

Life Cycle of a Pit or Quarry

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 **OSSGA**
ONTARIO STONE, SAND
& GRAVEL ASSOCIATION

Pits, Quarries and the Environment

Pits and quarries are located where aggregate is naturally found and, where possible, close to the markets that need it. One of the most environmentally responsible ways to source stone, sand, and gravel is to establish pits and quarries near the end users, which helps reduce greenhouse gas emissions associated with trucking material to construction sites. For many Ontarians, that means pits and quarries are located in or near their communities, which naturally raises questions about how these operations coexist with the local environment.

Today, aggregate industry employees are increasingly recognized as stewards of the land where they operate. The industry also employs environmental professionals who help ensure compliance with requirements designed to protect Ontario's environment.

Throughout the life cycle of a pit or quarry, sites are carefully managed and monitored to ensure there is minimal environmental impact. This brochure provides an overview of the activities at each stage in the life of a pit or quarry that ensure operations are completed responsibly.

Exploration and Site Selection

The location of a new pit or quarry is determined first by geology. Aggregate can only be extracted where it naturally occurs, and other environmental and cultural features can further limit where a site may be developed.

Quarries are located where high-quality bedrock is close to the ground surface, making extraction feasible because less overburden needs to be removed. Depending on quality, quarried rock can be used in high-end products such as asphalt, concrete, or bricks, while lower-quality rock may be used for road base, drainage, and other construction applications.

Pits extract sand and gravel from deposits created by ancient glacial activity, such as moraines, eskers, and spillways. When evaluating these deposits, grain size, cleanliness, and overall quality are important. The more 'fine' material mixed in with the sand and gravel, the less desirable the deposit may be. Not all deposits are created equal, which is why the industry takes a great deal of care when selecting new sites.

Once a potential property is identified, a series of studies are undertaken to better understand the site and surrounding environment. The destination, or end use, of the product is known as the market, and proximity to that market is another important factor in site selection.



Licensing and Approval

When a proposed site is identified, a wide range of studies may be required to assess its suitability. As part of the aggregate licensing process, these studies can address natural heritage features, nearby land uses, groundwater, surface water, blasting, traffic, species at risk, noise, dust, and archaeology. The purpose of this work is to identify potential impacts and develop measures to avoid, minimize, and mitigate them over the full life cycle of the operation. Because of the scope of the assessments and the need for fieldwork, analysis, and design revisions, these studies can take several years to complete. Their results help direct extraction and rehabilitation in a way that reduces impacts on the surrounding area.

Technical studies are a key component of an aggregate licence application. For example, hydrogeological (water) reports assess whether the proposed operation could impact nearby well users, surface water bodies, or natural environment features. Where potential impacts are identified, contingency and mitigation measures are developed to protect water quantity and quality.

In addition to water studies, natural environment reports evaluate potential effects on features such as wetlands, fish habitat, woodlands, and species at risk. These studies identify any potential impacts and outline measures to avoid, minimize, or mitigate them. Together, these technical reports are integrated to provide a comprehensive assessment of the proposed operation and ensure that environmental protections are built into site design and planning from the outset

The completed studies inform the development of detailed site plans that clearly describe the proposed operation. These plans form the foundation of an aggregate licence application and document existing site conditions, how extraction will occur, and how the site will be progressively and finally rehabilitated. Throughout the application process, the public, Indigenous communities, neighbouring landowners, and government agencies are consulted and engaged. Once approved, the site plans become legally binding and guide the operation from initial development through to final rehabilitation.

*Photos 2, 4, & 5 courtesy of Skelton, Brumwell & Associates Inc. Photos 7 & 9 courtesy of CBM Aggregates. Photos 1, 3, 6, 8, infographic & cover courtesy of OSSGA.



Opening a Pit or Quarry

Once a licence is issued, detailed site plans guide the property's preparation for operations, ensuring that safety and environmental requirements are met. These plans outline measures to manage noise, dust, and traffic, including constructing berms along property boundaries, upgrading site entrances and access roads, and planting vegetation.

Additional permits may be required for certain activities, such as water use or the on-site installation of processing equipment. Relevant regulatory agencies are engaged throughout this process to ensure that all necessary reviews are completed before permits are issued.

Active Sites

Aggregate materials are extracted using heavy equipment and then processed. The material is separated into various sizes using screening equipment, and some products are washed with water-based wash plants to remove fine particles—no chemicals are involved. This process produces the wide range of aggregate products needed to meet market demand. Finished materials are then transported to customers.

Environmental controls identified through background studies and site plans are implemented throughout operations. Producers must comply with strict monitoring and mitigation requirements set out in their approvals. Groundwater and surface water monitoring programs help ensure that local water quantity and quality are protected. Noise levels may be monitored to confirm compliance with regulatory limits, and dust is managed through on-site mitigation measures. In quarries, controlled blasting is typically required to extract rock. These activities are carefully monitored to meet standards established by the Ministry of the Environment, Conservation and Parks.

Aggregate producers also pay a per-tonne fee on material shipped from their sites. These fees support both provincial and municipal governments by helping to offset road maintenance costs, helping to administer regulation of the industry, and supporting the rehabilitation of legacy pits and quarries.

Rehabilitation

Rehabilitation is an integral and ongoing part of aggregate operations. Wherever possible, areas are progressively rehabilitated during extraction rather than waiting until the end of the site's life. This approach reduces the size of active working areas, helping control dust, limit soil erosion, and improve overall site management. It also increases efficiency, because materials used for rehabilitation are typically handled only once.

The approved rehabilitation plan, established during the licensing process, guides the site's final land use. Once extraction is complete, sites are transformed into productive landscapes such as wildlife habitat, wetlands, recreational spaces, agriculture, forests, or compatible urban developments. Operators must successfully establish the approved end-use condition before the licence can be surrendered to the Ministry of Natural Resources.

OSSGA would like to thank Stephen May (CBM Aggregates) George Antoniuk (The Miller Group), Brian Henshaw (Beacon Environmental) and Heather Melcher (Golder Associates) for their contribution to this fact sheet.



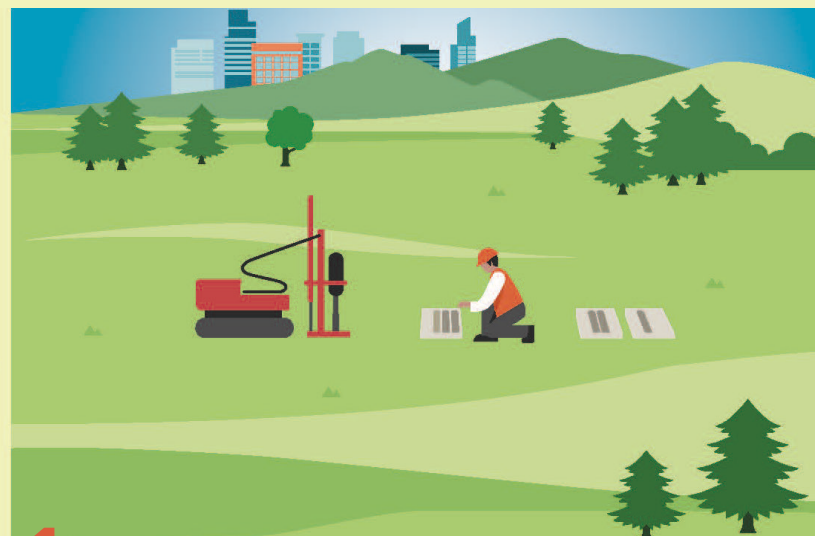
LIFE CYCLE OF A PIT OR QUARRY

At every stage in the life of a pit or quarry, minimizing the impact on neighbours and the environment are top priorities.

The industry employs hundreds of environmental scientists, from species-at-risk specialists to hydrogeologists and engineers, who are all focused on upholding the laws that protect Ontario's environment and communities.



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1

EXPLORATION AND SITE SELECTION

Pits and quarries are located where aggregate is naturally found and, where possible, close to the markets that need it. Quarries are located where high-quality bedrock exists. Sand and gravel pits are the result of ancient glacial activity and located in areas like moraines and eskers.



2

LICENSING AND APPROVAL

Prior to licence approval, studies are completed to support environmentally friendly development of the site and rehabilitation, while engaging in indigenous/public consultation through the process. Any potential issues are also identified and appropriate mitigation measures designed.



3

OPENING A PIT OR QUARRY

Environmental controls must be in place before extraction begins. Berms are constructed to address noise/dust. Monitoring wells may be installed to measure water levels/quality. To operate, sites must comply with permits, 25 pieces of legislation and hundreds of regulations.



4

AN ACTIVE SITE

Aggregate is extracted using heavy equipment and processed into different sized rocks. Washing may occur to clean the products, but chemicals are not used. Licensed sites must follow their site plans and government rules and regulations about water, noise, dust and blasting.



5

REHABILITATION

Rehabilitation takes place after each phase of the pit or quarry is extracted. After all the aggregate has been extracted, the site is rehabilitated into wildlife habitat, wetlands, recreational areas, urban uses, conservation lands, or agriculture. The licence is then surrendered.