

REHABILITATING LEGACY PITS & QUARRIES ACROSS ONTARIO

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Background

ABANDONED PITS AND QUARRIES WERE INTEGRAL to building Ontario's roadways, bridges, corridors and foundations for other infrastructures, and for this reason they are referred to as "legacy sites". Legacy pits and quarries range from 25-100 years old, but in order for a pit or quarry to be deemed "legacy" it must pre-date the Aggregate Resources Act (ARA), and fall within an ARA designated area in Ontario. The ARA came into effect on January 1, 1990, meaning any pit or quarry in a designated area was now deemed a "legacy" aggregate site if a licence was not applied for at that time.

Currently, when applying to open up a pit or quarry, a rehabilitation plan must be approved by the Ministry of Natural Resources and Forestry (MNRF). The plan must be completed upon closure in accordance with the ARA. Prior to January 1, 1990, there was no legal obligation to rehabilitate; therefore, once an aggregate resource was exhausted, the site often became abandoned. Typically, these unregulated legacy sites were relatively small by nature (less than 2 hectares) and were a result of small-scale operations such as municipal wayside pits, private use pits

or intermittent commercial operations.

When the ARA was put into effect, the aggregate industry, represented by the Ontario Sand & Gravel Association (formerly the Aggregate Producers Association of Ontario), agreed that ½ of a cent of the total 11.5 cent/tonne levy paid by the aggregate producers would be allocated to a legacy site rehabilitation program. Originally, the MNRF accepted the task of running this program, but in 1997 the MNRF built a partnership with private industry to manage certain administrative functions and programs to better focus their resources.

In 1997, the MNRF created The Ontario Aggregate Resources Corporation (TOARC) to maintain the administrative functions of the Aggregate Resources Trust, and The Management of Abandoned Aggregate Properties (MAAP) program, run by TOARC, to manage the rehabilitation of legacy sites in Ontario and conduct rehabilitation research.

MAAP Program

The original legacy files were obtained when the MNRF completed an inventory in the early 1990s. The locations were determined by analyzing historical

records and aerial photographs, and speaking with public works intendants and local contractors. After a few years of collecting data, approximately 6,600 legacy files were created. In 2007, a large part of Ontario became newly designated under the ARA, and TOARC hired a third party company to locate and survey the newly designated legacy sites. This equated to the addition of approximately 1,300 more files. To date, MAAP has 7,900 qualifying legacy sites in the database, but as more areas of the province become designated under the ARA, the inventory is expected to grow.

Since 1997, all 7,900 of the legacy sites have been assessed and it has been determined that 3,200 will require some sort of assistance by the MAAP program. The reality is many of the 7,900 sites have been reverted to other uses since often it has been 40 or more years since these sites have experienced disturbances. Based on the inventories, legacy site files have been 'closed' for the following reasons: obtaining re-licence status for aggregate extraction; disappearing under urban expansion; being rehabilitated by the property owner or the MAAP program; and having naturalized on their own.

Most often assistance from the MAAP

program involves grading and stabilizing slopes for safety, grading and seeding sites for agriculture or recreation, and creating and enhancing wildlife habitat by planting native trees, shrubs, wildflowers, and grasses.

MAAP Selection Process

MAAP created a systematic priority ranking system to evaluate legacy sites across Ontario. The inventories provide a clear record of the current conditions by documenting three key parameters (safety, environmental and aesthetics factors) to provide a composite overall ranking of 'high', 'medium' or 'low' priority. For instance, a high priority site could contain unstable slopes, deep water, and vertical cliffs with easy public access and high visibility, triggering major safety concerns. Meanwhile, a medium priority site may lack vegetation, be susceptible to erosion, be incon-

sistent with the surrounding area, is not as easily accessible to the public, and has less concern for public safety. The sites with higher priorities are approached first when organizing the annual MAAP program work schedule.

The rehabilitation construction work schedule is divided into a spring and fall work program. Projects are grouped geographically into two annual groupings for work purposes, travel time for staff and contractors, and to tender a number of small sites together in a single contract. Counties and regions targeted for work are rotated on a semi-annual basis to ensure that all sectors of the province are considered for rehabilitation work on as equitable a basis as possible.

In the simplest of terms, the MAAP program aims to rehabilitate sites to provide a higher level of function (usefulness) over the prevailing condition of the site,

always having regard for the elimination of any safety concerns as noted above.

Examples of Successful Rehabilitation

Project 15-08b: Township of Egremont, Grey County - Agriculture

Historically, many legacy pits have been returned to agriculture, as was project 15-08b (Figures 1a, b, c). This 0.25 ha pit had a large knoll that needed to be graded to return this legacy pit back into workable agriculture land. Most often when completing agricultural rehabilitation, a large portion of surrounding agricultural land will have to be stripped back to ensure optimal soil depth across the entire site.

For example, at project 15-08b, to maintain a soil depth of 8-10 inches and slopes of less than 8:1 (maximum 5:1 slope required for farm equipment use), a total area of 1.1 ha to a depth of 0.2-0.25m had



Figure 1a. Legacy site prior to rehabilitation construction.



Figure 1b. During construction.



Figure 1c. Post construction.



Figure 2a. Legacy site prior to rehabilitation construction.



Figure 2b. During construction.



Figure 2c. Post construction.

to be disturbed. This means that four (4) times the size of the actual pit area had to be incorporated into the rehabilitation plans to ensure productive lands.

Project 14-05b: Township of Normanby, Grey County – Naturalization

This 2.0 ha gravel pit was located off of highway 6 (Figures 2a, b, c) and had steep slopes with cedars sporadically spread across the site. One of the main challenges was that there was little soil to work with as there were no topsoil piles located on the site and the surrounding lands had a very shallow layer that could not be easily shared across the site.

As a result, the site was minimally graded to spread any found organics and was heavily seeded with a Premium Pasture

Mixture at 67 kg/ha, which contained species of clover, timothy, ryegrass, bluegrass, bromegrass and orchardgrass, and planted with 100 White Cedar (*Thuja occidentalis*). Two years after the rehabilitation was completed the site was starting to accumulate organics.

Costs of Rehabilitation

Based on recent levels of extraction in Ontario, the average amount available for rehabilitation projects ranges from \$400,000 to \$600,000 each year. The average legacy site size of 1.58 hectares costs approximately \$11,700/ha, resulting in an average cost per site of just under \$20,000 (based on data collected from 1992-2016). Therefore, the MAAP program is capable of rehabilitating 30-40 sites each year.

There is **no cost** to the property owner, the rehabilitation project is 100% funded by the aggregate industry.

MAAP Obstacles

Currently, the most prevalent challenge for the MAAP program is that many sites exhibit severely degraded soils, with steep and eroding slopes and lack of fill material. These characteristics may hinder the landowner expectations for rehabilitation. For example, if the landowner from project 15-08b (shown above) did not have access to the surrounding agricultural fields, the end-use could not be agricultural, due to lack of topsoil and fill materials. Since the MAAP program does not generally import fill, rehabilitation to agricultural land becomes unrealistic. Sites must be

assessed individually as one method of rehabilitation may not be applicable to the next. Other common obstacles found on sites across Ontario:

- Remoteness of Northern sites make access to heavy equipment nearly impossible;
- Finding appropriate erosion control measures to apply on sites that have minimal organics;
- Conservation authorities permits and approvals; and
- The presence of Species at Risk (SAR) and mitigating habitat.

Participation in the MAAP program is 100% voluntary and to date 574 landowners have reported that they are not interested in participating. They may not be interested for a variety of reasons. For example, they are currently storing equipment in the pit, their children use the slopes for sledding or they still extract for use on their own properties. But, if a landowner is interested and the legacy site requires rehabilitation, the MAAP program will find the most appropriate course of rehabilitation following consultation

and consent with the landowner and conservation authorities.

Current Research

The MAAP program works with universities, consultants or in house resources to find improved or new and innovative ways to rehabilitate former aggregate sites by funding a multitude of aggregate research. The most recent rehabilitation research MAAP funded was the Aggregates to Agriculture: An Assessment of Farmland Rehabilitation in Ontario study. The study aimed to create a comprehensive database to document the occurrences of agricultural rehabilitation of aggregate extraction sites in Ontario, as well as quantitatively analyze and compare agricultural conditions on rehabilitated farmland compared to similar undisturbed lands. The gathered information determined patterns of success and failure with respect to potential best practices employed on study sites, including different tillage methods, fertilizer applications and cover-cropping strategies.

The full report and a complete list of

past research can be found at www.toarc.com. If you have an interesting idea for aggregate research, TOARC's terms of eligibility for research funding can be found here as well!

Conclusion

The MAAP program has completed over 20 years of rehabilitation on legacy pits and quarries across Ontario, creating 720 hectares of productive lands at 453 sites at the cost of 8.5 million dollars. The existence of legacy pits and quarries have provided opportunities to re-establish landscapes and ecosystems lost to settlement and urbanization. The MAAP program can launch the progress of a legacy aggregate site on a trajectory to productive lands in a shorter time frame than if left on its own. Continuing to fund and conduct research on rehabilitation techniques will result in an expansion of agriculture lands and enhancements to habitat and biodiversity, and will provide an example of excellent rehabilitation for others to replicate in the aggregate industry. 🌱



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