

State of the Aggregate Resource in Ontario Study (SAROS)



**AGGREGATE RESOURCE ADVISORY COMMITTEE
CONSENSUS RECOMMENDATIONS TO THE
MINISTER OF NATURAL RESOURCES**

JUNE 2010

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Consensus Advice from the SAROS Advisory Committee to the Ontario Minister of Natural Resources

To The Honorable Linda Jeffrey

Minister of Natural Resources

We, the members of the State of the Aggregate Resource in Ontario Study Advisory Committee, take pleasure in submitting to you our consensus recommendations on improving the management of aggregate resources in the province.

Original signed by

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Ontario Professional Planners Institute

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Peter White
Canadian Land Reclamation Association

Signed this 21st day of June, 2010

Executive Summary

The SAROS Advisory Committee has reviewed the six SAROS papers and presents this consensus report containing a series of 17 recommendations and 5 priority areas of focus to the Minister of Natural Resources for consideration.

The priority areas identified by the Advisory Committee highlight a handful of action items that the members feel are both doable and realistic. They represent a go forward framework for the Government of Ontario to consider as immediate top-priorities.

The five priority areas emphasize the need to secure a future for aggregates in a sustainable manner. They emphasize protecting existing identified *aggregate resources* as well as managing escalating demand through smart growth, green building, the use of a variety of sources of supply and the enhancement of conservation strategies that emphasize reduction, reuse and recycling. They speak about the regulatory framework and the need for decision-making transparency and process ease. They speak about the importance of continually improving the knowledge and information base and the overriding importance of collaborative action and information sharing. Indeed, the five priorities focus on securing an edge for the future – thinking and acting strategically. The priority areas identified contain a number of action items, and are equally important as viewed by the Advisory Committee.

The Advisory Committee developed a set of 17 recommendations, which describe a suite of actions to be taken by government and cover a range of topics, including the creation and implementation of a strategic roadmap, aggregate resource protection, environmental protection and stewardship, information management & research, and information, communication and awareness.

In submitting this refined set of priorities and recommendations, the SAROS Advisory Committee is unwavering in its support for sustainable management of *aggregate resources*.

1.0 Introduction

Comprehensive planning and sustainable management of *aggregate resources* require the utilization of the most current science, data and information on the resource. The SAROS Study was designed as an information gathering and data collection exercise that would provide more up-to-date information and knowledge on the state of *aggregate resources* in Ontario. The protection and management of *aggregate resources* for the long term is one of a number of mandates of the Ministry of Natural Resources.

The SAROS project was coordinated through the Ministry of Natural Resources with the support of the Advisory Committee and a Technical Expert Panel who provided an advisory function. The SAROS Advisory Committee is comprised of leaders of stakeholder organizations able to speak for their respective members. Industry, environmental interests and concerned community groups as well as municipal organizations are represented on the ARAC.

The Advisory Committee had a four-fold mandate:

1. To review the scope and terms of reference of the SAROS project;
2. To monitor study progress;
3. To review the sector expert reports; and
4. To provide recommendations to the Minister of Natural Resources.

This report reflects the consensus advice and recommendations of the SAROS Advisory Committee to the Minister of Natural Resources. Members of the Advisory Committee recognize that this input and advice is being provided in the context of the Advisory Committee Terms of Reference and are aware that the Government has, and likely will obtain additional input and guidance from other sources.

The advice contained herein has been extracted from the six studies commissioned by the Ministry of Natural Resources in order to provide updated information on a number of aggregate resource-related matters, including:

- Aggregate Consumption & Demand;
- Future Aggregate Availability & Alternatives Analysis;
- The Value of Aggregates;
- Recycling and Reuse;
- Aggregate Reserves in Existing Operations; and
- Rehabilitation.

It is important to note that different stakeholders look at aggregates through different lenses. Despite the differences in perspective, there is abundant common ground. First and foremost, members of the Advisory Committee were unanimous in their support of the SAROS initiative. What follows is a Principle of Endorsement to this effect.

Principles of Endorsement:

The State of the Aggregate Resource in Ontario Study (SAROS) Advisory Committee believes that Ontario's commitment to securing updated information about the state of *aggregate resources* in Ontario will enable more effective long-range planning and management of *aggregate resources*. The SAROS Advisory Committee further believes that this work will serve to inform those with an interest in the effective planning, management, operation and reclamation of *aggregate resources*. The SAROS Advisory Committee believes that this initiative will inform decision-making and to this end, is of the view that information must remain current, relevant, and reflective of the science. The SAROS Advisory Committee believes that the Minister must take into account the entire *lifecycle management* of aggregates on a *landscape level*.

Every licenced pit and quarry has to be viewed as a once only opportunity to maximize the benefit of that specific aggregate resource and to develop a rehabilitation plan to provide a net maximum ecological benefit for the affected landscape.

Last, but certainly not least, the Advisory Committee was unwavering in their recognition of the value of the environment and the importance of balancing economic advantage with environmental sustainability and healthy, livable communities.

Decision-Making Fundamentals:

In moving forward, members of the Advisory Committee agreed upon a number of fundamentals:

- The environment is fragile...We need to take care of it and make decisions that are sustainable over the long term.
- Any tradeoffs between environment and economy are never easy decisions.
- Part of managing the environment is the acknowledgement of our responsibility to future generations.
- *Aggregate resources* are needed to maintain our existing infrastructure and develop the new efficient infrastructure of the future.
- *Aggregate resources* are spatially finite.
- There is an opportunity to enhance and improve the *lifecycle management* of aggregates and the commitment to environmental stewardship.
- Better information about the state of *aggregate resources* is an ongoing necessity. There must be an ongoing commitment to secure information and data, and to share information and knowledge widely leading to innovation and learning. The process should not be static but

iterative. Aggregate management should be viewed as an ongoing dialogue – learning and improvement are to be gained from each stage of the process.

- We all share a responsibility for ensuring that our *aggregate resources* are wisely used and well managed.

2.0 Influencing Change

Our world is changing. Existing and emerging growth pressures are causing us to rethink not only the way we make decisions, but the kind of decisions we make. Our economy, our environment and our society are changing in fundamental ways and yet our understanding remains incomplete. Policymakers, investors, executives, managers, consumers, regulators, stakeholders, researchers and the aggregate industry require information that is complete, accurate and up-to-date. The requirement for a firm foundation of information and knowledge cannot be overstated.

From the vantage point of industry and stakeholders, the *approval process* is costly, complex and inherently difficult to understand. Required as a foundational material, notably for roads and construction, aggregates are important for economic advancement. At the same time, decisions around the effective use of *aggregate resources* bring with them environmental and social concerns. These concerns frequently cause stakeholder groups to oppose proposals to develop new or to expand existing extraction operations.

In addition to *approval process* complexities, there are concerns that the process can be extremely lengthy. Lack of understanding increases uncertainties and elevates levels of mistrust and distrust. The entire *approval process* needs to be simple, straightforward and easy to understand and implement for all.

From a regulatory perspective, the management of *aggregate resources* is a complex and challenging task. The Ministry of Natural Resources administers not only the Aggregate Resources Act but other legislation which include regulations and policies that apply to and affect aggregate licensing and operations. The Advisory Committee is aware of the scope and mandate of the Minister of Natural Resources and puts forward the premise that collective action is needed by government to promote the wise use and management of *aggregate resources*. Beyond the sphere of government, the Advisory Committee recognizes the need for collective action by industry and by community. All of us have some of the answers; none of us have all of the answers. Only together can we advance towards commonly held values.

The SAROS initiative is a step toward more effective planning, management and use of *aggregate resources* in Ontario. Recognizing this step, members of the SAROS Advisory Committee are unanimous in the view that while Ontario may share some issues of common concern with other jurisdictions, any management model must reflect the individual attributes that characterize Ontario and the provincial aggregate industry. There are many models of aggregate management that exist across the global landscape that may inform us and offer best practices and approaches for Ontario to consider. However, it is imperative that the model for aggregate management be developed by Ontario for all of Ontario. Although there is opportunity to consider best practices from other jurisdictions, the process and the regulatory regime must be tailored to meet the needs of the Province.

As an essential first step, the following critical perspectives must be recognized:

FIRST STEP	The SAROS initiative represents a first step in an effort to increase knowledge and understanding of aggregates.
PROACTIVE	There is a need for the Province to take a strategic and proactive approach to aggregate planning and management, rather than one that is reactive and reactionary. The process must move away from polarized and fractured positioning to an approach that promotes collaborative planning on a <i>landscape level</i> .
INTEGRATED	The Province should consider its role and adopt a model for integrated aggregate management that supports the industry so that it remains economically competitive, environmentally sound and sustainable. There is an opportunity to examine other jurisdictions with a view to identifying applicable and relevant best practices applicable to Ontario.
SHARED KNOWLEDGE	The information that emerged through the 2009 SAROS initiative should be shared with those who have an interest.

2.1 Priority Action for Government

Government is strongly encouraged to act immediately to address the critical issues and opportunity areas for effective and sustainable aggregate resource management. In particular, Government should:

1. Work with its partners to set a strategic course to address the issues, the obstacles and the knowledge gaps so that a strategic roadmap can emerge for effective and sustainable aggregate resource management.
2. Move toward more effective protection of identified *aggregate resources*.
3. Work with other ministries, stakeholders and the aggregate industry to identify strategies for increasing the supply of aggregates through recycling, reuse and reduction efforts and in this way, develop a focused and comprehensive strategy for promoting *aggregate resource conservation*.
4. Take the lead to coordinate rehabilitation research, knowledge and information sharing.
5. Rationalize the existing regulatory framework to remove duplication and overlap while promoting confidence and trust among stakeholders and members of the public in the *approval process*.

2.2 Critical Priority Recommendations:

These five priority areas are discussed in more detail below (priority numbers have been assigned for presentation and reference purposes only and do not signify relative importance):

PRIORITY AREA 1

Develop a Strategic Aggregate Roadmap that focuses on aggregate resource supply and is based on the *lifecycle management* of aggregates. This Roadmap must be supported by a coordinated implementation strategy that emphasizes collaboration between government, industry and community.

RECOMMENDATION: IT IS RECOMMENDED THAT THE PROVINCIAL GOVERNMENT WORK WITH PARTNERS TO DEVELOP A STRATEGIC ROADMAP FOR AGGREGATE RESOURCES THAT FOCUSES ON AGGREGATE SUPPLY AND IS BASED ON THE *LIFECYCLE MANAGEMENT OF AGGREGATES*.

Issue Diagnosis: The SAROS Advisory Committee recognizes the importance of adopting a more strategic and visionary blueprint for aggregates – A Strategic Roadmap.

Desired Outcomes: A common vision shared and supported by all participants – government, industry and community that offers a framework for collective action.

Key Elements: This Strategic Roadmap would include:

- Management objectives (for public use, conservation, after-use, etc.)
- Existing & Emerging Pressures
- Challenges, Obstacles & Knowledge Gaps (e.g. climate change)
- Opportunity Areas (e.g. other forms of transportation; greater integration of transportation modes)
- Comprehensive and balanced strategies to ensure the protection and management of sustainable *aggregate resources* for Ontario over the long term
- Collaborative approach between provincial ministries, industry, stakeholders and communities

PRIORITY AREA 2:

Protect Identified Sources of Aggregate Resources.

RECOMMENDATION: IT IS RECOMMENDED THAT THE PROVINCIAL GOVERNMENT WORK WITH MUNICIPAL ORGANIZATIONS, MUNICIPALITIES AND THE AGGREGATE INDUSTRY TO ADDRESS THE FINITE NATURE OF *AGGREGATE RESOURCES* AND TO IMPROVE THE PROTECTION OF AND ACCESS TO CRITICAL *AGGREGATE RESOURCES* FOR FUTURE USE.

Issue Diagnosis: The *licensing process* is adversarial and frequently problematic. Securing aggregate supplies to support provincial initiatives like the Greater Golden Horseshoe Growth Plan will be critical in the future. There is a need to immediately protect these sources of supply from *constraints* for future utilization.

Desired Outcomes: Greater certainty of aggregate resource availability is established for known locations of identified *aggregate resources*.

Key Elements: Protecting identified aggregate resources would involve:

- Working collaboratively with municipalities to:
 - Promote better access to identified aggregate resource deposits
 - Protect *aggregate resources* and access to those resources at the municipal level
 - Protect available *aggregate resources* and promote security of tenure
 - Emphasize *resource rescue* where feasible
 - Strengthening the existing provincial policy base – protecting known *aggregate resources* from further *constraints* that could reduce areas of identified available aggregate resource for potential future use (subject to planning and regulatory requirements)

PRIORITY AREA 3:

Develop an Aggregate Resource Conservation Strategy to emphasize the three R's

RECOMMENDATION: IT IS RECOMMENDED THAT THE PROVINCIAL GOVERNMENT IN PARTNERSHIP WITH ONTARIO MUNICIPALITIES AS WELL AS OTHER MINISTRIES IDENTIFY STRATEGIES TO ADVANCE THE APPLICATION OF THE THREE R'S: REDUCE, REUSE AND RECYCLE, AS WELL AS STRATEGIES TO PROMOTE THE USE OF INNOVATIVE MATERIALS. TO THIS END, IT IS RECOMMENDED THAT THE PROVINCIAL GOVERNMENT IN PARTNERSHIP WITH MUNICIPALITIES MUNICIPAL ORGANIZATIONS, AND THE AGGREGATE INDUSTRY DEVELOP AN *AGGREGATE RESOURCE CONSERVATION STRATEGY* AND CONSIDER OPPORTUNITIES TO LEAD BY EXAMPLE (E.G. USE OF RECYCLED PRODUCT IN PROVINCIALLY-FUNDED INFRASTRUCTURE PROJECTS).

Issue Diagnosis: Not enough is being done to promote reduction, reuse and recycling of aggregates. Some public authorities are reluctant to use recycled materials or allow aggregate recycling activities. Projected demand for aggregate will continue to increase despite the finite supply of the resource. Conservation of the resource is an important part of any sustainable management strategy. Are there impediments in engineering standards and design that could be overcome to promote a more fulsome use of recycled product? Are there regulatory impediments that are limiting the use of recycled materials and the use of innovative materials? Greater efforts are needed to promote conservation and the three R's. There must be a collective effort to ensure that every tonne of aggregate that is being reused and recycled is reported.

Desired Outcomes:

- Primary aggregate usage is minimized and recycled aggregate content is maximized where possible and the results are documented.
- Government-funded construction projects promote innovation in resource conservation.
- The province leads by example.

Key Components: Developing a Conservation Strategy would involve:

- Strategies to increase aggregate recycling and developing a record of these actions
- Promoting the three R's and using innovative building materials in government-funded construction projects
- Conduct research into innovative building materials and their applications
- Working with professional associations to identify impediments and/or obstacles discouraging more effective use of innovative building materials

- Support the identification of pilot projects to develop innovative approaches that employ the three R principles

PRIORITY AREA 4:

Promote Rehabilitation of Aggregate Sites

RECOMMENDATION: IT IS RECOMMENDED THAT THE PROVINCIAL GOVERNMENT PROMOTE REHABILITATION AND CONSIDER ADDITIONAL OPPORTUNITIES FOR PROGRESSIVE AND FINAL REHABILITATION OF AGGREGATE SITES.

Issue Diagnosis: Rehabilitation efforts appear to be better documented by large operators. There should be more complete rehabilitation documentation across the industry as a whole. There is a need to consider means to encourage and promote rehabilitation and after-use.

Desired Outcomes:

- The quality and quantity of aggregate rehabilitation is improved
- Promotes continuous improvement of rehabilitation methodology
- Rehabilitation contributes to landscape-based planning and promotes systemic environmental integrity and enhancement (e.g. natural heritage)

Key Components: Emphasizing environmental protection/enhancement and stewardship through rehabilitation could involve:

- Development of *Master Rehabilitation Plans* and a coordinated effort by the province, municipalities and others to consider innovative opportunities for landscape-based rehabilitation planning
- Use of a range of mechanisms/tools (regulatory or non-regulatory) to facilitate, encourage, enhance and promote rehabilitation
- Identification, development and promotion of demonstration sites
- Documentation of lessons learned and best practices
- Improvements to the site planning process under the Aggregate Resources Act
- Concerted efforts to focus on site documentation at the time of licence surrender
- Improvements in rehabilitation reporting

PRIORITY AREA 5:

Rationalize the *Approval Process*

RECOMMENDATION: IT IS RECOMMENDED THAT THE PROVINCIAL GOVERNMENT TOGETHER WITH ITS PARTNERS INVESTIGATE OPPORTUNITIES TO RATIONALIZE THE EXISTING *LICENSING PROCESS* TO REMOVE DUPLICATION AND OVERLAP WHILE PROMOTING CONFIDENCE AND TRUST AMONG STAKEHOLDERS, THE AGGREGATE INDUSTRY AND MEMBERS OF THE PUBLIC IN THE *LICENSING PROCESS*.

Issue Diagnosis: The SAROS Advisory Committee is aware of the multi-faceted nature of the regulatory regime for the *approval process*.

Desired Outcomes:

- Decisions on applications are based on best available science and are undertaken in a timely and fair manner, involving all interested stakeholders
- The decision-making process is understood and viewed by stakeholders with confidence

Key Components: Regulatory Rationalization could involve:

- Completing a legislative and regulatory assessment to determine which legislation/regulations are effective for aggregate resource management
- Identifying opportunities for harmonization, integration and coordination across provincial ministries
- Identifying new ways of doing business that support the other four critical priorities (strategic roadmap; protecting existing resources; conservation and the three R's; promote rehabilitation)

3.0 Recommendations to Improve Aggregate Resource Management

For the members of the SAROS Advisory Committee, this exercise has demonstrated the need for action in a number of critical areas. Not only is there a need for action, but there is an opportunity to improve the current system.

The SAROS initiative has shown the value added in a collective effort to consider shared challenges and opportunities. There is a need for a common strategic vision among aggregate operators, regulators and other stakeholders to ensure a sufficient supply of aggregates considering the finite supply of this resource.

The Ontario Government is uniquely positioned to deliver on these identified priority areas. While business and the community sector will need to galvanize around these priority areas, the province can

occupy a defined position in providing leadership and direction. Based on the analysis of the six SAROS papers and in recognition of the opportunities and the challenges, this report makes a number of recommendations for the consideration of the Minister of Natural Resources and the Government of Ontario.

We need to consider aggregate resource management from a systemic perspective. Looking at the whole system, we need to take into account the *lifecycle management* of aggregates from policy development and regulation, through operations (including the contribution rehabilitation has on the post extraction landscape) to monitoring, scientific research, information dissemination and outreach. Finally, we need to consider the long term implementation and monitoring of aggregates.

Considering the *lifecycle management* of aggregates and the opportunities that a new, focused direction provide, members of the SAROS Advisory Committee made the following seventeen (17) recommendations (recommendation numbers have been assigned for presentation and reference purposes only and do not signify relative importance):

STRATEGIC ROADMAP

1. There is a need for a Strategic Roadmap to address current and emerging issues and to capitalize on areas of strategic opportunity.
2. There is a need for effective program governance and implementation as well as program benchmarks and performance measures by which to evaluate success.

*There is also a need for fiscal and human resources to be allocated for implementation of this strategic roadmap.

AGGREGATE RESOURCE PROTECTION & ACCESS

3. There is a need to protect the known sources of *aggregate resources*.
4. There is a need for *resource rescue* where possible.
5. There is a need to protect existing transportation modes and promotion of transit alternatives and modal integration.
6. There is a need for Government leadership (at all levels) in resource conservation. There is a need to promote the increased use of recycled and innovative building materials. There is a need for coordinated government action to further the recycle, reduce and reuse agenda as it pertains to aggregates and opportunities to conduct further research in the use of innovative materials and infrastructure.

ENVIRONMENTAL PROTECTION & STEWARDSHIP

7. There is a need to understand and monitor greenhouse gas emissions from the extraction, processing and transportation of aggregates.
8. There is a need to consider the range of mechanisms/tools that could be used to facilitate, encourage, enhance and promote rehabilitation. These may take the form of regulatory or non-regulatory incentives.

9. There is a need for collaborative action to consider innovative opportunities for landscape-based rehabilitation planning (*Master Rehabilitation Plans*).
10. There is a need for demonstration sites and pilot projects to document lessons learned and promote the application of new and better rehabilitation standards.
11. There is a need to emphasize post-rehabilitation site documentation at the time of licence surrender.
12. There is a need for better documentation of rehabilitation efforts among aggregate operators.
13. There is a need for an integrated and harmonized aggregate licensing and *approval process*.

INFORMATION MANAGEMENT & RESEARCH

14. There is a need for updated information gathering; including additional aggregate reserve information for sand and gravel.
15. There is a need for standardized data collection and coordinated reporting.
16. There is a need for relevant and non-confidential information to be made available to the public and interested stakeholders.

INFORMATION, COMMUNICATION & AWARENESS

17. There is a need for the public to better understand aggregate resource management.

4.0 Industry, Community & Academia Involvement

The SAROS Advisory Committee recognizes the importance of collective action and promotes a collaborative approach to advancing the aggregate agenda. There are a number of supportive actions that industry, community and academia can embrace to support the recommendations to the Minister including:

- Adopt a culture of continuous improvement.
- Develop, implement and share best practices in innovative management and planning of *aggregate resources*.
- Work with government to develop best practices that promote innovation and learning.
- Participate in research initiatives and, as appropriate, make information available to others.

In the spirit of collaboration and partnership, it is suggested that the Minister of Natural Resources consider the ongoing role of the Advisory Committee.

5.0 Final Remarks

The SAROS Advisory Committee, in providing its advice to the Minister, has attempted to consistently balance aggregates cost and benefits to the environment and to communities as appropriate. Approaching aggregate planning and management with balanced consideration for development needs, ecology and society is critical. The important role that conservation should play in offsetting demand and applying the principles of reduce, reuse and recycle was also emphasized.

It is the view of the Advisory Committee that the SAROS initiative represents an excellent starting point. The six papers have galvanized interest around effective aggregate management and enabled a number of critical elements to be updated.

The SAROS Advisory Committee is of the view that timing is critical and that it will be vital for the momentum already established by the SAROS work to continue.

The six SAROS papers put forward a number of recommendations. The SAROS Advisory Committee has not commented specifically on the recommendations contained in each of the sector expert reports. The view of the Advisory Committee is that these reports were commissioned by MNR and need to be considered by the Ministry specifically. Rather than reiterate a position with respect to these paper-specific recommendations, the Advisory Committee believes there are a number of integrated priorities that should be considered by the Minister in the future.

The SAROS Advisory Committee is of the view, both individually and collectively, that there is great value in continuing the SAROS work. Committee members recognize and support the SAROS initiative and encourage the Minister of Natural Resources to continue to advance the aggregate agenda. From the collective lens of ARAC members, having the opportunity to participate has allowed participants to be part of a process that will advance the sustainable planning and management of aggregates in Ontario.

The SAROS initiative offers a framework to develop and employ wise aggregate resource management. It is not an exercise in establishing political will. The advice contained in this report is not focused on political advice, but rather, reflects the collective perspectives of the Advisory Committee and it is against the backdrop of effective and wise resource management and use that these recommendations are submitted.

We commend the Minister for advancing this work and for providing the opportunity to participate in this process.

Respectfully Submitted,

The Members of the SAROS Advisory Committee

6.0 Acknowledgements

The members of the SAROS Advisory Committee would like to acknowledge the contributions of those who have assisted us in carrying out our responsibilities. We are, first and foremost, appreciative of the opportunity to participate as a member of the SAROS Advisory Committee and extend our thanks to the Minister of Natural Resources, in this regard.

We are mindful of the work completed by the six sector expert teams charged with the responsibility of completing the six studies. Having an opportunity to review the scope of the project and to seek clarification from the sector experts directly has greatly assisted us in thinking about our critical ideas and formulating our recommendations. We would also like to thank the Technical Expert Panel for the advice and information they provided throughout the study.

It is in the spirit of promoting better decision-making that these recommendations are being submitted and it is in the context of wise resource management and sustainable use that we offer these suggestions.

7.0 Glossary

Aggregate Resources: Means gravel, sand, clay, earth, shale, stone, limestone, dolostone, sandstone, marble, granite, rock or other prescribed material.

Aggregate Resource Conservation: Maximizing the use of recyclable materials and alternatives to the use of virgin aggregate to minimize new extraction.

Approval Process: The approval or decision-making process associated with licence applications, including tribunal hearings.

Constraint: Infrastructure, and other developments (including housing, buildings, sewage/water systems, utility corridors/facilities, transportation corridors/facilities, and oil/gas pipelines/facilities).

Landscape Level: Represents a broad perspective across the landscape, recognizing the interaction/interconnectedness of processes and functions within that landscape.

Licensing Process: The licence application process set out in the Aggregate Resources of Ontario Provincial Standards under the Aggregate Resources Act. This includes agency review and public consultation with respect to a licence application.

Resource Rescue: The removal of aggregate resources prior to the development of an area for alternative uses (i.e. plan of subdivision or highway corridor).

Lifecycle Management: The lifecycle of aggregates refers to two cycles.

- The first is the *site cycle*: The activity relating to a site where extraction is to take place, from its initial investigation, to the *approval process*, to operations, to shut down with final rehabilitation and then to subsequent use or disposition of the site.
- The second is the *aggregate cycle*: The actions and use of aggregate from its extraction at the site, through its processing such as crushing, its transport to other locations, its further processing into building materials such as concrete and asphalt, its end use in a site such as in a building foundation, then its subsequent possible recycling or re-use.

Master Rehabilitation Plan: A conceptual approach to planning the rehabilitation of multiple aggregate extraction sites in close proximity. The plan could link all the sites in a comprehensive way to a common rehabilitation goal or theme (e.g. endangered species habitat creation, municipal recreation area etc.).