

Developing Guidelines for the Rehabilitation of Aggregate Extraction Sites in Prime Agricultural Areas



Case Study **4** | Specialty Crop Rehabilitation Plan and Outcomes in the Context of a Surrendered Pit





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Case Study 4: Specialty Crop Rehabilitation Plan and Outcomes in the Context of a Surrendered Pit

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Background

With urban and rural development on the rise, there is a growing need for aggregate resources, such as sand and gravel, to build public and private infrastructure.¹ At the same time, population growth and urbanization are putting pressure on agricultural production and agricultural land.² It is critical to protect and sustainably manage both aggregate and agricultural resources. However, high quality aggregate resources are often found within prime agricultural areas or specialty crop areas.³ As such, the aggregates and agriculture industries must work together to sustainably manage resources.

The Ontario Provincial Policy/Planning Statements (PPS) outline the provincial government's land use planning policies for both the aggregates and agricultural industries.⁴ While the PPS (2024) requires prime agricultural areas to be protected for long-term use, it also allows planning authorities to "permit non-agricultural uses in prime agricultural areas for extraction of minerals, petroleum resources and mineral aggregate resources."⁵ In prime agricultural areas, on prime agricultural land, aggregate extraction is permitted as an interim land use, only if the impacts to the agricultural system are mitigated and minimized as recommended by an agricultural impact assessment (AIA) and the site is rehabilitated back to an agricultural condition upon the completion of extractive activities. The PPS (2024) defines

agricultural condition as "a condition in which substantially the same areas and *same average soil capability* for agriculture is restored".⁶ For specialty crop areas, the PPS (2024) requires that "the same range of specialty crops common in the areas can be achieved, and where applicable, the microclimate on which the site and surrounding area may be dependent for specialty crops will be maintained and restored". The only time that an aggregate extraction site does not have to be rehabilitated back to an agricultural condition is when the depth of aggregate extraction makes rehabilitation "unfeasible", typically due to extraction below the water table.⁷

The Aggregate Resources Act (ARA) includes requirements for the rehabilitation of aggregate extraction sites including those in prime agricultural

¹ Ministry of Natural Resources. (2025). Aggregate resources. *Government of Ontario*, <https://www.ontario.ca/page/aggregate-resources>

² Brooks, T. (2022). Ontario farmland under intense pressure. *Ontario Federation of Agriculture (OFA)*, <https://ofa.on.ca/newsroom/ontario-farmland-under-intense-pressure/>; Spoelstra, D. (2024). We must protect farmland for the sake of future generations. *Ontario Federation of Agriculture (OFA)*, <https://ofa.on.ca/newsroom/we-must-protect-farmland-for-the-sake-of-future-generations/>

³ Ontario Farmland Trust. (2020). The Impacts of Aggregate Mining on Farmland. *Ontario Farmland Trust*, <https://ontariofarmlandtrust.ca/2020/07/02/the-impacts-of-aggregate-mining-on-farmland/>

⁴ The Ontario Provincial Planning Statement was released in 2024, replacing the Ontario Provincial Policy Statement (PPS 2020) and the A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019). Previous versions of the Policy Statement include PPS 1997, 2005, 2014. Ministry of Municipal Affairs and Housing (2024). Provincial Planning Statement. *Government of Ontario*, <https://www.ontario.ca/files/2024-10/mmah-provincial-planning-statement-en-2024-10-23.pdf>; Ministry of Municipal Affairs and Housing. (2020). Provincial Policy Statement. *Government of Ontario*, <https://files.ontario.ca/mmah-provincial-policy-statement-2020-accessible-final-en-2020-02-14.pdf>; Government of Ontario. (2020). A Place to Grow: Growth Plan for the Greater Golden Horseshoe. *Government of Ontario*, <https://files.ontario.ca/mmah-place-to-grow-office-consolidation-en-2020-08-28.pdf> Penaud, A., Holy, K., Lemay, M. A., Fullerton, C. (2026). Policy Timeline – the Intersection of Agriculture and Aggregates. VISTA Science and Technology

⁵ Ministry of Municipal Affairs and Housing (2024). Provincial Planning Statement. *Government of Ontario*, <https://www.ontario.ca/files/2024-10/mmah-provincial-planning-statement-en-2024-10-23.pdf>

⁶ *Ibid.*

⁷ *Ibid.*



areas.⁸ The ARA states that every licensee/permittee has the duty to rehabilitate the site by performing “progressive and final rehabilitation of the site in accordance with the Act”.⁹ To ensure that effective and sustainable rehabilitation of aggregate extraction sites on prime agricultural land is carried out, aggregate producers must provide a rehabilitation plan as part of the site plan, in accordance with the Ministry of Natural Resources and Forestry (MNRF) site plan standards.¹⁰ Rehabilitation plans include rehabilitation notes, which outline the steps that will be carried out to restore the site to an agricultural condition with the same average soil capability in accordance with the PPS. Rehabilitation notes may also be included in the operational plan of a site plan, which describes progressive rehabilitation and recommendations from technical reports, such as an AIA. Aggregate producers must comply with all rehabilitation notes included in the approved site plan. Because of this, rehabilitation plans and notes are critical in holding the aggregates industry accountable to restoring agricultural land.

Detailed rehabilitation plans that incorporate best management practices are critical for effective rehabilitation. However, research and guidance on best practices for rehabilitation of aggregate extraction sites in prime agricultural areas is limited. To increase clarity on best practices, it is important to understand industry norms and common concerns and recommendations from stakeholders and government agencies related to rehabilitation of aggregate extraction sites located in prime agricultural areas.

This case study report is the fourth in a series of case studies analyzing records related to licence applications for aggregate extraction sites located in prime agricultural areas that will be rehabilitated back to an agricultural condition. The case studies seek to identify rehabilitation norms, common challenges in preparing aggregate applications and rehabilitation plans and recurring recommendations regarding rehabilitation back to an agricultural condition as required by the PPS. The case studies are a part of a broader research project developing evidence-based guidelines for rehabilitation of aggregate extractions sites located in prime agricultural areas in Ontario (Appendix A). Common industry terms are defined in Appendix B - Glossary of Terms. 🌿

⁸ Government of Ontario. Aggregate Resources Act. (2021). *Government of Ontario, E-laws*, <https://www.ontario.ca/laws/statute/90a08>

⁹ *Ibid.*

¹⁰ Ministry of Natural Resources and Forestry. (2020). *Aggregate Resources of Ontario: Site Plan Standards*. *Government of Ontario*, <https://files.ontario.ca/mnrf-aggregate-resources-of-ontario-site-plan-standards-2020-en-2021-03-18.pdf>





Case Study Introduction

This case study report focuses on the rehabilitation plan and rehabilitation outcomes of an aggregate extraction site on prime agricultural land in Ontario. The site was originally approved in the 1970s under the Pits and Quarries Control Act (PQCA). It received subsequent approval under the ARA in the 1990s. In the 2010s, the site was partially surrendered following final rehabilitation of a portion of the site. An amended site plan was approved to reflect a smaller licence boundary.¹¹ Mineral aggregate extraction and agricultural rehabilitation took place over more than 40 years at the site. Rehabilitation of the site is complete, and the ARA licence has been surrendered.¹²

According to the Ontario Ministry of Agriculture, Food and Agribusiness' (OMAFRA) AgMaps, the site was designated as prime agricultural area.¹³ The aggregate producer received planning approval from the local municipality to extract mineral aggregate resources with the condition that the site would be returned to an agricultural land use as per municipal planning policies.

However, the aggregate producer chose to rehabilitate the site for specialty crop production for two reasons. First, they had access to large volumes of mushroom compost, which they were able to use to improve the quality of topsoil for specialty crop production. Second, the aggregate producer had an agreement with a local grower for specialty crop (vegetable) production. This case study draws upon the following records:

- Site plan approved under the PQCA in the 1970s
- Site plans approved under the ARA in the 1990s
- Amended site plans approved in the 2010s
- A successful application for an *Outstanding Achievement in Property Rehabilitation Award: Specialty Crop Agricultural Rehabilitation* awarded by the Aggregate Producers Association of Ontario.¹⁴ The award application included:
 - A detailed overview of the rehabilitation program carried out at the site,
 - Rehabilitation outcomes, including crop yields,
 - Recommendation letters from a Professional Agrologist (P. Ag.) and a representative from the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA),¹⁵ who visited the site and assessed the rehabilitation program for the purposes of the award application.
- Licence Surrender Inspection Report completed by MNRF

¹¹ The Ontario Aggregate Resources Corporation (TOARC). (N.D.) Historical Designations of Private Lands Under the Pits and Quarries Control Act and the Aggregate Resources Control Act (By Geographic Township). Accessed from: <https://toarc.com/history-of-designated-areas/>; Government of Ontario. (1990). Aggregate Resources Act. *Government of Ontario*, <https://www.ontario.ca/laws/statute/90a08>; Penaud, A., Holy, K., Lemay, M. A., Fullerton, C. (2026). Policy Timeline – the Intersection of Agriculture and Aggregates. *VISTA Science and Technology*.

¹² The Ministry of Natural Resources and Forestry (MNRF) was the official title of the Ministry at the time that this licence application was submitted and therefore, MNRF was the commenting agency on this licence application. The Ministry's official title was changed to the Ministry of Natural Resources (MNR) in June 2024 and therefore, MNR will be the approval agency for this licence.

¹³ Ministry of Agriculture, Food and Agribusiness (OMAFRA) (2024). AgMaps. *Government of Ontario*, <https://www.ontario.ca/page/how-use-agmaps>

¹⁴ The Aggregate Producers Association of Ontario is now called The Ontario Stone, Sand, & Gravel Association. (OSSGA)

¹⁵ The Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) was the official title of The Ministry at the time that this licence application was submitted. The Ministry's official title was changed to the Ontario Ministry of Agriculture, Food and Agribusiness (OMAFRA) in June 2024.



Site plan documents approved by MNRF are legally-binding, meaning that aggregate producers must comply with all requirements detailed in the plan. A critical part of the site plan is the notes pertaining to rehabilitation of the site following aggregate extraction. Rehabilitation of the site is typically discussed in the operational plan and rehabilitation plan; each of which represent separate elements of the site plan.

Site Features and Conditions

The site represented a Class A, Category 3 licence, which allowed the aggregate producer to extract more than 20,000 tons of mineral aggregate resources above the water table annually. The total licenced area listed on the site plan was ~60 ha, with 100% of the extraction area eventually rehabilitated to an agricultural land use.

According to the site plan, the areas surrounding the aggregate extraction site were zoned by the local municipality as “agricultural”, “mining” and “extractive industrial”. This included adjacent mineral aggregate operations and agricultural operations. While OMAFA AgMaps did not designate the site nor surrounding areas as a specialty crop area,¹⁶ the site plan documented evidence of specialty crop production, including peach orchards on the site prior to extraction and on adjacent lands.” Other nearby agricultural activities documented on the site plan included field crop production and greenhouse operations. The site included two ponds, which were a source of water for irrigation of adjacent agricultural lands. 🌿

¹⁶ Ministry of Agriculture, Food and Agribusiness (OMAF) (2024). AgMaps. *Government of Ontario*, <https://www.ontario.ca/page/how-use-agmaps>





Agricultural Rehabilitation

Agricultural rehabilitation of the site took place in four sequential phases over more than 40 years. When aggregate resources were depleted in each phase, progressive rehabilitation was carried out. By the time three of the four phases were extracted and rehabilitated, more than 75% of the site (~45 ha) was restored to productive farmland. The licence for the rehabilitated part of the site was surrendered. An amended site plan was approved for the final phase of aggregate extraction and rehabilitation.

This section analyzes and compares the rehabilitation notes in the site plan approved under the PQCA in the 1970s and the site plans approved under the ARA in the 1990s and in the 2010s (Table 1). The site plan approved in the 1970s did not include a formal rehabilitation plan. The site plan approved under the ARA in the 1990s included a formal rehabilitation plan for the entire licenced area, which remained in effect until ~75% of the site was surrendered. The amended site plan, approved in the 2010s, included a rehabilitation plan for the remaining ~25% of the site that had yet to be extracted or rehabilitated. The entire site has been rehabilitated. The licence has been fully surrendered.

Phased Rehabilitation

A phased rehabilitation approach was included in the site plan approved under the ARA in the 1990s. Phased rehabilitation was outlined in the operational plan and included the following steps, repeated over four operational areas of the site:

- Extraction of aggregate materials to be completed in the area (e.g., Area 1).
- The side slopes adjacent to the regulatory setback will be graded to a 2:1 slope and seeded.
- Topsoil will be moved and stockpiled on the floor of the excavated area.
- Compost will be brought onto the site as it becomes available and will be mixed with topsoil and spread over the pit floor.
- Rehabilitation of the area will continue on an ongoing basis.

- Slopes and pit floor shall be seeded as soon as possible.
- The area will be progressively graded and backfilled with a 0.2 m layer of mixed topsoil and compost.

The site plan outlined that “phases may vary slightly with aggregate demand”, that “areas do not represent any specific time period”, and that “extraction may occur in Areas 2 and 3 before extraction is completed in Area 1”. The amended site plan (approved in the 2010s) did not include a phased rehabilitation approach because only the final phase remained to be extracted and rehabilitated after the rest of the site had been surrendered.

Site Plans: 1970s, 1990s and 2010s

This section provides a comprehensive analysis of the rehabilitation notes included in the site plans approved in the 1970s, 1990s, and 2010s. The site plan approved under the PQCA in the 1970s stated that the site was “expected to be replanted as an orchard.” It did not include any direction as to how the site would be returned to an orchard.

Meanwhile, the site plans approved under the ARA in the 1990s and 2010s included a formal rehabilitation plan, which outlined the rehabilitation practices that would be carried out during each phase of rehabilitation. A comparative analysis of these rehabilitation notes is included in Table 1. While the 2010s site plan was amended to reflect a smaller licence area and removed notes pertaining to phased rehabilitation, the site plan remained nearly identical



to that approved in the 1990s. Only minor additions were made pertaining to water management and drainage of the site (Table 1).

Table 1. Comparison of rehabilitation notes in the site plan approved under the ARA in the 1990s and the site plan amendment in the 2010s. Certain information is paraphrased for readability.

	1990s Rehabilitation Notes	2010s Rehabilitation Notes
General Rehabilitation Notes	- Rehabilitation of the pit floor and slopes will generally proceed progressively. - The final rehabilitation elevation of the site will be in general conformity with that shown on the site plan (elevation of 215 m to 213.5 m more or less).	All general rehabilitation notes remained.
Soil Management	- Topsoil will be stripped and stored separately. - All existing topsoil from onsite operations will be retained and used for rehabilitation. - Stockpiles of mushroom compost exist on a site and will be mixed with topsoil to enhance future agricultural growth. Additional mushroom compost may be brought onto the site when available. - Topsoil shall be mixed with compost whenever possible and placed on the pit floor at a minimum depth of 0.20 m and seeded with a grass-legume mixture. - Soil samples may be submitted to OMAFRA to determine if additional organic fertilizer is required for growing specialty crops. - Before replacing any topsoil on the pit floor, compaction of the pit floor will be relieved by working the surface of the pit floor with a heavy duty subsoiler and ripper in a criss-cross pattern allowing for drainage and aeration in accordance with accepted farm practice. - Topsoil will only be moved when it is generally dry to prevent compaction.	All soil management notes remained.



Slope	- The sides of the pit will have slopes of 2 horizontally to 1 vertically to (a) maximize the volume of aggregate materials extracted, (b) maximize the area of rehabilitated pit floor for specialty agricultural crops and (c) accommodate specialty crop agricultural equipment (this type of farming can only be accomplished using machinery that works on relatively flat land). - Slopes shall be regraded and reseeded as necessary as erosion occurs.	All notes related to slope remained.
Water Management and Drainage	- The existing pond will be lined with clay along the edge, and a berm will be built to minimize water seepage. - There will be no de-watering on the site. Drainage ditches shall be installed and tied into the existing agricultural drain adjacent to the property. - Final rehabilitation elevation is to be designed to accept agricultural drainage tile throughout the entire site accommodating a final ground water level of 0.71 m below the final rehabilitated surface level.	All water management and drainage notes remained, with the addition of the following statements: - Dewatering for agricultural purposes from the pond on site may be carried out, in compliance with a permit to take water issued by the Ministry of Environment, Conservation and Parks. - The entire rehabilitated area will be tile drained and tied into the existing agricultural drain adjacent to the property.
Final Rehabilitation Notes	- Farming operations will commence in rehabilitated areas prior to completion of the final rehabilitation of the entire site. - The site will generally be on a gradual downward slope from the west to the east. - No buildings shall remain on the site after rehabilitation. - The property will be rehabilitated to agricultural use for specialty crops. - Fencing may be removed upon completion of rehabilitation and surrender of licence.	All final rehabilitation notes remained.





Rehabilitation Outcomes

This section details the outcomes of progressive and final rehabilitation at the site. Progressive rehabilitation outcomes were detailed in the application for the rehabilitation award, which was submitted following partial rehabilitation of the site. The award application noted that the aggregate producer drew on his farming experience to optimize rehabilitation outcomes. This included the use of agricultural best management practices (BMPs) not included in the rehabilitation notes of the site plan (Table 1). The application package included letters of support from a P.Ag. and a horticultural crop specialist with OMAFRA, who were asked to assess the success of the rehabilitation program carried out at the site. Final rehabilitation outcomes were obtained from a surrender inspection report from MNRF.

Rehabilitation outcomes are discussed in the context of four key themes:

- Drainage
- Soil Conditioning
- Cropping Practices and Crop Yields
- Success of Progressive and Final Rehabilitation

Drainage

The rehabilitation program resulted in enhanced site conditions for “cold air drainage” and water drainage. The material below the extraction limit consisted of fine sand, “which is well suited for the sandy topsoil that was placed on top”.¹⁷ The topsoil and subsoil conditions provided optimal conditions for surface drainage, while also offering “excellent soil moisture retention, which is beneficial to protect against drought”.¹⁸

To further enhance drainage at the site, 10 cm perforated plastic drainage tiles were installed with ~6 m spacing across the site. The final agricultural surface level was ~0.66 m above the water table.

The property was designed to be level, with ~0.3 m inclines every ~120 m to allow for appropriate drainage of cold air and create an environment suitable for specialty crops.¹⁹ The final grade also created a “natural fall for farm drainage tile”.²⁰

The OMAFRA horticultural crop specialist noted in a letter of support for the award application that “the layout of the drainage plan for the site and the health of the topsoil layer was quite apparent.... Previous to gravel excavation, this site had had difficulties with variable drainage and moisture holding capacity. This appears to have been improved with this project.”²¹

Soil Conditioning

A key objective of the rehabilitation plan was to enhance the quality of the topsoil to enable production of specialty crops on the site (Table 1). The site plan stated that topsoil would be “augmented by a mix of silt pond sediments, fine sands, and a mushroom compost material”. The award application confirmed that existing topsoil was augmented using silt pond sediments, fine sands and mushroom compost, but did not specify how this was done (i.e., quantities

¹⁷ Anon. (n.d.) Application for Outstanding Achievement in Property Rehabilitation Award: Specialty Crop Agricultural Rehabilitation. *Aggregate Producers Association of Ontario*.

¹⁸ *Ibid.*

¹⁹ *Ibid.*

²⁰ *Ibid.*

²¹ *Ibid.*



of soil amendments utilized). Where necessary, additional “topsoil” was created for agricultural rehabilitation, which was produced by mixing “one-part silt pond settling waste; one-part fine sand; [and] one-part mushroom compost”.²² The application highlighted that “after drainage systems were in place, a further eight cm of mushroom compost was applied resulting in positive nutrient levels”. There was no evidence of soil testing to quantify “positive nutrient levels”.

Cropping Practices and Crop Yields

To restore the site to a condition that could support specialty crops, the aggregate producer began by planting wheat, with straw incorporated back into the soil after harvest to further enhance soil health. In the second year, soybeans were planted, “producing excellent yields”. The application for the rehabilitation award highlighted that “soybean yields achieved in the early stages of the rehabilitation program were encouraging and prompted an earlier program of specialty crop planting (onions) than was originally expected.”²³ In the third year, cooking and table onions, red onions, carrots and radishes were planted. The specialty crops were produced using “standard agricultural practices” including tillage, fertilizer applications, weed control and irrigation.²⁴ Crop production was carried out while the aggregate producer continued to extract and rehabilitate the remainder of the site.

Yield data for specialty crops planted on rehabilitated portions of the site for the first year of production were reported in the application for the rehabilitation award. Yields for cooking and table onions were 42,500 pounds per acre, while yields for red onions were 46,500 pounds per acre; both of which were “well above the county average for dry onions”.²⁵ Carrot yields were 24,000 pounds per acre, which was ~55% of the county average. The lower-than-average yields for carrots were attributed to the early stage of rehabilitation at the site. Yields

were expected to improve over time. There were also positive results from radish plantings but, due to a weak radish market, the leasing farmer decided not to bring radishes into full production on the site.

The OMAFRA horticultural specialist confirmed the crop yields and that the rehabilitated site was suitable for vegetable production. In their letter of support, the specialist recounted a visit they had made to the site several years earlier to assess a peach orchard planted on the neighbouring land, noting that the peach orchard was visited due to a concern with excessive growth of peach trees. According to the specialist, “it was apparent from the rank growth and development of these trees that the fertility and moisture holding capacity of this site was excellent. However, it was not suitable for peaches as these trees did not harden off well... I believe that this site is very well suited to vegetable production, particularly onions and carrots. These crops require fertile soil with good water holding capacity, and [the aggregate producer] and their cooperating growers have proven this quite well.” The P. Ag. confirmed the high crop yield achieved on the rehabilitated site: “Based on my site observations and examination of yield data and based on my experience with agricultural rehabilitation in the aggregate industry, I acknowledge that [the aggregate producer] has accomplished a substantial agricultural rehabilitation program, with results worthy of recognition.”

²² *Ibid.*

²³ *Ibid.*

²⁴ *Ibid.*

²⁵ *Ibid.*





Success of Progressive and Final Rehabilitation

In noting the success of the rehabilitation, the P.Ag. described the rehabilitation process as being “extremely well executed”. They further noted that the aggregate producer paid “full consideration to all of the conditions that are the perquisites of successful rehabilitation, including: topography, microclimate, internal soil drainage, surface drainage, soil organic matter, fertility, stoniness, compaction, soil structure and depth over underlying subsoil materials and water table”. The OMAFRA horticultural specialist also shared positive sentiments about the rehabilitation outcomes: “The effect that gravel excavation has had on prime horticultural soils in our area has always been a concern. However, with the success of this rehabilitation project, I am encouraged that horticultural production can be maintained and/or improved in this area.”

Following partial surrender of the licence, after successful rehabilitation of the first three phases of extraction, the aggregate producer continued to extract and rehabilitate the final phase of the site. Upon completion, the final portion of the site was inspected by MNRF to assess the potential of fully surrendering the licence. According to the inspection report: “overall, rehabilitation looks great... compaction has been alleviated, drainage has been improved with tile drainage, an ample amount of topsoil has been spread, and vegetation has been well-established across much of the site. The site is ready for an agricultural use.” The licence was surrendered, and the entire site was sold to a local grower. 🌾





Discussion

Analysis of the site plans approved in the 1970s, 1990s and 2010s, the application for a rehabilitation award and the surrender inspection report from MNRF highlighted the challenges stakeholders face in developing, reviewing, approving, and implementing rehabilitation plans. It also provided insights into rehabilitation practices and reporting of rehabilitation outcomes for an extraction site in a specialty crop area.

This section discusses the findings of the analysis in the context of four key themes.

- Differences Between Plan and Practice
- Optimizing Rehabilitation for Specialty Crops
- Vague and Ambiguous Language
- Site Plan Evolution

Differences Between Plan and Practice

A comparison of the rehabilitation plans included in the site plans (Table 1) and the documents related to the rehabilitation award highlighted some differences between what was planned for the site and what was practiced at the site. The site plans provided a skeletal plan for how rehabilitation would proceed, lacking detail and clear direction in some instances. In contrast, the application for the rehabilitation award was quite specific, documenting exactly how rehabilitation had been carried out. For example, the 1990s and 2010s site plans simply stated that drainage tiles would be installed throughout the entire site; whereas the award application specified the size and type of drainage tiles and the spacing and depth at which they were installed. The award application also specified that the rehabilitated property was levelled, with ~0.3 m inclines every ~120 m to allow for cold air drainage, which was not mentioned in the site plans. Furthermore, the site plans simply stated that topsoil would be “augmented by a mix of silt pond sediments, fine sands and a mushroom compost material”. In contrast, the award application specified that existing topsoil had been enhanced, and that additional growing media had been produced

by mixing a 1:1:1 ratio of silt pond sediments, fine sand, and mushroom compost.

While the aggregate producer complied with all the rehabilitation notes in the site plan; additional practices, such as grading the pit floor for cold air drainage and applying additional soil amendments, not specified in the site plan, were also implemented.

Optimizing Rehabilitation for Specialty Crops

As the site was not designated as a specialty crop area, it was not required by the province or municipality to be rehabilitated for specialty crop production. The only requirement was that the site be rehabilitated back to an agricultural land use following aggregate extraction as per municipal planning policies. Through an agreement with a local mushroom producer, the aggregate producer used mushroom compost and additional BMPs to enhance the soil quality to produce specialty crops.

Drawing on their experience as a farmer, the aggregate producer adopted five BMPs that optimized the rehabilitated site for specialty crops. First, topsoil was augmented with the addition of a soil amendment, which was produced using one-part mushroom compost, one-part silt sediments from the bottom of a pond and one-part fine sand from the pit floor. Second, the topsoil was placed over a subsoil layer of fine sand, which provided “excellent” moisture retention and protection against drought.²⁶

²⁶ *Ibid.*



Third, agricultural drainage tiles were installed across the site to ensure adequate drainage and prevent waterlogging. Fourth, the pit slopes were rehabilitated to a 2:1 slope, maximizing the flat, level pit floor for specialty crops and for accommodating specialized equipment for horticultural production. Finally, 0.3 m inclines were installed every ~120 m across the site to facilitate cold air drainage and create favourable microclimatic conditions for specialty crops.

Collectively, these BMPs contributed to successful rehabilitation that supported production of specialty crops, including carrots and onions, on a site that was not initially designated as a specialty crop area. Yields for both carrots and onions were high after just one year of production, with onion yields exceeding county averages.

Vague and Ambiguous Language

Site plans remain the only enforceable records for aggregate extraction sites in Ontario. The site plans approved by MNRF for this site included several instances of vague language, such as “generally”, “as necessary” and “more or less” (Table 1). For example, the site plan stated: 1) topsoil would only be moved “when it is generally dry to prevent compaction”, 2) the final elevation of the site would be “more or less” the values stated in the site plan and 3) erosion control measures would be taken “as necessary”. The site plan noted that soil compaction and drainage practices would follow “accepted farm practices,” but did not define or list specific practices. In the case of this site, the aggregate operator’s farming experience and a commitment to rehabilitation appear to have enabled successful rehabilitation despite vague and ambiguous terminology in the site plan.

Site Plan Evolution

Extraction of aggregate resources first began in the 1970s under the PQCA. The PQCA required site plans show, “as far as possible,” progressive and ultimate rehabilitation, and “where possible”, the intended use and ownership of the land after the extraction operations have ceased.²⁷ Despite these requirements, the site plan approved under the PQCA only included one sentence related to rehabilitation. It stated that “the property is expected to be replanted as orchard.” The PQCA site plan did not include any notes as to how and when rehabilitation would be carried out.

In 1990, the ARA replaced the PQCA.²⁸ The now repealed Section 69 of the ARA allowed for existing licences under the PQCA to continue temporarily, while applying for a new licence.²⁹ As part of the transition to the ARA, a new site plan was prepared to comply with the ARA, which included updated requirements for rehabilitation. The ARA required that the site plan include a rehabilitation plan, outlining the practices that would be used to carry out progressive rehabilitation and achieve final rehabilitation. Because of this, the site plan approved under the ARA was significantly more detailed than the site plan approved under the PQCA. It included provisions for soil handling, soil storage, soil conditioning, water management, drainage, and more (Table 1).

Differences in the site plan approved under the PQCA and the site plan approved under the ARA showcase the impacts that legislative changes have had on site plan contents over time. Although the site plan approved under the ARA included vague and ambiguous language, it outlined a more detailed approach that would be enforced at the site. Added rehabilitation provisions to the site plan approved under the ARA could have had positive impacts on rehabilitation outcomes at the site.

²⁷ Ontario (1980). Pits and Quarries Control Act, York University, <https://digitalcommons.osgoode.yorku.ca/cgi/viewcontent.cgi?article=1886&context=rso>

²⁸ Penaud, A., Holy, K., Lemay, M. A., Fullerton, C. (2026). Policy Timeline – the Intersection of Agriculture and Aggregates. VISTA Science and Technology.

²⁹ *Ibid.*



Conclusions

This case study analyzed the rehabilitation plans and outcomes of rehabilitation at an aggregate extraction site located within a prime agricultural area in Ontario. The site was originally approved under the PQCA (1971). It received subsequent approvals in the 1990s and 2010s under the ARA (1990).²⁹ The site was progressively rehabilitated over the course of 40+ years. The site was rehabilitated for specialty crop production in phases over that time. The licence has been surrendered, and the site has been sold to a local grower. The case study analysis drew upon a site plan approved under the PQCA in the 1970s, a site plan approved under the ARA in the 1990s, a site plan amended under the ARA in the 2010s, a surrender inspection report from MNRF and an application for an Outstanding Achievement in Rehabilitation Award, which included letters of support from a P. Ag. and a horticultural specialist with OMAFRA.

Although the site was not designated as a specialty crop area, the aggregate producer successfully rehabilitated the site to produce specialty crops, including carrots and onions. The aggregate producer used BMPs designed to enhance soil health, including using mushroom compost to improve topsoil quality. Drainage tiles were installed across the site to ensure adequate drainage and prevent waterlogging. Gentle 0.3 m inclines were installed every ~120 m across the site to facilitate cold air drainage. These targeted BMPs resulted in successful rehabilitation outcomes, with onion crop yields exceeding county averages. Agricultural specialists who visited the site were impressed with the rehabilitation outcomes, noting that the site exemplified how post-extractive rehabilitation activities can “enhance horticultural soils”. MNRF was similarly impressed by the rehabilitation program, with the Ministry’s surrender inspection report stating that “rehabilitation looks great”.

Although the rehabilitation program was ultimately successful, many of the BMPs used to rehabilitate the site for specialty crop production were not listed in the site plans. The initial site plan approved under

the PQCA in the 1970s only stated that the site was expected to be replanted as an orchard. It did not provide direction as to how this would be achieved. The site plans approved under the ARA in the 1990s and 2010s included significantly more detail regarding the rehabilitation process. Despite added detail, site plans approved under the ARA lacked clear direction and used vague and ambiguous statements. Because site plans are the only enforceable document governing rehabilitation, unclear language has the potential to compromise rehabilitation outcomes. In this case, however, it appears that the aggregate operator’s farming expertise and commitment to rehabilitation enabled positive results that not only met but exceeded the regulatory requirements and policy objectives for rehabilitation. This outcome demonstrated that positive rehabilitation outcomes can be achieved when aggregate producers adopt well-established agricultural BMPs and are committed to rehabilitation.





Appendix A: Project Information

This case study report is a part of a broader research project: **Developing Evidence-based Guidelines for the Rehabilitation of Aggregate Extraction Sites in Prime Agricultural Areas in Ontario**. The overall goal of this project is to develop practical, evidence-based guidelines for rehabilitating aggregate extraction sites on agricultural land. Specifically, the project will:

- Identify key soil health properties and indicators that support rehabilitation to agricultural land uses.
- Evaluate evidence-based rehabilitation best practices for building and maintaining soil health that supports productive agricultural land.
- Assess recurring challenges related to rehabilitation in licence applications, site plans, rehabilitation plans and agricultural impact assessments for sites on agricultural land.
- Develop standard protocols for demonstrating and confirming rehabilitation measures are in place.

The rehabilitation of pits and quarries is not only mandated; it is a vital step in the sustainable management of aggregate resources in the province. Moreover, the quick return of these sites to an agricultural condition post-extraction is critical for minimizing the loss of productive farmland. This loss not only affects food security directly but also underscores the importance of expedited rehabilitation efforts.

The PPS (2024) requires that prime agricultural areas be protected for long-term use.³⁰ It allows the extraction of aggregates in prime agricultural areas, on prime agricultural land and specialty crop areas as an interim land use, stipulating that extraction sites must be returned to an agricultural condition. For prime agricultural areas, agricultural condition is defined as “a condition in which substantially the same areas and same average soil capability for agriculture is restored”. For specialty crop areas, the PPS requires that “the same range of specialty crops common in the areas can be achieved, and, where applicable, the microclimate on which the site and surrounding area may be dependent for specialty crops will be maintained or restored”. The PPS (2024) further requires that both progressive and final rehabilitation must be carried out.

For sites where rehabilitation to an agricultural condition is required, the collective results of this project will:

- Reduce delays and uncertainty in the approval process and minimize revisions of applications, site and rehabilitation plans and technical reports by adding clarity and transparency to the commenting and approval process.
- Lead to enhanced consistency and efficiency of the licence commenting and approval process.
- Provide all stakeholders with access to an evidence-based set of parameters/ indicators and common/standard language and approaches for inclusion in site and rehabilitation plans and technical reports.

³⁰ Ministry of Municipal Affairs and Housing (2024). Provincial Planning Statement. Government of Ontario, <https://www.ontario.ca/files/2024-10/mmah-provincial-planning-statement-en-2024-10-23.pdf>; Penaud, A., Holy, K., Lemay, A., Fullerton, C. (2025). Policy Timeline – the Intersection of Agriculture and Aggregates. VISTA Science and Technology.



- Allow OMAFA (and other review and commenting agencies) to provide timelier, more consistent reviews and enhanced guidance to applicants on, 1) what constitutes rehabilitation to an agricultural condition and same average soil capability for agriculture and; 2) the details to include in applications, site and rehabilitation plans and relevant technical reports to fully describe how sites will be returned to an agricultural condition.
- Lead to improved, more consistent rehabilitation of sites in prime agricultural areas and specialty crop areas and increased compliance. 🌾





Appendix B: Glossary of Terms

Aggregate Resources Act (ARA): Legislation that directs the management of aggregate resources in Ontario; controls and regulates aggregate operations on Crown and private lands; enforces the rehabilitation of land from which aggregates have been extracted; and works to minimize adverse impacts to the environment in respect to aggregate operations.³¹ Mechanisms utilized to enforce the ARA include aggregate licences and site plan documents. The Ministry of Natural Resources (MNR) is responsible for the administration of aggregate licences and enforcing the ARA. While the ARA governs aggregate extraction, the aggregate industry must also comply with provincial planning policies (e.g., the PPS and the Greenbelt Plan) and municipal policies.

Agricultural Condition: In prime agricultural areas, agricultural condition is defined as “a condition in which substantially the same areas and same average soil capability for agriculture will be maintained, restored or enhanced.”³² In specialty crop areas, agricultural condition is defined as “a condition in which substantially the same areas and same average soil capability for agriculture are restored, the same range and productivity of specialty crops common in the area can be achieved, where applicable, the microclimate on which the site and surrounding area may be dependent for specialty crop production will be maintained, restored or enhanced.”³³

Agricultural Impact Assessment (AIA): An “evaluation of potential impacts of non-agricultural uses on the agricultural system. The assessment recommends ways to avoid or if avoidance is not possible, minimize and mitigate adverse impacts.”³⁴

Canada Land Inventory (CLI) for Agriculture: An inventory and “interpretative system used to assess the effects of climate and soil characteristics on the limitations of land for growing common field crops.”³⁵ The system evaluates soil productivity, the range of common field crops that can be grown on specific soil classes and best management practices to support the conservation of soils for field crop production.³⁶

Comprehensive Rehabilitation: A “rehabilitation of land from which mineral aggregate resources have been extracted that is coordinated and complementary, to the extent possible, with the rehabilitation of other sites in an area where there is a high concentration of mineral aggregate operations”.³⁷ Comprehensive rehabilitation is often proposed for pit expansions, which enables adjacent licenced pits to be rehabilitated to a uniform post-extraction land-use (e.g., agriculture).

³¹ Government of Ontario. (2021). Aggregate Resources Act. *Government of Ontario, E-laws*, <https://www.ontario.ca/laws/statute/90a08>

³² Ministry of Municipal Affairs and Housing (2024). Provincial Planning Statement. *Government of Ontario*, <https://www.ontario.ca/files/2024-10/mmah-provincial-planning-statement-en-2024-10-23.pdf>

³³ *Ibid.*

³⁴ *Ibid.*

³⁵ Ministry of Agriculture, Food, and Agribusiness. (2024). Soil capability for agriculture in Ontario. *Government of Ontario*, <https://www.ontario.ca/page/soil-capability-agriculture-ontario#:~:text=The%20soil%20capability%20class%20represents%20the%20potential,are%20generally%20feasible%20on%20similar%20soils%20elsewhere>

³⁶ Ministry of Agriculture, Food, and Agribusiness. (2024). Soil capability for agriculture in Ontario. *Government of Ontario*, <https://www.ontario.ca/files/2024-08/omafa-soil-capability-for-agriculture-in-ontario-en-2024-08-15.pdf>

³⁷ Ministry of Municipal Affairs and Housing (2024). Provincial Planning Statement. *Government of Ontario*, <https://www.ontario.ca/files/2024-10/mmah-provincial-planning-statement-en-2024-10-23.pdf>



Greenbelt Plan: The Greenbelt Plan (2017) is a land-use planning framework established under the Greenbelt Act to provide protection to agricultural lands, natural heritage sites and water resources in Ontario's Greater Golden Horseshoe region.³⁸ The plan includes the Protected Countryside, Urban River Valleys, and lands within the Niagara Escarpment Plan, Oak Ridges Moraine Conservation Plan and Parkway Belt West Plan areas. The plan works alongside the PPS to ensure sustainable resource use and environmental and agricultural preservation.

Growth Plan for the Greater Golden Horseshoe: Growth Plan for the Greater Golden Horseshoe (2019), was a provincial plan for the Greater Golden Horseshoe region of Ontario, which spans much of Southern Ontario, including the western boundaries of Lake Ontario, Lake Simcoe, the Georgian Bay area of Lake Huron and the eastern boundary of Lake Erie. Under the Growth Act, this provincial plan set out the regulatory framework for land-use planning policies in the Greater Golden Horseshoe. The plan worked alongside the Provincial Policy Statement (2020), until the PPS came into effect in 2024.³⁹

Mineral Aggregates Resources: Gravel, sand, clay, earth, shale, stone limestone, dolostone, sandstone, marble and granite suitable for construction, manufacturing and maintenance purposes.⁴⁰

Overburden: All material lying between the subsoil and the workable mineral aggregate deposit. "Many sand and gravel deposits in Ontario do not contain overburden material – engineers often use the term to refer to material lying above the workable deposits, including topsoil and subsoil."⁴¹

Prime Agricultural Areas: regions where prime agricultural lands predominate, including specialty crop areas and associated Canada Land Inventory Class 4 through 7 lands, and additional areas with a local concentration of farms which exhibit characteristics of ongoing agriculture. "Prime agricultural areas may be identified by a planning authority based on provincial guidance or informed by mapping obtained from the Ontario Ministry of Agriculture, Food and Agribusiness and the Ontario Ministry of Rural Affairs or any successor to those ministries."⁴²

Prime Agricultural Land: defined as land with high capability for agriculture, including specialty crop areas and Canada Land Inventory Class 1, 2, and 3 lands.⁴³

Progressive Rehabilitation: Rehabilitation that is done in phases along with extraction. Before proceeding to the next extraction phase, rehabilitation must be completed in areas of the site where aggregate resources have been removed. Required under the ARA.⁴⁴

Provincial Policy/Planning Statement (PPS): The Provincial Planning/Policy Statement, is issued under the authority of the Ontario Planning Act. The PPS consists of policies that stipulate the use and development of land, including agricultural and aggregate land uses. The PPS (2024) replaced PPS (2020) and A Place to Grow: A Growth Plan for the Greater Golden Horseshoe (2019). Previous versions of the PPS include 1997, 2005 and 2014.⁴⁵

³⁸ Government of Ontario. (2017). Greenbelt Plan. *Government of Ontario*, <https://files.ontario.ca/greenbelt-plan-2017-en.pdf>

³⁹ Ministry of Municipal Affairs and Housing. (2019). A Place to Grow: Growth Plan for the Greater Golden Horseshoe. *Government of Ontario*, <https://files.ontario.ca/mmah-place-to-grow-office-consolidation-en-2020-08-28.pdf>

⁴⁰ Government of Ontario. (2021). Aggregate Resources Act. *Government of Ontario, E-laws*, <https://www.ontario.ca/laws/statute/90a08>

⁴¹ Mackintosh, E. E. and Mozuraitus, E. J. (1982). Aggregates and the Aggregate Industry: Industrial Mineral Background Paper 3. *Ministry of Natural Resources*, https://toarc.com/wp-content/uploads/2019/02/Agri_Aggre.pdf

⁴² Ministry of Municipal Affairs and Housing (2024). Provincial Planning Statement. *Government of Ontario*, <https://www.ontario.ca/files/2024-10/mmah-provincial-planning-statement-en-2024-10-23.pdf>

⁴³ *Ibid.*

⁴⁴ OSSGA (2022). Rehabilitation 101: A Primer. https://ossga.com/publications/news/rehabilitation_101_a_primer/

⁴⁵ Open Council. (2024). Ontario Provincial Planning Statement (PPS) tells municipalities how to handle growth and development. (2024). Open Council. <https://opencouncil.ca/provincial-planning-statement/>. Penaud, A., Holy, K., Lemay, A., Fullerton, C. (2025). Policy Timeline – the Intersection of Agriculture and Aggregates. VISTA Science and Technology.



Ripping: A remedial approach utilized to alleviate soil compaction and promote root penetration, infiltration and development of soil structure on rehabilitated lands.⁴⁶ It is recommended that ripping be constrained to the depth of each soil horizon (i.e., topsoil or subsoil) to minimize mixing soil layers.⁴⁷

Secondary Agricultural Lands: Areas with agricultural capability, that fall outside of the soil capability range utilized to define prime agricultural areas. Secondary agricultural areas are typically found in an area with a high concentration of agricultural activity. These lands are associated with CLI Classes 4 through 7.⁴⁸

Soil Capability: The suitability of soils for growing field crops. Higher soil capability aligns with higher Canada Land Inventory (CLI) classes.⁴⁹

Soil Health: The “ability of soil to support crop growth without becoming degraded or otherwise harming the environment”. Soil health includes physical, chemical and biological components, as outlined by the OMAFA.⁵⁰

Specialty Crop Area: Areas within the agricultural system whereby specialty crops, such as tender fruits (e.g., peaches, cherries, plums), grapes, vegetable crops, greenhouse crops and crops from agriculturally developed organic soil predominate.⁵¹ According to the PPS (2024), specialty crop areas are typically

the result of:

- “Soils that have suitability to produce specialty crops, or lands that are subject to special climatic conditions, or a combination of both.
- Farmers skilled in the production of specialty crops; and
- A long-term investment of capital in areas such as crops, drainage, infrastructure and related facilities and services to produce, store, or process specialty crops.”⁵²

Stripping: A process of removing the topsoil, subsoil and overburden material located above mineral aggregate deposits. Prior to extraction, soil studies can be utilized to identify the depths of each soil zone and inform a stripping plan to minimize mixing of soil layers.⁵³

Subsoil: The zone immediately beneath the topsoil, which may extent to a depth of 1 m or more. “Under natural conditions, the subsoil is often well structured and contains numerous plant roots... In summer drought periods, plants may obtain much of their moisture requirements from this zone.”⁵⁴

Topsoil: The uppermost zone of the soil, often darker in colouration due to the accumulation of organic matter. “On arable agricultural lands, it is normally restricted to the depth of cultivation, which is about 15 to 30 cm.”⁵⁵ 

⁴⁶ Ministry of Agriculture, Food and Rural Affairs. (2018). Draft Agricultural Impact Assessment (AIA) Guidance Document. *Government of Ontario*, <https://www.ontario.ca/files/2024-04/omafra-agricultural-impact-assessments-en-2024-04-03.pdf>

⁴⁷ *Ibid.*

⁴⁸ Wellington County. (2025). Wellington County Official Plan. *Wellington County*, <https://www.wellington.ca/business-development/planning-development/official-plan-land-use>

⁴⁹ Ministry of Agriculture, Food and Agribusiness. (2024). Soil Capability for Agriculture in Ontario. *Government of Ontario*, <https://www.ontario.ca/files/2024-08/omafra-soil-capability-for-agriculture-in-ontario-en-2024-08-15.pdf>

⁵⁰ Ministry of Agriculture, Food and Agribusiness. (2024). New Horizons: Ontario’s Agricultural Soil Health and Conservation Strategy. *Government of Ontario*, <https://www.ontario.ca/files/2024-04/omafra-new-horizons-ontarios-agricultural-soil-health-and-conservation-strategy-en-2024-04-04.pdf>

⁵¹ Ministry of Municipal Affairs and Housing (2024). Provincial Planning Statement. *Government of Ontario*, <https://www.ontario.ca/files/2024-10/mmah-provincial-planning-statement-en-2024-10-23.pdf>

⁵² *Ibid.*

⁵³ Ministry of Agriculture, Food and Rural Affairs. (2018). Draft Agricultural Impact Assessment (AIA) Guidance Document. *Government of Ontario*, <https://www.ontario.ca/files/2024-04/omafra-agricultural-impact-assessments-en-2024-04-03.pdf>

⁵⁴ Mackintosh, E. E. and Mozuraitus, E. J. (1982). Aggregates and the Aggregate Industry: Industrial Mineral Background Paper 3. *Ministry of Natural Resources*, https://toarc.com/wp-content/uploads/2019/02/Agri_Aggre.pdf

⁵⁵ *Ibid.*



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