is hardly astray from private LULUs, in that it exercises vast power through the different levels of government and regulations, for instance, in the regulation of the operation of an aggregate site. Therefore, government does in fact play a tremendous part and have a substantial effect, whether it be positive or negative, in the aggregate industry. "This increasing regulatory and administrative presence of government has its impact on land use for purposes other than enterprise. To regulate is not simply to control and limit. It is also to allow. When government allows private enterprise to go forward, in an important sense it becomes a partner in whatever external effects that enterprise might cause its neighbours"(Brion, 1991, xii). The result often is the tension caused with the residents, the enterprise and the government. Due to the fact that government sets guidelines and regulations, government is not detached from the operations of a private organization, rather they are a major player. This is chiefly evident with the aggregate situation in the Province of Ontario.

As a primary concern, local residents of North Dumfries question the roles of the various levels of government, and the mandates for each of these levels. As explained in Chapter Four, there are various pieces of legislation and different levels of government

explains ". . . a failure of the different planning agencies to coordinate and manage the extraction of aggregate mining can be attributed in many cases to the lack of communication and different mandates between municipalities and the province" (McLellan, Baker, 1994, 339). It is important that all work together in a productive manner, thus avoiding overlap by each of the governing agencies.

Subsequently, there has been unrest between the Province and Municipality, as two different levels of government, with regards to the aggregate issue. This is clearly evident in attending public meetings and talking to municipal officials (Interview, J. Martens, 1996). While aggregate is deemed a 'provincially needed' resource, the municipality deals, on a first hand basis, with the aggregate producers and residents. Township officials can only do so much in the way of the responsibility they hold apart from the Province. Councillors feel the tension between both parties, and are generally 'caught in the middle' with regards to this situation. McLellan, focusing on this particular issues addresses it as such, "there is a traditional conflict between the Municipality and the Province in the control and planning of resources. The management of aggregate resources provides a good example of provincial expertise and "provincial interest" attempting to enforce legislation and policy on municipal governments which are often reluctant to follow the guidance of provincial mandates (Baker, 1993). Municipal governments tend to be more responsive to local citizen concerns and often elected municipal counsellors support politically expedient, anti-aggregate sentiments with the townships" (McLellan, Baker, 1994, 339). While the Township councillors are required to adhere to provincial guidelines, they too value the Township; its scenic nature, natural areas, agricultural base and the small town community feeling. Township officials are fully aware of the pressures the 'community togetherness' and small town feeling could experience. Township officials aim to protect the Township and its natural beauty, but are limited in how far this protection can go.

The Township would appreciate more control of the aggregate situation in their Township. Considering the Township belongs to the people who live there, and the councillors who represent those people, the Township feels they should be more a part of the decision making with regards to the aggregate industry. The Township stresses it is doing what it can given its situation, often feeling caught in the middle between Provincial

and aware of the increasing environmental degradation, as people have began to locate to this rural Township for its tranquillity and beauty. At public meetings, when councillors explain the regulations and procedures with respect to the Township's responsibility, the public would become infuriated and dissatisfied with the bureaucratic responses and lack of cooperation they were receiving (Public Meeting, November 18, 1996).

On the other hand, the Township is limited in the control it has over the aggregate operations because the majority of it falls under the Provincial regulations. Thus the Township can only respond to those concerns the public have that fall under the jurisdiction of the Township.

There is a definite need for revisions and rethinking of our land use planning system with respect to this issue. There is room for improvement where all could be involved, and potentially benefit. The gridlock that is part of the LULU and NIMBY situations can be attributed to the 'structure and function' of the processes and regulations through which aggregate sites receive approval. People feel threatened by the possibility of a LULU and what affects it could have on them. When there is realization that this industry is of little benefit to the local people, voices are heard. People quickly become angered and frustrated because of the bureaucratic process. As McLellan highlights, "the present planning system and legislation alienates local people in terms of benefits derived from a local resource. Aggregate resources, as a local product, are being exported with little compensation being returned to the community from which they are derived. Aggregate production involves a considerable environmental and social impact resulting from both mining and transportation of material. Residents and municipal coffers are faced with infrastructure costs and environmental uncertainty as a result of mining" (McLellan, Baker, 1994, 339).

5.3.1.2 NIMBY, Residents and the Aggregate Producers

One might question the development of the regulations for the aggregate industry. "The regulatory processes of government - what performance standards will be imposed on the LULU and how strictly those standards will be enforced - can be similarly skewed in favour of the Developer. Even the legislative processes - what institutional arrangements are to be established for making these approval and regulatory decisions - are subject to capture

questionnaires, speculating that regulations could be biased. Residents are quick to point out that the aggregate producers are concerned with 'getting in and getting the product' in a way that keeps costs to a minimum, profits to a maximum and averts conflict. Historically this has been true. In addition, the aggregate industry is resistant to long term planning. The primary goal is to extract the product and deliver it to market for the least possible cost. The consequences of their actions are generally not a primary concern. However, it is those residents that are within close proximity to the site that suffer the consequences. This conviction is expressed by Brion when discussing the LULU issue, "when these decisions go forward under this bias, the inevitable result is substantial harm to the Neighbour from the external effects of the LULU. To the extent the developer does not compensate the Neighbours, then he is passing on part of the cost of the LULU to them. The cost to the neighbours is measured by the harm that they suffer; the benefit to the Developer is measured by the lesser of the cost to compensate the Neighbours and the cost to internalize the external efforts" (Brior, 1991, 164).

Aggregate producers work hard to avoid the public eye, being aware that uneasy situations can result and become costly. It would appear, however, that when the producers shy away from public scrutiny, there is indeed reason to be suspicious or assume that the aggregate site is not necessary. Consequently, if one were to examine the situation from the aggregate producers point of view, the analysis would differ. Assuming aggregate producers are rational developers, in the sense that profits are maximized while costs of the licence approval process are minimized, the costs must be less than any public confrontations that require compensation (Brion, 1991, 166). This would only appear to be in the best interest of aggregate producer so as to minimize expenses. However, community members feel an intrusion on the use and enjoyment of their property. In addition, the industry provides limited relief of harm neighbours might suffer.

The aggregate producers see the situation slightly different. This industry is a business and a way of life. Aggregate producers have come to expect the adversity that the industry can cause, and hope that through the education of local residents about the industry, opinions will change. The aggregate industry has always been under the microscopic eye of the public, because of its effects left to the landscape, it has never been greatly accepted with

that society does not understand the aggregate industry.

There is an opportunity for compensation through lengthy judicial processes of the Ontario Municipal Board. As mentioned, the OMB is responsible for reviewing evidence for the interested parties if objections to a license application cannot be resolved. This too is an additional cost to parties involved. A number of times residents of this Township have been advised not to consider the OMB as an option because of the costs involved, and the minimal chance for compensation from the aggregate industry.

McLellan explains there is, ". . . the need to build an effective conflict resolution strategy on the basis of party interests rather than the defined "rights" of parties, or a solution that is contingent on 'who is most powerful'. The present system of planning in Ontario uses both a rights and power based method to resolve conflict. The continuation of the three decade old "aggregate wars" indicates the ineffectiveness of this conflict resolution strategy" (McLellan, Baker, 1994, 347). Presently, it is the aggregate producer who has the 'right' per se, because of the Provincial regulations that are in place. It is the Province who holds the 'power' enabling aggregate sites to be opened. Communities are often left behind, with little chance to participate before it is too late. Steps can be made to improve this situation. If all parties are equally considered, and perhaps work from a bottom-up approach, instead of top-down. It is important that not only those that have the 'power' are considered, but also those who have vested interests in the situation - residents, their life's and the life's of grandchildren.

5.3.2 Rehabilitation Options As Expressed by the Community

With the rehabilitation options the community would like to see and the areas that could be subject to rehabilitation, the resource manager must determine which is the most appropriate option and which site should undergo a specific rehabilitation option. Considering the amount of aggregate sites presently opened, and the number that could be open, steps must be made to determine what exhausted sites will be rehabilitated as the final land uses. A number of factors must be considered when deciding upon a final rehabilitated land use. These include: community participation and ideas, time frame, size of the site, cost,

characteristics of the rehabilitation option.

In a society where 'leisure time' is of growing importance, recreational ideas were a popular response for rehabilitation options. There are a number of options one might consider with regards to recreational opportunities for rehabilitation. For example, "urban user-based 'contact' activities, where physical requirements are greater than biological requirements, are nearest the urban centre, and rural resource-based 'no-contact' activities, where biological requirements are greater than physical requirements, are furthest from the urban centres" (Garr, 1980, 141). In this regard, " the carrying capacity per unit area decreased away from the urban centre, and it follows that there is a corresponding change from intensive to extensive resource use away from the urban centre" (Garr, 1980, 142). It would be ideal that corridors or linkages be made from the existing natural areas/recreational based land uses with those that will be implemented in the future.

Figure 3.3 shows the aggregate resource areas in addition to the ESPAs in North Dumfries Township. This information can be used in conjunction with the rehabilitation options that the community is interested in being implemented. For example, the more intensely used recreational options could be incorporated in and around the cities of Kitchener and Cambridge, and the areas that will be used less intensely, and appreciated more for their natural features could be integrated further into the Township, away from the cities.

It is important that the spatial pattern of these areas are suitable to the public's needs. "All too often, one is confronted with a patchwork landscape, perhaps zoned on a 'between' site basis, but exhibiting no spatial order in relation to the surrounding land use . . ." (Garr, 1980, 141). The land use options should have a spatial relationship to one another, and be suitable to the public's needs and the present surrounding land uses. This makes the landscape more conducive to good environmental management. It is important that this is planned for as a whole Township, and not on a site by site basis.

As was shown in Figure 5.9, recreational areas as options for rehabilitation were the most popular. This includes options such as golf courses, swimming areas, hiking, cross country skiing trails, ball diamonds, or an arena, listed in the order of priority. Some of these uses are more intensive than others, and thus placement of them would have to coincide with existing features. For example, should an area be rehabilitated to include a ball diamond, or

new sports fields and an arena were needed).

Another popular response was that of a golf course. There is however, one already in the Township, and plans for a new one on a gravel site to the east of the Grand River. Incorporated within the development of a golf course, other rehabilitation measures could be used. Natural corridors creating linkages from the golf course to other natural areas. For example, it can be seen on Figure 3.3 that there are a number of ESPAs that connect or almost connect running in a south westerly direction through the Township. This is a perfect opportunity to incorporate the rehabilitation options, such as swimming areas, hiking and cross country skiing trails or natural areas, the community would like to see in the Township with the aggregate sites in this vicinity.

Other rehabilitation options that were mentioned by the respondents to the questionnaire included agricultural uses, tree farming, industrial uses and housing. These options as well, can be incorporated into the plans for the future of rehabilitation. For these uses, as well, it is important that they are developed in a site that is similar and functional with its surrounding land uses. For example, there is an area in the Township that is specifically designated as Industrial. This occurs in the north west corner of the Township near Highway 401. There are also aggregate sites in this vicinity. Should any further industrial development occur, this would be an ideal location.

This is very similar to agriculture as the final rehabilitated use of an aggregate site. This should also occur in areas in which it will be compatible with. In addition, natural hedgerows can be incorporated in the rehabilitation to enhance the area and habitat for a variety of flora and fauna species.

Proactive thinking with regards to the rehabilitation of exhausted aggregate sites is a relatively new phenomenon. McLellan, a leading professional in this area, provides an illustrative example of the techniques that can be used and the benefits that can be gained. There are a variety of avenues that must be explored when designing a landscape plan for an extracted aggregate site. One of the most important is the attitudes and opinions of the local residents. While there are different options available, some may be more socially and economically feasible than other. The involvement of the public and the co-operation of all parties is key to the success of rehabilitation, "although rehabilitation forms only a segment of

is seen as the cornerstone to gaining public acceptance of the industry" (Yundt, Messerschmidt, 1979, 110). McLellan strongly advocates that "efforts to alter degrading developments and achieve Net Community Gain should result in activities which are not merely acceptable but enhance valued environmental components" (McLellan, unpublished manuscript, 9).

This example is that of a rehabilitation design which was completed in 1992 for a proposed aggregate site. The site was described as "225 acres of undulating kame-morainic topography, one small ephemeral pond, and one isolated remnant woodlot" (McLellan, unpublished manuscript, 11). In addition, human activity on the property had resulted in a landscape of degraded remnant habitats. Extensive agricultural activity stripped the property of its topsoil, rendering less useful, and timber harvest and animal browsing degraded the woodlot.

The site was rich in aggregate resources, a band which ran directly under the woodlot on the property. The intent of the extraction and rehabilitation plan was to "produce a mining plan that would allow access and removal of the valuable aggregates in a manner which would create a landscape that had the potential to support greater biological productivity and diversity", the end result being net community gain (McLellan, unpublished manuscript, 11).

The rehabilitation plan was designed such that:

1) a similar acreage of agricultural land use with contours and slopes much more appropriate to agricultural activities;
2) a substantially increased acreage of linked woodlots with a more diverse mix of species capable of sustaining an enhance and more balanced habitat; and
3) a central wetland comprising two deep water ponds with islands, extensive shorelines and a surrounding shallow wetland area (McLellan, unpublished manuscript, 11).

In addition, McLellan has also developed a rehabilitation site plan for an aggregate extraction site in the Township of North Dumfries. This site (Lot 16, Concession 11) is located in the northern portion of the Township, bordering the City of Cambridge to the east. The selected site was approximately 8.27 km^2, located on primary aggregate deposits as outlined by the Ministry of Natural Resources (Ontario Ministry of Natural Resources, 1980). Within the site and immediate area, are five Environmentally Sensitive Policy Areas, each

these environmentally sensitive areas.

Table 5.6 Characteristics of ESPAs Within the Selected Site for Rehabilitation

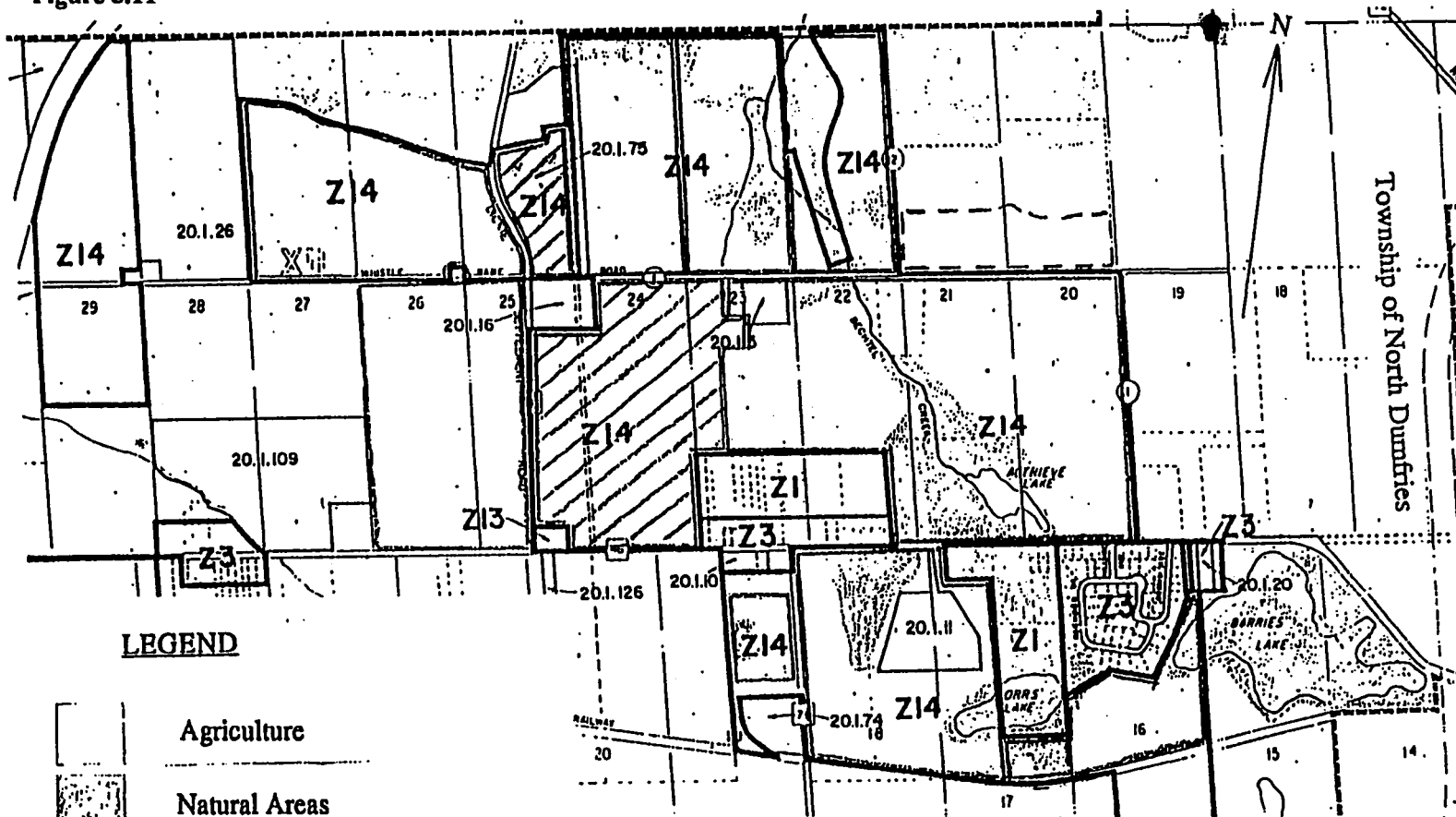
Environmentally Sensitive Policy Areas	Description
Cruickston Park Nature Reserve	• located in the north eastern part of the study area • a combination of flood plain, open fields and forest • one of the last remaining large nature travel corridor for animals
Blair Swamp	• east of Cruickson Park • dense swamp of mainly white cedar
Altrieve Lake & Forest	• bog lake surrounded by marshy lowland and wet forest
Orr's Lake	• a kettle lake surrounded by a sphagnum bog fringe and wetland forest with upland oak and hickory
Barrie's Lake	• lake surrounded by upland forest • swamp and marshland areas found throughout the lake

These ESPAs and the selected site are illustrated in Appendix D in overlay format.

The rehabilitation plan was designed such that agricultural capabilities would be improved. A large portion of the study area was designated for rehabilitation to agriculture. The contoured landscape was designed "to provide better drainage, reduce erosion potential and improve farmer safety" (Dakin et al., 1994, 59). Additional hedgerows were suggested to also reduce erosion, provide a wind break and provide natural corridors for wildlife and bird species.

Fish ponds were also proposed for the study area suitable for raising fish on a large scale. The potential ponds would have a sufficient supply of water, as the aggregate site would be excavated below the water table. The remaining suggested ponds would be left to naturalize on their own. This would provide an enhanced habitat and scenic value for the Township. In addition, two proposed wetland areas were suggested. These natural areas would link two of the ESPAs in the study area. Figure 5.11, through overlays, displays the opportunities available for rehabilitation in the selected site. This Township contains an ideal landscape to explore opportunities such as this, "the end products of aggregate extraction and

Figure 5.11



Pre-extraction Land Use and Licensed Aggregate Extraction Areas

Scale 1:25000 Source: Dakin et al., 1994.

regional landscape - for agriculture, for natural areas and for human usage. This type of creative rehabilitation helps us to halt the systematic destruction and degradation of our farms and natural areas and restore them to their former magnificence and productivity (Dakin et al., 1994, 77).

This chapter has presented and discussed the responses and results of the community distributed questionnaires. In addition, the concerns and views of the Township councillors and the aggregate producers of the Township were discussed. The results have illustrated that there is grave concern about the aggregate industry in the Township of North Dumfries. It have been shown that all players on the community have concern for the aggregate industry in their own regard, however, many do not look toward the future, and plan in a proactive manner. Chapter Six will summarize the major findings of this research, and present recommendations for further study in this area.

Through the previous discussion with regards to the aggregate industry in North Dumfries Township, it was evident that the concentration of the industry in the Township, is a concern among residents of the Township. The research of this thesis aimed to isolate factors that influence one's move toward proactive planning. An investigation of the magnitude of the aggregate industry presently in North Dumfries was conducted by delimiting the spatial dimensions of the aggregate resources. In addition, opinions and attitudes toward future landscape design of residents in the Township were determined through questionnaires and interviews. This chapter will summarize the findings of the study, conclusions of the research and present recommendations for further study.

6.1 Summary of the Major Findings

North Dumfries Township is rich in aggregate resources, a necessary resource, and also exhibits vast areas of diverse integral resources - agricultural areas, woodlots and wetlands. In addition, it is home to nearly 7,000 people that enjoy the small community feeling and country life. It is a Township that is ideally located for the aggregate industry, enabling easy access to primary transportation routes and major markets. The aggregate industry has grown to be one of the most prominent enterprises in the Township of North Dumfries. Containing over 85% of aggregate reserves, the Township currently supports thirty three aggregate operations in close proximity to residential communities, agricultural lands and environmentally sensitive areas. There is hardly an area in the Township that is not marked with a sign of, or potential for, an aggregate pit. The community, and the Township officials, in some regard, are concerned about the number of aggregate sites the Township currently supports. The aggregate industry has a number of benefits, as well as a number of costs. Concerns have been raised by the community members, including Township councillors, aggregate producers and residents, with regards to the operation of this industry.

The aggregate producers, willing to provide comments, felt it was essential that the public become more educated about the aggregate industry and its importance to the economy,

these destinations. Traditionally, this industry produces raw materials at a low cost for large volume of materials, with transportation costs drastically affecting the final cost of the product. Aggregate operators would like the public educated about their position, in that in order to maximize profits, the industry must carry out operations as it does.

While those aggregate operators who responded noted the importance of rehabilitation, the notion of different final rehabilitation options to fit the surrounding landscape was not overly welcomed. Aggregate producers noted that, subject to regulations, land was required to be returned to its use prior to extraction, generally agriculture. Should an alternative land use be implemented, this would involve amendments to the official plan and zoning by law, in addition to the consultation with the general public. Aggregate producers felt that public involvement should be kept to a minimum with respect to opportunities for different final land use rehabilitation options. With the nature of the aggregate industry, it is easiest for the aggregate producers not to change their traditional way of conducting business, and this includes not necessarily planning in a proactive manner for the future.

Township officials, as elected representatives of the community, noted the pressure experienced from both the aggregate producers and the residents in the Township. Their position and level of responsibility, allow councillors the ability to only do so much in terms of the regulation and operation of aggregate sites. In response to these pressures, the councillors are dealing with the issues reactively, on a site by site basis. Minimal planning for the future takes place through the development of the Township's Official Plan. Township officials expressed the difficulty in planning for the long term because of governmental situations. It is hard to plan for more than four years at a time because government's are continually changing. Township councillors are perhaps, ignorant of what could be done in the Township. They suggest they are fenced in legislatively, one might, however, suggest that they are hiding behind the legislation instead of taking a forward approach to the long term planning in the Township.

Four out of six of the councillors did express concern toward the eventual impacts to the environment and the impacts that are and could be felt socially. However, they did not see the importance of proactive planning in the way of rehabilitation opportunities for the Township.

enthusiastic about the industry because of the economic benefits to the Township.

Residents of the Township were questioned about the aggregate industry, community involvement and rehabilitation of aggregate sites as far as future landscapes. People generally realized the need for this industry, however they questioned why a number of sites had to be all operating at once. As was shown in Chapter Five a number of issues were addressed from social, environmental, governmental and economic concerns. These included topics such as public unrest, the loss of the small town feeling, lack of regulation toward the aggregate industry, decrease in property values, and a number of impacts that could effect the environment including effects to water quality and quantity, or the loss of flora and fauna. Some respondents saw the need for rehabilitation, and suggested a number of final land use options. This was an important part of the research, as it provided an opportunity to gather input from the community.

Respondents were primarily concerned about social issues, and rarely mentioned the need to plan for the future. This is a major finding, and thus a contributing factor/barrier to the opportunities for a future landscape plan for this Township. Participants are focused on the present effects that are occurring, a cause of the NIMBY phenomenon. Respondents felt progressive rehabilitation was a good idea, but wondered how this would work and all come together. In theory it was a good idea to them, but resistance to proactive thinking made respondents question the feasibility of an idea such as this. Responses and opinions of participants provided an indication of the knowledge one had toward the aggregate industry and the role it played in the Township.

6.2 Conclusions

The previous description of the results illustrates that the Township of North Dumfries is facing severe stepping stones before the development of a landscape plan for the future of the Township can take place. The resistance that occurs on behalf of the aggregate producers, the Township councillors and residents of the community influence the rate at which proactive planning in the Township will occur. Aggregate producers do not want to change traditional operations, as this may effect their ability to maximize profit. They feel that they should not go beyond what is required of them to do. If one were do go an extra

may hinder their chances of making a profit, the feeling of "if no one else is doing it, why should I".

The Township councillors, faced with the decision making for the Township, is hiding behind the legislation that is laid out with regards to the aggregate industry. Granted, all the decisions that are made on behalf of the Township council will not please everyone, however, the council is in the position to try and make the best out of the aggregate situation. It appeared that little planning for the long term is done. While it is hard to plan in a time of uncertain futures given a number of extraneous factors, the process can aid in decision making when a problem does arise. Although planning may not solve all problems that might exist in this Township, it certainly provides an pivotal and organized approach to land use in the future. The Township of North Dumfries must think and plan for the long term. It is easy for immediate demands to draw ones attention to the short term concerns, however, the 'eleventh hour' is too late for shortcomings to be repaired. There is an opportunity for the Township councillors to step out from behind the framework of their own structure, and step forward in the planning for the future.

The community participants have focused views and opinions of the aggregate industry in the Township. The concerns expressed by the residents are largely those of social considerations of the present time. The residents of the community must also look beyond the present, and consider what can be done for the future generations. Proactive planning is wonderful in theory, however, in reality, for it to work, the community has to be part of the process and come together as one to develop a greater appreciation and sense of planning for the future.

6.3 Recommendations

Given this summary and these conclusions of the research, this section will present recommendations with regards to the aggregate industry and proactive planning in the Township of North Dumfries. In addition, areas of further study will be mentioned with respect to this issue.

It is important that the future is planned for in terms of the extent of extraction that will occur in the Township. In order for this proactive planning to occur, someone must step to the forefront, move away from the internalized thinking and initiate the move toward planning for the future. There is opportunity for the Township councillors to take a lead in this role. These people have contact with both the aggregate producers and the residents of the Township, there has to be heightened communication between everyone who will be affected. By working together with each of these parties, objective and goals for the future can be established. To follow through with the long term landscape design and plan, committees should be established.

Involvement from a variety of professional people can aid in the development and implementation of the long term landscape plan for the Township. Participation on behalf of the local Conservation Authority can provide information of landscape patterns, conservation practices, and waterway and flooding regimes of the Township. Support from environmental planners and consultants will aid in the actual development of the plan in terms of what would be the best options for extracted aggregate sites. In addition, involvement from non governmental organizations such as the World Wildlife Fund, can provide information on wildlife habitat patterns, and designs for habitat enhancement in existing or proposed natural areas. The long term landscape plans must be more than just statements of intent as to how the Township will be looked after, and the conglomeration of a number of people in different areas, including the public, will help see this intent through.

6.3.2 Education

For successful long term planning to take place, those people involved must be aware of the situation from all points of view. Education of the various facets of the aggregate industry can be achieved through public meeting, seminars and tours of aggregate industries. The community can become well versed in the roles and importance of the aggregate industry through the Aggregate Producers' Association, previously mentioned in Chapter Five. This association provides literature for the use of the public in learning about the industry.

Township councillors and the aggregate producers must be informed of the opportunities available to them to improve and enhance the community in which they live and/or work.

It is also important that the aggregate producers and the Township councillors are aware of the concerns of the residents of the community. Understanding the position of the residents and their concerns will perhaps bring the community together on this aggregate issue.

6.3.3 Legislation

In order to achieve the landscape plan for the Township, updated legislation and policy changes are needed. This could help in reducing the conflicting mandates at the various levels of government. In addition, the legislation has to be enforced, without the enforcement, little can be accomplished.

The development of updated legislation needs to addresses the opportunities and benefits available for aggregate producers to rehabilitate an extracted site. Legislation has to encourage aggregate producers, in co-operation with community members and other key players, to create imaginative and innovative new landscapes that will benefit all involved now, and in the future. As McLellan suggests, it must present 'Net Gain' opportunities as opposed to 'No Net Loss' situations (McLellan, unpublished manuscript, 4).

6.3.4 Long Term Landscape Planning and Design

There is opportunity to enhance both conservation practices and the economy with some ingenious steps and education. It is important that all parties are aware of the importance of the views of each of the other parties. In this respect, the residents most realize that aggregate is a needed and necessary resource, while the producers must keep in mind, that although, this industry provides jobs, it also effects the people and natural environment in the area. A number of people do live in the direct vicinity of an aggregate site, and these are the people that are continually reminded of the damage that has been and could be done to the environment and to their way of life. In addition, through proactive planning "the adversary relationship which exists all too often must be replaced by a working relationship that will ensure that reclaimed surfaced mined land is returned to an ecological viable condition where ever possible" (Cairns, 1979, 89).

and the role humans play. In order for the process of rehabilitation to succeed, among other key technical issues, this ecosystem based concept is essential to keep in mind. This is a growing realization among the community of the importance of the environment, as people are developing an aesthetic and cultural appreciation of the landscape around them. There is a cultivating change in people's attitudes and empathy towards the natural environment. People no longer regard wetlands or ESPAs as wastelands, but as areas for its natural value, recreation and education. These types of areas, and other mentioned rehabilitation options by the public, can be part of the planning process, and thus part of the future to restore and value the uniqueness of the Township. People are beginning to realize that the natural endowment of the world's resources, more specifically, the Township of North Dumfries' resources, are neither inexhaustible or indestructible. The possibilities are numerous in terms of the opportunities to enhance, restore or create an unique landscape for all to enjoy and appreciate. People must begin to look past these barriers, and aim for creative solutions, as a team, that will bridge these gaps, and create an end use that will benefit all, today and tomorrow.

From the administered questionnaire, the researcher was able to identify what respondents felt the Township would look like in 20 to 50 years. This can be the initial stepping stone for the development of the Township's future landscape. With these responses, one can see what the people do not want, and there is some indication of what they would like to see. As was shown in Table 5.5, there were an array of responses. In the development of the recommendations for future planning, one must consider as many of the views as possible.

As the most popular response, people felt that the Township would become a 'lunar like' landscape, with an expansion in the number and size of gravel pits. Subsequently, respondents were positive in the sense that rehabilitation would become more of a priority in the future, meaning the community, Township officials and the aggregate producers would see the importance of the planning for the future in such a way that the final uses are beneficial to as many people as possible. The general feeling was that there would also be an increase in the community involvement, due to the increased awareness on behalf of residential of the potential effects to themselves and to the environment.

growth in the community's acceptance and involvement in the aggregate industry and rehabilitation issues. Residents are generally at the point where there is grave realization of the extent of aggregate deposits, and the irreparable harm and loss of landscape amenity values that occur as a result of numerous aggregate extraction sites. People were, and can continue to be consulted on the options they would like to see in terms of the landscape for the future. Gaining a sense of what the community would like to see, provides an ideal starting point for building and planning options for the development of the Township's landscape and 'vision' for the future.

Before proceeding with rehabilitation plans, the resource manager should ensure each person involved has equal understanding of what 'rehabilitation' is, what it involves, and how it is beneficial to the Township. In addition, the logistics of the aggregate industry might be considered. For instance, one must be aware of the time frame that an aggregate site could be operating. Therefore, in conjunction with appropriate progressive rehabilitation, and forecasting for the future in similar time frames, progress can be made to the revitalization of an area that underwent extensive mineral extraction.

6.3.4.1 Options to Rehabilitation

Rehabilitation management options which exist for this Township should all be closely considered incorporating the opinions and concerns of the public. Options that are available for consideration of this Township include the following:

i) Natural Recolonization - Do Nothing

ii) Rehabilitate the land to its original condition

iii) Rehabilitate the land to a use that will be ecologically, economically and socially acceptable (Cairns, 1979, 85).

There are, however, advantages and disadvantages to each of these methods and all must be considered accordingly. As mentioned the key component that should play a part in the decision making of the final land uses for these exhausted sites, should the concerns of the public.

Selecting the most appropriate option for the management of the aggregate resources and the rehabilitation of sites will largely depend on the vision and goals of the Township officials and its residents with regards to the final land uses of exhausted pits. This will all depend on the financial situation and the time frame that is available to conduct any one of these options. Consequently, the option of 'doing nothing', leaving the land as it is once extracted, is advantageous with respect to the financial considerations of the Township. If the Township felt money could be better spent in another area, this option is ideal. It depends on how much value is placed on the landscape, for instance, is the Township concerned about the aesthetics of the site, and thus the time frame involved in improvement of the site if it is left to natural processes?

Secondly, surface mined land will *eventually* recover to a climax community through succession. Although it may not support the flora and fauna species of the previous land use, different species will adapt to the new habitat. The extraction of the land area meant the depletion of an natural habitat, however the natural colonization of the exhausted pit also means the development of a new and exciting environment for other species to dwell. There is evidence of natural succession where habitats have grown to flourish with species abundance. For example, in the Peak District of England, an abandoned quarry site left to natural conservation now supports a number of ". . . plants that cannot stand the competition of the more vigorous plants that grow on good soil" (Bradshaw, Chadwick, 1980, 15). In addition, pits and quarries that are left alone to recolonization ". . . can also become wilderness places where the various stages of development of ordinary plant communities can be seen, the open grassy vegetation which will lead to mature grassland, the scrub that will lead to woodland" (Bradshaw, Chadwick, 1980, 15). Through the succession process, a variety of animal species will also adapt to the new habitat.

With respect to the after use of an exhausted pit, owners/operators feel that because the property belongs to them, they should be able to do with it as they wish. This may include doing the minimum required in terms of rehabilitation. While this may not be the most accepted method, it reduces the cost to the land owners.

Considering the 'do nothing' option, one must keep in mind that the time scale involved with natural colonization is substantial, and can therefore be considered

key factors; the size of the disturbed areas and the degree of disturbance (Cairns, 1979, 83). This scale effect unquestionably influences the recovery of an exhausted site. Land can generally rehabilitate faster if there is human intervention where defined management practices are followed.

Economically, the rehabilitation of a land area, can provide financial gains that may not have otherwise been realized. Renewable resources such as timber or game, recreational areas such as golf courses or residential estates, can provide financial rewards, which could either be put back into maintenance of the area, or directed to another rehabilitation site. This is providing a valuable social and economic gain for the community.

Conducting various rehabilitation practices connotes the collection of valuable information that can be assimilated on various ecosystems that function within this region. The implementation of various techniques and practices of rehabilitation provides unique opportunities to learn, analyse and refine notions about rehabilitation procedures. Although resource managers may not fully understand the restoration of semi-natural ecosystems, much can be learnt about community structure, species sensitivity, habitat characteristics and their management requirements, for example. Setbacks provide insightful information, that can be learnt from, for future rehabilitation measures.

As a drawback to this approach, land that could be useful in another state is not being considered. Land and its ecosystems of various kinds are increasingly becoming scarce. As technology and our progressive mentality increases, significant natural areas are largely threatened. Therefore, it would make sense to rehabilitate an area to a land use that could be successful in an agricultural crop or timber production, or serve as a socially useful function such as a recreational site.

Rehabilitation of Aggregate Sites to Its Original Condition

The second option, as mentioned, is the concept of returning the site to its original condition. In the case of Ontario, provincial aggregate regulations require the site to be returned to its original condition, generally agriculture. There are also advantages and disadvantages to this option. The restoration of an aggregate site to its original condition would mean that the community has not experienced a tremendous long term loss of natural

land is not accompanied by the right to damage it in such a way that it imperils neighbouring ecosystems and decreases property values in the area (Cairns, 1979, 87). Morally, as good stewards of the land and its functioning ecosystems, it would be left in an equal or improved state as found, for succeeding generations. The destruction of ecosystems through aggregate extraction could have destroyed essential ecosystems providing a habitat for rare or threatened species. In this way, humans have " . . . both a moral and legal commitment to protect. . ." these ecosystems (Cairns, 1979, 87).

On the reverse side, it may not be economically or socially feasible to restore a site to its original condition. This depends on the amount of monies available to restore a site to its original condition. Although knowledge is building, in some areas of landscape rehabilitation, limited ecological knowledge is available for the functioning of more complex ecosystems. For example, restoring a site to an agricultural use remains one of the most challenging and complex after uses (Yundt, Messerschmidt, 1979, 110). This is especially true with regards to the handling and placement of the soils. The challenge in returning the land to a productive nature is the arrangement of the soils that have been susceptible to erosion or compaction during the aggregate operations.

Rehabilitation of an aggregate site to its original condition may not make good ecological or financial sense. An exhausted site generally retains fairly step slopes. The re-contouring and designing of the original land use, could result in less soil stability, for example. The cost of restoring a site to its original use can be hard to determine given the present conditions and those required for the future (Cairns, 1979, 88). "In short, we know how to rehabilitate damaged ecosystems to a more socially acceptable and economically viable condition because the number of options is far less diverse than the number of different 'original ecosystems'" (Cairns, 1979, 88).

Rehabilitation to an Ecologically, Economically and Socially Acceptable Option

The third rehabilitation option provides an opportunity to overcome some of the previously mentioned drawbacks. Having said this, consideration of what the community would like to see for the future landscape is essential. This option, as with the previous two, also has advantages and disadvantages.

is involved in the decision making of the final land uses much more than involvement would be with rehabilitation option one or two. "The option of developing alternative ecosystems to the one impaired or destroyed is attractive and even exciting to many members of the population" (Cairns, 1979, 88). Rehabilitating the land to a final use that is accepted by most, including the aggregate producers, provides short term benefits to the Township, the community, as well as the aggregate producers. The Township and the community would be appreciative of the measures being taken to restore the aggregate sites in the Township to something of their liking. In this way, respect is gained of the aggregate producers by the community. Aggregate operators took something away from the Township, and rehabilitation is an excellent opportunity for something to be given back to the community.

Rehabilitation using this option, fulfills two important objectives. As Yundt and Messerschmidt describe, rehabilitation returns exhausted aggregate sites to a use that is acceptable and compatible with the surrounding land uses (Yundt, Messerschmidt, 1979, 110). Consequently, the more rehabilitation that is conducted, the more socially accepted this industry will become, ". . . the more compatible the industry will be to its surroundings and the more it will demonstrate industry's willingness to fit within the community framework" (Yundt, Messerschmidt, 1979, 110).

On the reverse side, it can be difficult for all parties to agree on the final land use, this will take time and deliberation. There must be compromise between the involved parties, although this may take time and money, the final product can be worth the effort. This may be one of the most challenging steps, but as mentioned, it involves the community in the decision making.

As was previously shown, there are three options available for consideration for the final use of the extracted land. However, executing these various proposals means a clear objective must be developed for successful implementation of the rehabilitation measures. While there are different options available, some may be more socially and economically feasible than others. The involvement of the public and the co-operation of all parties is key to the success of rehabilitation.

Given the results and recommendations of this research, there is a number of opportunities to continue study in this Township with regards to the aggregate issue. In order that one may develop a long range landscape plan, this information provides a starting point for further research opportunities.

This research has looked at one Township in particular, and the struggle with the aggregate industry. Through the interaction with key players in the area; the community, Township councillors and aggregate producers, a great deal of background information and their input was received. This was all essential in gaining a sense of just how strong the issues were and are in the Township with regards to the aggregate issue. A step further was taken, in which residents of the community were consulted for their opinion on rehabilitation and what they felt might be valid rehabilitation options for their community.

As this research has touched on the social aspects of the aggregate issues in the Township of North Dumfries, further research should concentrated on the optional plans and designs for exhausted aggregate sites for the final land use. This would involve not only the actual designs and implementation, but also additional interaction with the public and the aggregate producers. It is essential in a project such as this that the community is involved. This is the Township many chose to live in, and thus they should be part of the decision making for future land uses.

There are a number of factors that will influence the successful implementation of suggested land use management options. At the point where rehabilitation measures actually become reality, monitoring programs will have to be explored and implemented to observe the health of these areas. It will also be necessary that programs are developed to include the community, as well as the aggregate producers and Township officials. This will involve the development of committees and agendas for the programs that will take place. Occurring in stages, each party will become aware of the concerns of each of the other parties, and can thus be addressed in an appropriate fashion.

Further research should also be conducted in the physical aspect of the aggregate industry, including the identification and evaluation of cumulative impacts that could be felt by the community and the environment. This could involve the concentration of a particular site in the Township where continual monitoring of an area is set up for specified amount of

species to gauge the effects felt from a near by aggregate site.

In addition, further research should be conducted in the area of aggregate legislation. One might explore the opportunities or development of less rigid legislative guidelines, and the benefits and cost that creative and innovative rehabilitation measures would add to the aggregate industry. This would involve further consultation with the aggregate producers, and governmental officials in order ascertain areas which they would like to see improvement.

It has been shown through this research, that the aggregate industry is an essential enterprise within the Province of Ontario. The industry provides needed raw materials which the growth of society relies upon, however, its also produces costs. A number of social costs affect those people living within the Township. While there are opportunities to decrease these costs in the way of proactive planning, a number of factors have been outlined which influence to resistance to planning for the future. With the co-operation of a number of various players, the Township can develop landscape plans that will improve and enhance the appearance and acceptance of the landscape.

Code # :

Stakeholder Attitudes Toward Long Range Management of a Threatened Landscape: A Case Study of Aggregate Use in the Township of North Dumfries, Ontario

Dear Council Member,

As a Master of Environmental Studies student at Wilfrid Laurier University, I will be undertaking a study of the aggregate resources and their development within the Township of North Dumfries, Regional Municipality of Waterloo. The purpose of this research is to ascertain attitudes toward long range management of aggregate resources, within the limits of a community based landscape, and thus your assistance through completion of this questionnaire is requested.

All of the information collected in this questionnaire will be **strictly confidential** and used in the final report in such a way that individual data could not be identified. The information is available only to those two people working on the report (Kim Horrigan and Dr. Jerry Hall). Survey sheets will be encoded and your name will not be recorded on the survey sheet - all survey data will be locked in a file cabinet at Wilfrid Laurier University. If you choose to withdraw at any time, your survey will be destroyed.

Should there be any questions regarding this questionnaire or the use of the reported data, please do not hesitate to contact Kim Horrigan (884-1970 ext. 3994), or Dr. Jerry Hall (884-1970 ext. 2442).

Thank you for your assistance,

Kim Horrigan

Respondent Information

Name:
Address:
Date:

Length as a resident in the Township of North Dumfries:

Length as a council member for the Township of North Dumfries:

What is your opinion about the abundance of aggregate resources in this Township; economically, politically, environmentally?

What changes have you seen in this Township in the time you have been here, in these respects?

Transportation

Is the transportation of the aggregate resources through the township a primary concern among the residents, and thus, in the council meetings? Concerns?

Approximate cost for the maintenance of roads? Of Township funds, does road maintenance costs receive a substantial amount of those funds? In terms of MNR subsidies are the funds adequate?

Rehabilitation

What do you envision your township looking like in 20, 50 years?

Opinion on rehabilitation, specifically progressive rehabilitation?
Progressive Rehabilitation - refers to the extraction and rehabilitation that is done sequentially, or in phases

Do you feel the community should have some input into the final uses of extracted property? Why or why not?

Considering your Township, its residents, and the abundance of various resources, what would you consider viable rehabilitation options aggregate producers might consider exclusive of government constraints?

Community Concerns

Do you feel the community is fairly considered, and have public voice in terms of disapproving aggregate extraction, increasing aggregate expansion, or rehabilitation, for example?

In your opinion, what effect do you feel the aggregate industry had & has on your Township?

You have an unique Township, its important to plan/strive for maximum aggregate extraction, at the same time as caring for the integrity of the Township within a community based landscape - do you feel it is possible to meet a happy medium?

Conditions restricting the Township's or the community's involvement on the licensing of a property?

Conditions restricting the Township's or the community's involvement in the rehabilitation of a licensed property?

What do you see as the three biggest concerns of the community in terms of the aggregate issue?

What are your three biggest concerns, as a council member of the Township, in terms of the aggregate issue?

Pressures in council - between the aggregate operators, and the community?

Stakeholder Attitudes Toward Long Range Management of aThreatened Landscape: A Case Study of Aggregate Use in the Township of North Dumfries, Ontario

Dear Aggregate Producer,

As a Master of Environmental Studies student at Wilfrid Laurier University, I will be undertaking a study of the aggregate resources and their development within the Township of North Dumfries, Regional Municipality of Waterloo. The purpose of this research is to ascertain attitudes toward long range management of aggregate resources, within the limits of a community based landscape. Your assistance through completion of this questionnaire is requested and appreciated.

All of the information collected in the questionnaire will be **strictly confidential** and used in the final report in such a way that individual company data could not be identified. The information will be available only to those two people working on the report (Kim Horrigan and Dr. Jerry Hall). Survey sheets will be encoded and your name will not be recorded on the survey. All survey data will be locked in a file cabinet at Wilfrid Laurier University. If you choose to withdraw at any time, your survey will be destroyed.

Should there be any questions regarding this questionnaire or the use of the reported data, please do not hesitate to contact Kim Horrigan (884-1970 ext. 3994), or Dr. Jerry Hall (884-1790 ext. 2442).

Thank you for your assistance,

Kim Horrigan

* (Please complete this section for each license or pit operation in this Township)

Participant Information

Company Name:

Company Address:

Contact Person:

Date:

License Description*

Location: Lot

Concession

Township — Township of North Dumfries

Region — Regional Municipality of Waterloo

Total Hectares of Property:

Total Licensed Hectares:

MNR License Number (s):

License Issued (Month/Year):

Annual Tonnage Limit (tonnes):

Breakdown of Resources (within licensed boundary):

a) depleted	_____ha	_____%
b) proven reserves	_____ha	_____%
c) possible reserves	_____ha	_____%
d) unavailable resources (due to setbacks, environmental designations, etc.)	_____ha	_____%
e) rehabilitated	_____ha	_____%

Annual production (averaged over past 5 years):

Estimated proven reserves (tonnes):

Are your materials washed on site?

If yes, is all process water recycled? How?

_____

_____

_____

Other Processing Functions On-site?

_____

_____

_____

Product Breakdown*

Average percentage of total production (averaged over the past 5 years):

a) concrete & asphalt stone	_____%
b) concrete & asphalt sand	_____%
c) granular sub-base(B & sandfill)	_____%
d) granular base (A & M)	_____%
e) winter sand	_____%
f) unmarketable by-product	_____%
g) other	_____%

Transportation

Average haul distance (km):

Average cost/tonne for delivery:

Main haulage routes:

_____

_____

Rehabilitation*

Disturbed hectares awaiting rehabilitation:

Number of hectares rehabilitated:

Present use of rehabilitated lands:

Condition of approved rehabilitation:

The final use of property if it differs from above:

Opinion of rehabilitation, particularly progressive rehabilitation:

Rehabilitation practices that are generally conducted (progressive rehabilitation, succession, let nature take its course, etc)?

General

License conditions restricting resource availability:

Are you aware of any abandoned or "old" rehabilitated sites in your area? (Location, Name)

Do you have information on previous licenses you may have had? (Location, Name, Rehabilitated?)

Do you have information of previous licenses you may have had? (Location, Name, Abandoned?)

Other General Questions

Do you feel the community is fairly considered, and have fair voice in terms of disapproving aggregate expansion, increasing aggregate expansion, or rehabilitation?

Do you feel the public should have concern or public voice in the final uses of extracted property?

Do you feel the community is fair to aggregate producers?

protecting sensitive areas and the integrity of the township with in a community based landscape. Do you feel it is possible to meet a happy medium between these two objectives?

Additional Comments:

License Description*

Location: Lot
Concession
Township
Region

Total Hectares of Property:

MNR License Number (s):

Total Licensed Hectares:

License Issued (Month/Year):

Annual Tonnage Limit (tonnes):

Resource Availability*

Breakdown of Resources (within licensed boundary):

a) depleted	_____ha	_____%
b) proven reserves	_____ha	_____%
c) possible reserves	_____ha	_____%
d) unavailable resources (due to setbacks, environmental designations, etc.)	_____ha	_____%
e) rehabilitated	_____ha	_____%

Annual production (averaged over past 5 years):

Estimated proven reserves (tonnes):

Are your materials washed on site?

If yes, is all process water recycled? How?

_____

_____

Other Processing Functions On-site?

_____

_____

_____

Average percentage of total production (averaged over the past 5 years):

a) concrete & asphalt stone ____%
b) concrete & asphalt sand ____%
c) granular sub-base(B & sandfill) ____%
d) granular base (A & M) ____%
e) winter sand ____%
f) unmarketable by-product ____%
g) other ____%

Rehabilitation*

Disturbed hectares awaiting rehabilitation:

Number of hectares rehabilitated:

Present use of rehabilitated lands:

Condition of approved rehabilitation:

The final use of property if it differs from above:

Questionnaire Format Adapted From: The Oak Ridges Moraine Aggregate Committee, Oak Ridges Moraine Aggregate Resources Study, May 1994.

Dear Resident,

As a Master of Environmental Studies student at Wilfrid Laurier University, I will be undertaking a study of the aggregate resources and their development within the Township of North Dumfries, Regional Municipality of Waterloo. The purpose of this research is to ascertain attitudes toward long range management of aggregate resources, within the limits of a community based landscape, and thus your assistance through completion of this questionnaire is requested.

All of the information collected in this questionnaire will be **strictly confidential** and used in the final report in such a way that individual data could not be identified. The information is available only to those two people working on the report (Kim Horrigan and Dr. Jerry Hall). Survey sheets will be encoded and your name will not be recorded on the survey sheet - all survey data will be locked in a file cabinet at Wilfrid Laurier University. If you choose to withdraw at any time, your survey will be destroyed.

Should there be any questions regarding this questionnaire or the use of the reported data, please do not hesitate to contact Kim Horrigan (884-1970 ext.3994), or Dr. Jerry Hall (884-1790 ext. 2442).

Thank you for your assistance,

Kim Horrigan

Respondent Information

Name:
Address: (Lot & Con.)
Date:

Length as a resident in the Township of North Dumfries:

Why do you live in this Township? Why did you move here?

Resource Availability

What is your opinion about the abundance of aggregate resources in this Township; economically, politically, environmentally, socially?

Community Concerns

Do you feel the community is fairly considered, and have public voice in terms of the aggregate issue, for example, when a licence for extraction is submitted? Why or why not?

Conditions restricting the Township's or the community's involvement in the licensing or rehabilitation of a property? Suggestions for improvement?

In your opinion, what effect might (or does) the aggregate industry have on your Township?

What are your three biggest concerns, as a resident of the Township of North Dumfries?

Do you think that the aggregate industry has (or could have) an effect on the value of homes in this Township?

What do you think you might do if you had an abundance of aggregate resources on your property?

What do you picture your township looking like in 20, 50 years?

Opinion on rehabilitation, specifically progressive rehabilitation?
Progressive Rehabilitation- refers to the extraction and rehabilitation that is done sequentially, or in phases.

Do you feel the Township should have more say in the final uses of an extracted property? Why or why not?

Do you feel the community should have more public voice towards the final uses of an extracted property? Why or why not?

Considering your Township, its residents, the abundance of various resources (aggregate, agriculture) and environmentally sensitive areas, what would you consider viable rehabilitation options that you would like to see in your community, or that aggregate producers might consider?

You have an unique Township, its important to plan for the integrity of the Township within a community based landscape, as well as dealing effectively with the aggregate resources. Do you feel it is possible to meet a happy medium between the community, the Township and the aggregate producer? Suggestions you might have for improvement to this local issue?

Thickness Classes as Designated in the Deposit Symbol

Class	Average Thickness in Metres	Tonnes per Hectare
1	greater than 6	greater than 18,500
2	between 3 - 6	between 9,000 - 18,500
3	between 1.5 - 3	between 4,500 - 9,000
4	less than 1.5	less than 4,500

(Source: Ontario Ministry of Natural Resources, 1980, Map 1)

Geological Type as Designated in the Deposit Symbol

IC Undifferentiated Ice-Contact Stratified Drift
ICT Ice-Contact Terrace
K Kame
E Esker
EM End Moraine
OW Outwash
LB Lacustrine Beach
LP Lacustrine Plain
LD Lacustrine Delta
AL Older Alluvium
WD Windblown Forms

(Source: Ontario Ministry of Natural Resources, 1980, Map 1)

The Aggregate Producers' Association of Ontario . . .

1) *Is committed to the concept of sustainable development, which requires balancing the need for economic growth and the continued supply of mineral aggregates, through wise environmental/resource management.*

2) *Encourage its members to strive for excellence in the preparation of operational plans and to provide leadership by maintaining their properties in an attractive and controlled condition.*

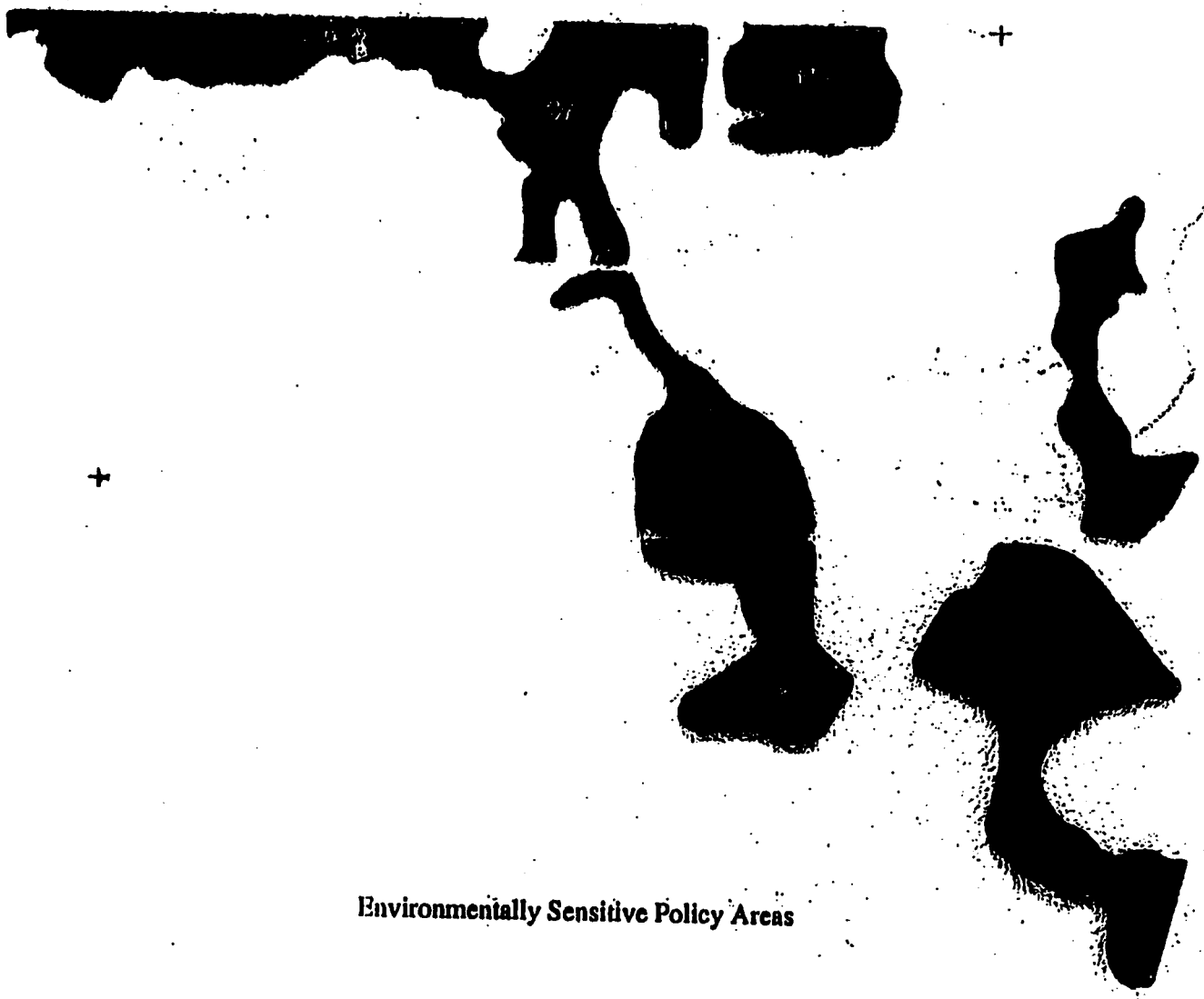
3) *Will work pro-actively with government and the public in the development of equitable, feasible and realistic laws for the protection of the environment.*

4) *Encourage its members to operate in accordance with all established environmental regulatory requirements by diligent application of technically-proven and economically-feasible environmental protection measures and to co-operate with government officials in developing improved methods of environmental control.*

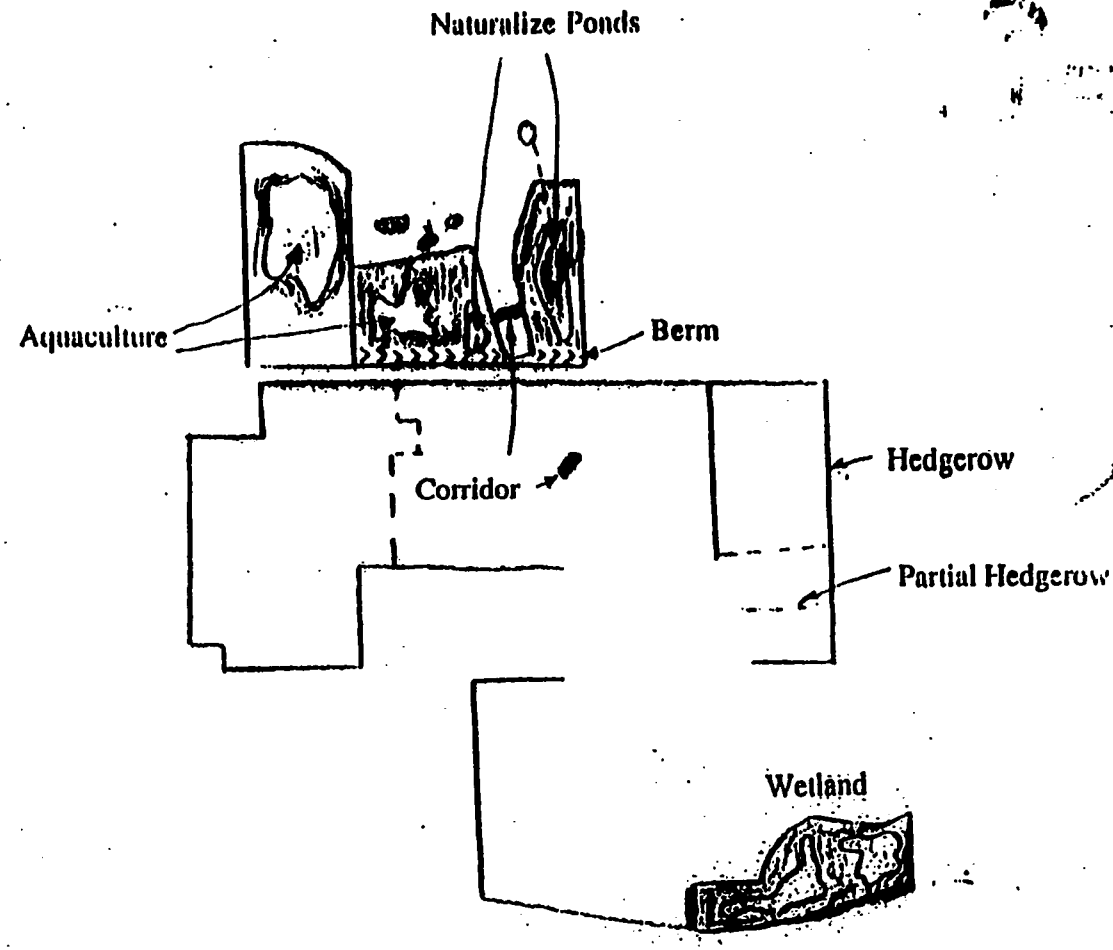
5) *Encourage its members to adopt progressive rehabilitation plans to ensure that aggregate extraction is an interim land use and that rehabilitation programs enhance the ultimate use or condition of the land.*

6) *encourage its members to work with community leaders and citizen groups on all aspects of their operations, including development plans for appropriate after uses of their lands, once excavation operations have been completed.*

7) *Encourage its members to participate in communicating to the public the importance of an assured supply of mineral aggregate resources, excavated, processed and transported, in an environmentally responsible manner, at reasonable cost to the citizens of Ontario.*

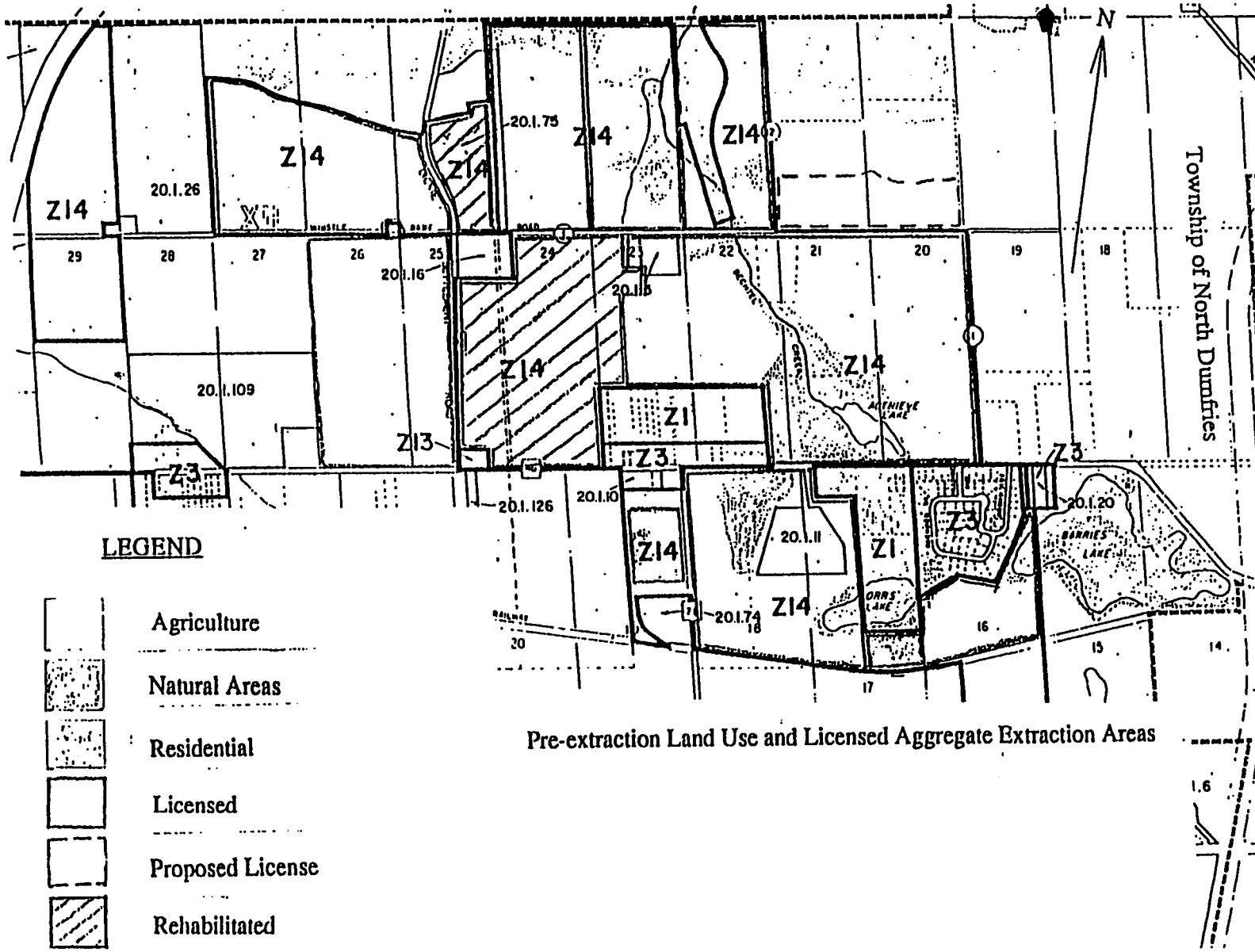


Environmentally Sensitive Policy Areas



Proposed Rehabilitation Land Use

Figure 5.11



Pre-extraction Land Use and Licensed Aggregate Extraction Areas

Scale 1:25000 Source: Dakin et al., 1994.

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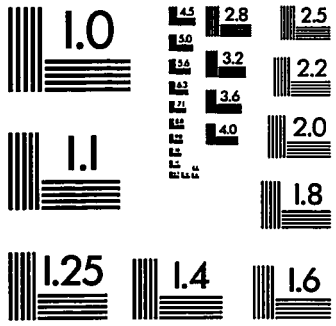

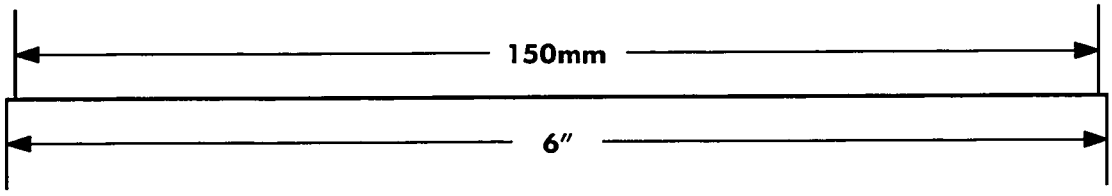

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