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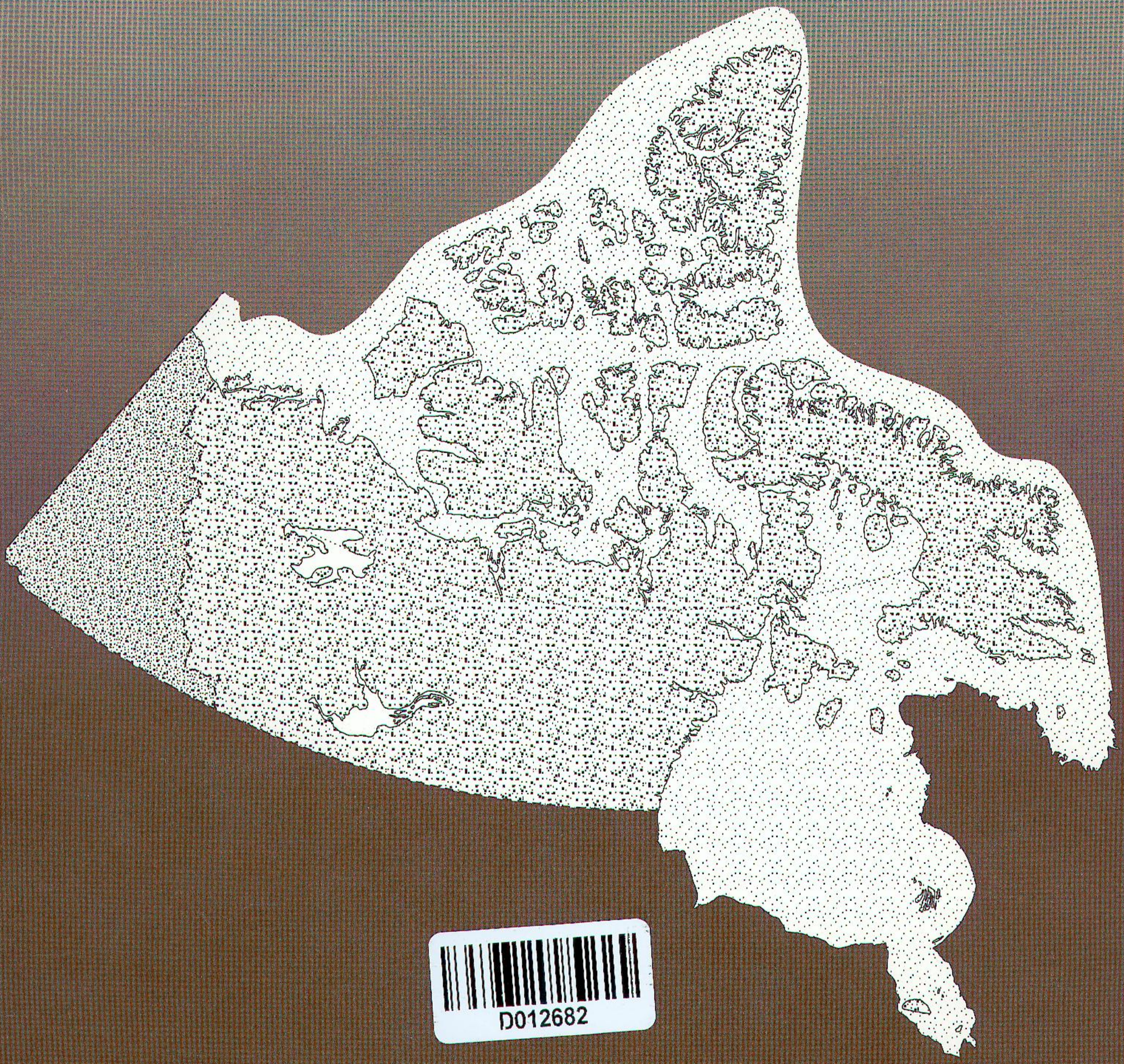
Sustainable Development of Northern Granular Resources

A DISCUSSION PAPER



NORTHERN GRANULAR RESOURCES SERIES

Sustainable Development of Northern Granular Resources

A DISCUSSION PAPER

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SUSTAINABLE DEVELOPMENT OF NORTHERN GRANULAR RESOURCES

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SUSTAINABLE DEVELOPMENT

OF NORTHERN GRANULAR RESOURCES

> *"In the Canadian context, the North . . . presents a unique opportunity for the integration of economic and environmental concerns. It is a young jurisdiction with a dynamic and evolving political system. ...The North is also the least industrially developed area of the country and is thus open to future development activities that reflect and promote the natural link between the economy and the environment."* (Sadler, 1990).

Background

The Natural Resources and Environment Branch has included integration of the environment and the economy as one of its main workplan priorities for several years. Indeed, since 1991, the Branch Mission has been to foster sustainable development in the Northwest Territories and Yukon. In response to the pressing demand for economic opportunities in the North, a Northern Sustainable Development Workshop was sponsored by the Branch in early 1993. The workshop was intended to help develop a common understanding and consistent approach to sustainable development, and to explore opportunities for promoting sustainable development both in the Canadian North and at a circumpolar level.

A Background Paper to the above workshop, by Resource Futures International (Bregha et al, 1993), outlined some changes taking place in the North that combine to make sustainable development a particularly difficult challenge. Probably the most significant change is the ongoing political transformation, including the settlement of aboriginal land claims, division of the Northwest Territories and devolution of provincial-type responsibilities to the territorial governments. The northern economy, particularly in the NWT, fluctuates widely in response to resource prices and government incentives. Aboriginal peoples have seen significant change in their lifestyles over just a few generations. Even the environment is threatened by "outside" forces, such as the long-range transport of contaminants and by global warming.

The Workshop Background Paper (Bregha et al, 1993) concluded that future economic growth will continue to be driven by government programs with large transfers from the south. Natural resource development will provide an economic base for some communities, and the settlement of land claims will ensure a degree of certainty for developers. Large cash payments made by the federal government to aboriginal people as part of their land claims settlements should provide some economic stimulus and lead to greater self-sufficiency of individual communities. The decentralization and regionalization of government due to claims settlements are expected to increase spending at the local level. Associated with these opportunities is a need for improvements to the facilities and infrastructure required for resource and community development.

More recently, sustainable development has become a central theme of the federal government's agenda and a commitment was made in the Throne Speech to develop a framework in which environmental and economic considerations are interlinked. Recent amendments to the Auditor General Act require each department to prepare a departmental sustainable development strategy within two years. A new Commissioner of the Environment and Sustainable Development will ensure that these strategies are implemented. A Framework Paper on "Managing for Sustainable Development," submitted to the Cabinet Committee on Economic Development, was prepared to advise and assist in the preparation of the departmental sustainable development strategies, and to ensure some consistency among the strategies.

The framework paper points out that strategies should integrate sustainable development into their business plans and programs, and be comprehensive (dealing with both policies and programs affecting others, and internal operations), results oriented (with concrete goals and objectives, and clear action plans and performance indicators), and open (developed in consultation with partners, stakeholders and clients). The implementation of the strategies will be monitored to encourage continuous improvement and departments are to be accountable for delivering sustainable development in their programs.

Granular resources are essential as construction materials for nearly all economic development projects in the North. They are the primary component of airstrips, roads and other transportation facilities and of drilling sites and other exploration workpads; they are often an integral part of the foundations of residential,

commercial or industrial buildings; they are the main component of manufactured construction materials like concrete, asphalt, and roofing materials; and they have many additional special uses such as for erosion protection and for traction on icy roads. These resources are finite, they vary in quality and are not uniformly distributed. Where there are shortages in the locally available supplies of these resources, their importance soon becomes evident to the developers of new projects and northern communities alike. As a result, the recent focus on sustainable development is particularly relevant to northern granular resources. This paper investigates how this approach can be applied to a "non-renewable" resource.

What is Sustainable Development?

Sustainable development means seeking to meet "the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland Commission, 1987). This is not a new idea but it tends to take on different meanings depending on the backgrounds and interests of individuals or institutions. For example, industrial developers, environmental activists, homeowners, entrepreneurs, resource managers and scientists, all living in the same area, may each have a different understanding of sustainable development. Their counterparts in other regions, with different natural resources, may have yet other ideas about what is meant by sustainable development.

In the context of the "renewable" resource industries, such as agriculture, forestry, fisheries, or trapping, it implies harvesting the

resources at levels that ensure continued productivity to maintain supplies over time, or sustainable use. Sustainability of these resources is based on their capacity to reproduce and grow. This capacity can be jeopardized, as evidenced, for example, by the recent collapse of the East coast fishery.

In the case of non-living natural resources, the so-called "non-renewable" resources, such as minerals, oil and gas or granular resources, the issue is not their regenerative capability. Yet theoretically, these resources are also being renewed through ongoing geological processes (albeit, at extremely slow rates, in most cases). Some granular deposits (e.g. coastal bars and spits) are constantly being replenished, and others, like the floodplains of braided streams, are seasonally "renewed" with spring runoff or periodically, with each summer storm event. Some minerals (e.g., metallic minerals) are repeatedly "renewed" through recycling and reuse (EMR, 1992) where the appropriate infrastructure exists.

Most geological resources are present in the earth's crust in much larger quantities than could ever be consumed. Thus, on a global basis, there are adequate resources to maintain supplies for future use. On a local basis, however, economically recoverable supplies of non-living natural resources are usually finite, so it is unlikely that their development can be sustained forever. Sustainable development of non-living resources does not involve prevention of their use, rather it implies wise management of the resource. Therefore, the issue is not so much depletion of the resource, as it is minimizing environmental and social costs, maximizing the utilization of the resource and ensuring future choices. According

to Brundtland, it means "foreclosing as few options as possible" for non-living natural resources.

The evolution of ideas on sustainable development is reflected in changes in government policy and legislation. Early resource development in the North was largely based on economic issues. Since the early 1970's, most legislation (Northern Inland Waters Act, Territorial Land Use Regulations, Arctic Waters Pollution Prevention Act, etc.) has attempted to minimize the environmental impacts of industrial activity in the NWT and Yukon by controlling land use and natural resources development. In the early 1980's, increased consideration was given to socio-cultural issues such as the inclusion of traditional pursuits like hunting, trapping and fishing as part of integrated resources management through land use planning. Finally, with the settlement of northern land claims, institutions and decision-making procedures have been developed that allow aboriginal people to share responsibility with government for management and decision-making on land, water, resources and (to a limited extent) in the offshore. There is now a general consensus that the concept of sustainable development includes environmental, economic, socio-cultural and political dimensions.

Environmental Issues:

Granular materials are surface resources, thus, the impact of their development on the environment is immediately obvious to everyone in the vicinity. The most significant impacts are limited to the relatively small sites occupied by pits and quarries. These impacts can include loss of vegetative cover and habitat for some burrowing and denning mammals and birds, increased susceptibility to erosion

and changes to the water table or to the permafrost. With effective site reclamation most of the impacts are temporary. The processing and transportation of these resources can also have undesirable effects on aesthetics and the environment. Increased noise, dust, traffic and the effects of fossil fuel energy consumption are all undesirable results of granular resource development. Public reaction to these effects has sometimes led to the closing of pits and quarries before all usable materials have been recovered.

However, as local supplies of granular materials dwindle or are excluded from use, the resulting requirement for development from further afield leads to greater transportation distances and increased impact. Eventually, the use of poorer quality sites or alternative sources, such as bedrock, requires even greater energy consumption for site preparation and processing that results in even more adverse impacts on the environment.

The application of sustainable development principles involves following practices that will, for example, maintain ecological processes, sustain life-supporting systems and preserve genetic diversity. It includes understanding the impacts of development, their significance, and the rehabilitation of sites after completion of granular resource extraction activities.

Economic Issues:

There is little doubt that development is needed to support growing northern populations and the increasingly complex and fragmented institutional structures. Pit and quarry operations can provide entrepreneurial opportunities, at least on a small scale, in most

northern communities. They are much less capital intensive than other non-living resource sectors, and they are generally most economical when they are local. The beginning of a local operation is often dependent on other types of development, such as the opening of a nearby mine, but once in place, these operations are less subject to "boom and bust" cycles. They support ongoing maintenance of infrastructure and the very existence of local operations can encourage upgrading of both private and public facilities.

Most major development or infrastructure expansion projects cannot proceed unless adequate quantities and qualities of granular materials are available. Although rarely a controlling factor, the certainty of supplies of economical, high quality construction materials can provide an economic "uplift" that will enhance the viability of, or influence the location of projects requiring large quantities of material. Sustaining development implies wise management, including optimizing use, conserving supplies and developing alternative sources.

The common strategies for resource conservation (reduction, reuse and recycling) can be applied. This involves encouraging re-utilization of resources (e.g. recovering materials from abandoned artificial islands and drill pads), reducing resource needs through a variety of alternative engineering designs and new technologies (e.g. styrofoam insulation, geotextiles), and recycling of "waste" rock, concrete and asphalt.

Socio-cultural issues:

The socio-cultural dimension extends sustainable development beyond the integration of environment and economy. It involves accepting the premise that healthy communities are as important as environmental quality and economic prosperity. All phases of decision-making on development should include central involvement of northerners and show sensitivity to community and traditional cultural factors. Because historical camp sites, seasonal migration routes and even burial grounds are often located on high, dry granular deposits, conflict can occur between granular resource development and traditional values.

Projects that allow for the participation of local labour, and provide opportunities for learning skills that can be transferred to other projects, support sustainability. Without ongoing job and training opportunities, the labour force in many northern communities is characterized by low mobility, skill and education levels. Because granular resources development must be local, and because it includes some low-skilled work, it can readily facilitate local labour participation. Development of granular resources can also provide some direct local training and entrepreneurial opportunities for northerners.

Political issues:

The concept of sustainable development also considers the institutional response, or the political dimension. This involves the accountability, transparency and inclusiveness of the decision-making process. The process should use the existing institutional

framework and processes, but recognize that they are going through a period of change. Because northern granular resources are included with the surface title, aboriginal organizations are assuming responsibility for administration and management of considerable quantities of granular resources as a result of land claims. Granular materials are now being utilized as revenue-generating resources by these organizations. The new institutions and processes resulting from the claims ensure a much greater role for aboriginal peoples in the management of these resources.

The Northern Granular Resources Program

The Land Management Division has a responsibility to promote the wise management of granular resources, at territorial, regional and community levels, consistent with departmental objectives relating to sustainable development. Granular resources are needed today, and additional supplies will be required to ensure long-term northern economic development. The Division's granular program recognizes the need for careful allocation of limited resources between public and private consumers and the importance of considering the interests of various levels of government, aboriginal peoples, communities and industry.

The main objectives of the Northern Granular Resources Program are:

1. to provide granular resource information in support of economic renewal and settlement of native land claims.

2. to ensure that the Northern Affairs Program is prepared to address potential granular resource demand issues during preplanning of major projects such as transportation corridors, mineral or hydrocarbon development and any associated infrastructure.

3. to provide the "tools" (e.g., supply/demand information, management guidelines) that can be used at community and regional levels for planning to ensure sustainable development of granular resources.

4. to promote the preparation and implementation of regional and community granular resource management plans.

The granular program has always encouraged the conservation of adequate supplies of suitable granular resources for the future. It has also recognized the need for environmental protection and has promoted this as a part of resource development. The program's goals and objectives will be achieved through identification of available supplies, assessment of factors affecting their development, determination of requirements for the future, local planning of development of the resource, provision of a modern and effective regulatory regime, and public education regarding the importance of granular resources.

Consistent with the ideals of the concept of sustainability, the granular program has attempted to promote the sustainable development of granular resources in a way that complements, rather than replacing or duplicating, existing initiatives. This includes the refocussing of existing programs to promote sustainable

development of granular resources. The program has also attempted to make the fullest possible use of the aboriginal claims settlement process to encourage adoption of this approach.

Guiding Values of the Program:

The granular program conforms with the Natural Resources and Environment Branch Vision for Sustainable Development:

> *"Our mission is to foster sustainable development in the Yukon and Northwest Territories in a manner which serves northern residents in particular and Canadians in general."*

and with its guiding values:

1. " ***Sustainable development includes the integration of environmental protection and economic development".***

   Granular resource development must be undertaken in an environmentally sound manner.

   The application of environmental management and protection measures to granular resources developments must consider their economic impacts.

2. " ***Sustainable development is an ethic, an attitude, guiding `how to' and not `how to prevent'".***

Granular resources can be developed in a way that will ensure the availability of suitable materials for the future.

This requires an understanding of the interrelationships among granular resources development, environmental health, socio-cultural concerns and economy, and careful planning of pit and quarry operations.

3. " ***Development is needed in the north to create opportunities, wealth and choices***".

Supplies of granular resources of suitable quality are needed for future development.

These important resources must be developed in a way that optimizes long term social, environmental, and economic benefits and opportunities.

This resource lends itself to management by communities.

4. " ***Development must be pursued in a way that will leave choices available for future northern generations***".

The need for future granular resource development must be considered in land use and other resource use planning.

Plans for granular resource development must address social, environmental and economic issues.

Improved quality and availability of information used in planning and management of granular resource development will ensure that decision-making is more efficient and effective.

5. " ***Environmental protection is not just preservation and prohibition***".

Lands disturbed by granular resources development activities must be returned to a safe, stable condition that is compatible with adjacent lands and land uses, but this does not require that granular development be prohibited.

The costs of minimizing environmental damage during granular resource development and of reclamation of granular extraction sites must be recognized as a cost of development and explicitly factored into project costs.

6. " ***The Branch will work cooperatively towards implementing our common vision of sustainable development . . .*** "

Adoption of the sustainable development approach to the management of northern granular resources can provide an example of how it can be applied to other non-living resources.

The general principles of sustainable development (listed in Appendix A) will be followed.

What has been done?

The existing granular resources program consists of five main elements: **supply, demand, management plans, legislation and education.** Each of these is important to the sustainable development of granular resources. The program has attempted to address each element every year, subject to the current priorities and availability of funding. In recent years, the granular program has received limited "core" departmental funding and varying levels of support from special allocations for granular resource studies as part of the Northern Oil and Gas Action Program (NOGAP), the Inuvialuit Final Agreement Implementation Program (IFAIP) and the Panel on Energy Research and Development (PERD). Each of these has its own objectives, but collectively they have covered the main program elements. Over the past six to eight years, considerable effort has been expended towards developing and updating computerized models and compiling existing information on northern granular resources into databases. This extensive computerized granular resources data collection will ensure an accessible source of relevant information in a consistent and usable format. This is considered the base level of information needed to support sustainable resource development.

A brief summary of the activities and results under each of the five main elements of the granular program is presented in the following sub-sections. A more detailed description of the role of each of the program components in ensuring sustainable development of granular resources is contained in Appendix B.

Supply:

Detailed inventories of the locations and extent of granular resources are critical to the effective management of the limited supplies of high quality granular materials, and to the sustainable development of the resource in general. The vastness of the North and the high cost of field activities prevent the development of a complete inventory of surficial resources. Instead, inventory work has concentrated on specific areas, based on the availability of funding. For example, an inventory of granular materials near each of the six communities in the Inuvialuit Settlement Region has now been completed as part of the IFAIP. Inventories of granular resources have also been compiled for much of the Beaufort Sea and the Mackenzie Valley under NOGAP. Some granular supply work has been carried out for most Yukon highway corridors and preliminary work has been undertaken for the Slave Geological Province in the NWT.

Demand:

Accurate and up-to-date forecasts of future demands for granular materials are required for the resource to be managed in a sustainable manner. The Inuvialuit Final Agreement requires that 20-year demand forecasts be prepared for the communities in the Inuvialuit Settlement Region at least every five years. The granular program has completed demand surveys through the IFAIP to fulfil this legislated requirement. Demand forecasts have also been completed for the Beaufort Sea and the Mackenzie Valley as part of NOGAP. A computerized demand forecast model was recently developed for DIAND and the Inuvialuit, as part of the IFAIP. The

model considers material quality and includes a variety of potential uses for granular materials. It simplifies the tracking of forecast demands and actual usage of granular materials, and the comparison and analysis of these data to improve its forecasting capability over time.

Management Plans:

In 1982, the Land Management Division published "*Environmental Guidelines - Pits and Quarries*" as the first of a series of publications dealing with northern land use operations ranging from access roads and trails to hydrocarbon wellsites. The initial publication has been circulated widely, quoted frequently and it is still being used. It provides recommended practices for all phases of development of any pit or quarry site, from initial siting, through extraction operations, to rehabilitation upon abandonment. More recently, the granular program has attempted to develop, with the Inuvialuit and under the IFAIP, improved practices for dealing with granular deposits containing icy sediments and massive ice bodies. The granular program has also attempted to ensure that issues related to sustainability of granular development are included in the regional land use plans, such as the Beaufort Sea-Mackenzie Delta and the Greater Kluane Regional Land Use Plans. The program is currently preparing a guide to granular resources management (Indian and Northern Affairs Canada, 1996) that is intended to help those who will be involved with the preparation of future granular resource management plans for the Northwest Territories and Yukon Territory.

Regulations:

The existing *Territorial Quarrying Regulations* are oriented towards disposition of rights to granular materials rather than sustainable development of the resource. Draft *Pits and Quarries Regulations* prepared in the early 1980's were intended to deal more effectively with both onshore and offshore resources. They included new provisions dealing with land use, resource conservation and rehabilitation and a new fee schedule that provided for higher royalties on higher quality materials. Although never completed, these proposed changes have influenced resource management policy in the interim period. Recently, these proposals have been revived and new regulations based largely on the above draft are being developed. The current proposals are considered consistent with the principles of sustainable development of non-living resources.

Education:

Northern granular resource development is usually small-scale, local and intermittent; consequently, the importance of this activity is often overlooked and generally underestimated. Sustainable development cannot be achieved without a greater understanding of the importance of the resource. The granular program has attempted to increase awareness in a variety of ways. These include technical papers, presentations at conferences and participation in workshops, planning sessions and environmental reviews. Several community meetings and workshops held in the Inuvialuit Settlement Region under the IFAIP have helped raise the profile of granular resources in this region. Workshops held in 1992 and 1993 under NOGAP were also partly intended to present information on granular

resources collected as part of NOGAP. The program has also compiled some basic statistics on granular resource production in the North that will be used to promote a higher profile for this important resource.

What else can be done?

Adoption of the sustainable development approach to management of northern granular resources offers some new challenges for addressing each of the granular program elements described above. It suggests also that the program should be expanded to include several additional program areas, primarily to address the environmental, socio-cultural and political issues that are part of sustainable development principles. Specific tasks, for each of the current granular program elements and for several additional elements, are listed in the following subsections.

1 Supply:

1.1 Areas of significant granular resource potential should be identified and dedicated to granular material production or managed to allow other development compatible with granular extraction.

1.2 The future needs of all communities and transportation corridors for granular materials should be considered and addressed in co-operation with the territorial government and the communities.

1.3 The existing inventories of supply should be updated to account for new site investigations and usage, to incorporate information from territorial government and the private sector, and to provide an improved database interface for greater usability.

1.4 All land use, conservation and resource management plans should consider and address issues related to potential granular resource development.

1.5 Research into more effective technologies for exploration and development of potential granular sites should be supported to enhance granular supply.

2 Conservation:

2.1 Projects should be developed to demonstrate and promote the conservation strategies of reduction, re-use, and recycling of granular materials.

2.2 Examples of alternative or improved engineering and construction methods that reduce granular requirements or reduce wastage should be identified and promoted (e.g., the use of erosion control/slope protection to allow increased slopes and reduced fill quantities).

2.3 New or innovative technologies or alternative materials that will reduce granular requirements should be examined for their value in northern situations (e.g., styrofoam insulation

to reduce fill thickness over permafrost; use of geotextiles as separators on soft subgrades, or to allow future recovery).

2.4 Abandoned granular fills such as drill pads, mine sites, airstrips, roads and artificial islands should be included in supply inventories and appropriate techniques for the recovery of these materials should be promoted.

2.5 Technologies and methods for small-scale and in-place recycling of asphalt, concrete and other construction "waste," and for "waste" rock from mines are now in widespread use in southern Canada and elsewhere. These should be documented and examined with respect to their feasibility in the North.

3 Demand:

3.1 Additional information on historical and current usage of granular materials should be obtained for a broader range of communities and projects.

3.2 The current demand forecasting model should include an expanded suite of project types to allow its use throughout the North.

3.3 Closer working relationships with mining, oil and gas and economic development sectors, territorial governments, and native organizations should be promoted to permit more timely prediction of demands.

4 Management:

4.1 The 1982 Environmental Guidelines publication should be updated to emphasize sustainable development approaches to granular resource management.

4.2 The recent paper on Granular Resource Management Plans should be distributed to northern stakeholders and its principles and methods should be promoted at community workshops.

4.3 Information sources and systems containing baseline data, which would be useful for the assessment of socio-cultural, environmental and economic impacts of granular resources development, should be identified and provisions made for access to them when needed.

4.4 Programs, forums and mechanisms for public participation in decision-making and integrated resource management should be identified, promoted and supported.

4.5 Examples of alternative temporary and permanent land uses that are compatible with granular site development should be identified and documented.

5 Constraints Assessment:

5.1 Closer working relationships should be established with other lead agencies to assess the potential impacts of their concerns

and the resulting constraints that could be placed on granular resource availability.

5.2 Co-operative research related to competing use of landforms containing granular resources (e.g. wildlife habitat on eskers) should be supported with other appropriate lead agencies.

5.3 Unique natural features and endangered heritage resource sites should be identified and protected, including exceptional examples of landforms containing granular materials.

5.4 Basic research is needed to address thermal regimes, ice formation and thermokarst processes in ice-rich granular materials and their impacts on granular extraction and site rehabilitation.

5.5 Information on the economic and environmental impact of developing northern granular deposits with increasing transportation distances should be compiled and evaluated.

6 Rehabilitation:

6.1 Consistent standards for rehabilitation of granular resource extraction sites should be established and implemented.

6.2 Lands disturbed by granular resource extraction activity should be catalogued and evaluated with respect to their priority for rehabilitation to appropriate standards.

6.3 Information gathering and monitoring should be carried out at the community level so that rehabilitation performance can be evaluated.

6.4 Research is needed on improved methods for the rehabilitation of sites in permafrost areas and in areas with limited overburden, for the conservation of organic materials and for the encouragement of natural revegetation.

6.5 Research and technology development that enhances rehabilitation of northern granular extraction sites should be encouraged.

7 Regulation:

7.1 The new granular resources regulations, under development, should be promulgated and implemented as soon as possible.

7.2 Granular resource legislation should be reviewed on a regular basis towards accommodating changing economic, environmental and socio-cultural circumstances. Other regulatory regimes should be monitored to ensure those in the North are kept up to date.

7.3 The costs of granular resources from private lands should be monitored to ensure that the federal fees are kept at an appropriate level to ensure sustainability of the resource.

7.4 The various permitting processes in the North should be monitored against increasing complexity and overlap.

8 Education:

8.1 Public information respecting granular resource management activities should be assembled, published in open-file and digital forms, and distributed to a broader user base.

8.2 Statistics on the northern granular resources industry should be compiled to determine its complete extent and significance and its relative importance locally. The "state of the industry" should be regularly assessed, documented and made public.

8.3 Granular resource development projects displaying safe, efficient and environmentally-sound or innovative resource management should be identified and used as models.

8.4 Educational programs and informational packages should be developed and promoted at the community level.

8.5 Community-based programs to collect information on granular resource management activities and rehabilitation should be established.

Closure:

The northern granular resources program has contributed to the sustainability of northern granular resources development by encouraging the wise management of existing resources and by identifying additional supplies. It has relied on the participation of industry, native organizations and other northerners, and attempted to be responsive to their ideas. Resource conservation and environmental protection have always been a key concern of the program. It has devoted a lesser effort to the socio-cultural and political issues that are also considered part of sustainable development.

The adoption of the sustainable development approach to management of northern granular resources therefore offers some new challenges. It will require the extension of the existing program to include several additional program areas, primarily to better address the environmental, socio-cultural and political issues that are an integral part of sustainable development. Specific tasks have been identified to make the program more consistent with the sustainable development approach to resources management. Other non-living resources can be managed in a similar way to ensure their sustainability.

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APPENDIX A

Principles of Sustainable Development

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Principles of Sustainable Development[1]

- Central involvement of northerners in all phases of decision-making.
- Transparent, accountable, inclusive, and rigorous decision-making process.
- Maintenance of key ecological processes and biological diversity.
- Economic viability of development proposals.
- Opportunity to benefit from development for those who bear the financial, environmental or social risks.
- Scale and rate of development as consistent as possible with the absorptive capacity of local communities.
- Expansion and diversification of the local economies.
- Consideration of development impacts on communities and traditional values.
- Consideration of transboundary and cumulative effects.

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[1] *Source:* *Natural Resources and Environment Branch Vision for Sustainable Development*

APPENDIX B

Components of the Northern Granular Resource Program

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Components of the Northern Granular Resource Program

The northern granular resources program has always encouraged the optimal use of all granular resources and the conservation of adequate supplies of suitable granular resources for the future. It has also recognized the need for environmental protection, and has promoted this as a part of resource development. The program's goals and objectives will be achieved through identification of available supplies, assessment of factors affecting their development, determination of requirements for the future, local planning of the development of the resource, provision of a modern and effective regulatory regime, and public education regarding the importance of granular resources.

The existing granular resources program consists of five main elements: **supply, demand, management plans, legislation and education.** Each of these is important to the sustainable development of granular resources. The program has attempted to address each element every year, subject to the current priorities and availability of funding. In recent years, the granular program has received limited "core" departmental funding and varying levels of support from special allocations for granular resource studies as part of the Northern Oil and Gas Action Program (NOGAP), the Inuvialuit Final Agreement Implementation Program (IFAIP) and the Panel on Energy Research and Development (PERD). Each of these has its own objectives, but collectively they have covered the main program elements. Informal steering committees, whose

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membership included representatives of the northern regional offices, other federal departments, the territorial governments, the hydrocarbon industry or the Inuvialuit as appropriate, have helped the granular program in planning and assessing the results of studies conducted under each funding source.

Over the past six to eight years, considerable effort has been expended towards developing and updating computerized models and compiling existing information on northern granular resources into databases. This extensive computerized granular resources data collection will ensure an accessible source of relevant information in a consistent and usable format. This is considered the base level of information needed to support sustainable resource development.

Supply:

Detailed inventories of the locations and extent of granular resources are critical to the effective management of the limited supplies of high quality granular materials, and to the sustainable development of the resource in general. However, the vastness of the North and the high cost of field activities prevent the development of a complete inventory of surficial resources. Instead, inventory work has concentrated on specific areas, based on the availability of funding. As part of the IFAIP, an inventory of granular materials near each of the six communities in the Inuvialuit Settlement Region has now been completed. Inventories of granular resources have also been compiled for much of the Beaufort Sea and the Mackenzie Valley under NOGAP. Some granular supply work has been carried out for Yukon highway corridors and preliminary

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work has been undertaken for the Slave Geological Province in the NWT.

The supply work has generally concentrated on compiling, standardizing, analyzing, and summarizing the available information from previous granular resource studies, and identifying significant gaps in information for critical areas. Emphasis was given to avoiding duplication of effort and utilization of existing information. This has required the co-operation of other departments, other governments and of industry to obtain access to their data, much of which was (or is) proprietary. These parties have recognized the value of this approach, and in return, have increased expectations for an inventory that readily provides current detailed information on the location, type, quality and quantity of material at each known source.

Access to the existing inventory data through the computerized databases will allow a more timely, thorough and detailed analysis of the granular resources. This system will also provide for the efficient transfer of granular resource data, in a more usable form, to the Territorial government and to native organizations as part of devolution and the implementation of land claims settlements.

Although the granular program has focussed on higher quality resources, it has not restricted its efforts to strictly "granular" materials. It has compiled any existing information on lower quality deposits that may serve as alternatives to the more limited supplies of higher quality materials. It has also included information

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on potential rock quarry sites and on the dredging of granular materials from the offshore or the bed of the Mackenzie River.

Demand:

Accurate and up-to-date forecasts of future demands for granular materials are required for the resource to be managed in a sustainable manner. These forecasts have traditionally been based on surveys of the anticipated needs of communities, transportation and other infrastructure, and the likelihood of any major public or private projects for each five-year interval during a 20-year forecast period. This procedure was intended to ensure adequate longer-term supplies, and minimize the effort required to update demand forecasts. The co-operation of the territorial governments, aboriginal land managers and industry is essential to the success of demand forecasting.

The Inuvialuit Final Agreement requires that 20-year demand forecasts be prepared for the communities in the Inuvialuit Settlement Region at least every five years. The granular program has completed demand surveys through the IFAIP to fulfil this legislated requirement. Demand forecasts have also been completed for the Beaufort Sea and the Mackenzie Valley as part of NOGAP.

A computerized demand forecast model was recently developed for DIAND and the Inuvialuit, as part of the IFAIP. The model considers material quality and includes a variety of potential uses for granular materials. It will track both forecast demands and actual

usage of granular materials, and can compare and analyze these data in order to improve its forecasting capability over time.

Management Plans:

In 1982, the Land Management Division published "*Environmental Guidelines - Pits and Quarries*" as the first of a series of publications dealing with northern land use operations ranging from access roads and trails to hydrocarbon wellsites. The initial publication has been circulated widely and quoted frequently and it is still being used. It provides recommended practices for all phases of development of any pit or quarry site, from initial siting, through extraction operations, to rehabilitation upon abandonment. Since its initial release, this publication has generally formed the basis of most of the detailed pit development plans included with geotechnical site investigations by the granular program. More recently, the program has attempted to develop, with the Inuvialuit and under the IFAIP, improved practices for dealing with granular deposits containing icy sediments and massive ice bodies.

Although the main responsibility for developing local or regional management plans for granular resources is considered to rest with the Districts or Regional Offices, the granular program attempts to provide advice and general background information on supply, demand and potential constraints to development. The latter may include environmental and social restrictions such as protection of critical wildlife habitat, archaeological sites and sensitive terrain, conflicting land use such as recreational or traditional hunting or trapping areas, and the common aesthetic and operational (traffic,

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dirt and noise) concerns. The granular program has also attempted to ensure that issues related to sustainability of granular development are included in regional land use plans, such as the Beaufort Sea-Mackenzie Delta and the Greater Kluane Regional Land Use Plans.

The program is currently preparing a guide to granular resources management intended to help those who will be involved with the preparation of future granular resource management plans for the Northwest Territories and Yukon Territory. It presents an overview of granular resources management, a description and explanation of the information required for the preparation of management plans and an outline of a process that will achieve the desired objective of the wise management of a commodity required for northern development. The proposed process would be largely locally-initiated and controlled, responsive to the concerns of all stakeholders, and consistent with the principles of sustainable development.

Although intended primarily for those responsible for managing granular resources on federal Crown lands, the territorial government and native organizations are encouraged to participate in this process. Ideally the resources for which they have responsibility should be included in proposed regional planning, since it is not possible to effectively manage the resources on federally-controlled lands without considering those on the adjacent Commissioner's or privately-held lands.

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Regulations:

The existing *Territorial Quarrying Regulations* are oriented towards disposition of rights to granular materials rather than sustainable development of the resource. They were not designed to provide for environmental protection or for proactive management of the granular resources which are, or will be, required for large scale northern development projects. Draft *Pits and Quarries Regulations* prepared in the early 1980's were intended to deal more effectively with both onshore and offshore resources. They included new provisions dealing with land use, resource conservation and rehabilitation and a new fee schedule that provided for higher royalties on higher quality materials. Although never completed, these proposed changes have influenced resource management policy in the interim period.

Recently, these proposals have been revised and new regulations based largely on the above draft are being developed. The current proposals are considered consistent with the principles of sustainable development of non-living resources. They will require more thorough consideration of potential environmental and social impacts of any granular resource development, and a change in environmental strategies, from the current, reactive rehabilitation or restoration, to preventative planning.

Education:

Northern granular resource development is usually small-scale, local and intermittent; consequently, the importance of this activity is

often overlooked. Information on pit and quarry operations is often incorporated into other industrial activities (e.g., mining or construction) and so their overall significance is generally underestimated. The result has often been a lack of concern about the depletion of valuable resources. Sustainable development can not be achieved without a greater understanding of the importance of the resource.

The granular program is attempting to increase awareness of the importance of this resource in a variety of ways. These include technical papers, presentations at conferences and participation in workshops, planning sessions and environmental reviews. Several community meetings and workshops held in the Inuvialuit Settlement Region under the IFAIP have helped raise the profile of granular resources in this region. Workshops held in 1992 and 1993 under NOGAP were also partly intended to present information on granular resources collected as part of NOGAP. The program has also compiled some basic statistics on granular resource production in the North that will be used to promote a higher profile for this important resource.