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PROGRESSIVE AND FINAL REHABILITATION MONITORING **STUDY**

BURLINGTON QUARRY EXTENSION

Part Lot 1 and 2, Conc. 2 &Part Lot 17 and 18,
Conc. 2, NDS (former Township of Nelson),
City of Burlington

Date:
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Prepared for:
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1.0 INTRODUCTION

Nelson seeks to replenish its existing reserves by extending the Burlington Quarry on lands to the south and west of the existing quarry so that it can continue to supply aggregate to the local market and surrounding municipalities from this strategic location. The proposed extension is located at Part Lot 1 and 2, Concession 2 and Part Lot 17 and 18, Concession 2, NDS (former geographic Township of Nelson), City of Burlington, Region of Halton. See Figure 1.

The proposed licence area is 78.3 hectares and the proposed extraction area is 50.2 hectares. The South Quarry Extension is 18.3 hectares with a proposed extraction area of 14.5 hectares. The South Quarry Extension consists of lands currently used for agricultural crops. The West Extension is 60.0 hectares with a proposed extraction area of 35.7 hectares. The West Extension consists of lands currently used as a golf course. See Figure 2.

As part of the pre-consultation process the review agencies required that a "Progressive and Final Rehabilitation / Monitoring Study" be submitted with the application for the Burlington Quarry Extension.

As outlined, in the Region of Halton Aggregate Resource Reference Manual, the purpose of the study is to:

- Demonstrate how the subject lands will be rehabilitated to a land use that is compatible with the land use of the area and in conformity with Provincial, Regional and Local policy; and
- Identify requirements for monitoring and rehabilitation to ensure that the rehabilitation of the site is consistent with the requirements of applicable policy documents.

The objectives of the study are to:

- Identify and document the specific elements of a plan for the progressive and timely rehabilitation of the site;
- Recommend a rehabilitation strategy for progressive rehabilitation, monitoring and post development rehabilitation;
- Prepare a strategy to rehabilitate the site to a state of greater or equal ecological value;
- Identify potential after-uses that are compatible with surrounding land uses;
- Identify ongoing monitoring milestones for monitoring site impacts and rehabilitation requirements; and
- Identify any further planning approvals that may be necessary to facilitate after uses.

The "Progressive and Final Rehabilitation / Monitoring Study" is a summary document that contains information already contained in the following reports prepared for the Burlington Quarry Extension:

- Adaptive Management Plan, Proposed Burlington Quarry Extension, Earth FX Incorporated, Savanta, and Tatham Engineering, April 2020.
- Financial Impact Study, Proposed Burlington Quarry Extension, Nelson Aggregates Co., April, 2020.
- Level 1 and 2 Hydrogeological and Hydrological Impact Assessment Report, Proposed Burlington Quarry Extension, Earth FX Incorporated, April 2020.
- Level 1 and 2 Natural Environment Technical Report, Proposed Burlington Quarry Extension, Savanta, April 2020.
- Surface Water Assessment, Burlington Quarry Extension, Tatham Engineering, April, 2020.
- Visual Impact Assessment Report, Proposed Extension of the Burlington Quarry, MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), April 2020.
- Planning Report and Aggregate Resources Act Summary Statement, MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), April 2020.
- Aggregate Resources Act Site Plans, MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC), April 2020.

The study includes:

- An overview of the application and a summary of the proposed rehabilitated landform;
- An analysis of the rehabilitation policies in the Niagara Escarpment Plan, Provincial Policy Statement, Region of Halton Official Plan and City of Burlington Official Plan to determine if the land use is compatible with surrounding land uses and appropriate;
- The monitoring and rehabilitation requirements for the site based on the technical recommendations from the water resources report and natural environment report;
- The proposed phasing plan to ensure timely rehabilitation;
- A rehabilitation plan that includes woodlands, wetlands, ponds, lakes, vernal pools and grasslands to rehabilitate the site to a state of greater or equal ecological value;
- An after use plan that is designed to be compatible with surrounding land uses. The after use plan includes a proposal to convey the lands into public ownership in phases; and
- A summary of further planning approvals that may be necessary to facilitate the final end use will be included.

2.0 OVERVIEW OF THE BURLINGTON QUARRY EXTENSION

Nelson seeks to replenish its existing reserves by extending the Burlington Quarry on lands to the south and west of the existing quarry so that it can continue to supply aggregate to the local market and surrounding municipalities from this strategic location. The proposed extension is located at Part Lot 1 and 2, Concession 2 and Part Lot 17 and 18, Concession 2, NDS (former geographic Township of Nelson), City of Burlington, Region of Halton. See Figure 1.

The proposed licence area is 78.3 hectares and the proposed extraction area is 50.2 hectares. The South Quarry Extension is 18.3 hectares with a proposed extraction area of 14.5 hectares. The South Quarry Extension consists of lands currently used for agricultural crops. The West Extension is 60.0 hectares with a proposed extraction area of 35.7 hectares. The West Extension consists of lands currently used as a golf course. See Figure 2.

The proposed extension includes 6 phases. Phases 1 and 2 are located to the south of the existing quarry and Phases 3-6 are located to the west of the existing quarry. Extracted aggregate will be transported to the existing Burlington Quarry for processing and shipping to market utilizing the existing entrance/exit and haul route. See Figure 3. The site will be operated and progressively rehabilitated in accordance with this Phasing Plan.

The Burlington Quarry Extension contains approximately 30 million tonnes of the highest quality aggregate resource in Southern Ontario. Nelson is applying for a maximum tonnage limit of 2 million tonnes per year, however they plan on extracting an average of 1 million tonnes per year. As a result, the South Extension is expected to operate for +/-9 years and the West Extension for +/-21 years.

The rehabilitation plan for the Burlington Quarry Extension includes the following landforms:

- South Extension (18.3) includes:

  <u>Setback Area (3.8 hectares)</u>
  - 2.5 hectares of setback area to be forested during operations in Phases 1 and 2
  - 0.4 hectares of setback area to be forested once berms are removed
  - 0.9 hectares of setback area of existing trees and grasslands

  <u>Extraction Area (14.5 hectares)</u>
  - 1.6 hectares of beach
  - 0.8 hectares of shallow lake

- 9.8 hectares of deep lake
- 1.5 hectares of forested sideslopes
- 0.8 hectares of wetland

- West Extension (60.1 hectares) includes:

  Setback Area (24.4 hectares)
  - 17.4 hectares of existing trees and grasslands
  - 4.3 hectares of pond to be built prior to extraction in Phase 3
  - 2.0 hectares of setback area to be forested prior to extraction in Phases 3
  - 0.4 hectares of setback area to be forested once berms are removed
  - 0.3 hectares existing wetland

  Extraction Area (35.7 hectares)
  - 13.4 hectares of forested slideslopes
  - 9.8 hectares of lake
  - 0.9 hectares restored to original grade and forested
  - 8.1 hectares gradual grade with trees and vernal pools, including islands
  - 0.7 hectares of pond
  - 2.8 hectares of wetlands

See Figure 4.

As part of the Burlington Quarry Extension application Nelson is prepared to enter into an agreement requiring extraction at the existing quarry and proposed extension to conclude within +/- 30 years of approval of the extension.

If the extension is approved, Nelson's after use vision for the extension and existing quarry is to develop a future park and conservation area that could be created in phases. The total area includes 382 hectares consisting of:

- 71 hectares of existing natural heritage system;
- 13 hectares recreational swimming area / beach;
- 47 hectares of additional lake / ponds;
- 89 hectares of new forest areas and wetlands; and
- 162 hectares of grassland area that could be used for active parkland.

The after use vision includes a revised rehabilitation plan for the existing quarry. Current approvals require the existing quarry to be rehabilitated to a private 185 hectare lake with shoreline wetlands, an island, vegetated shorelines ranging from 30 m to 250 m and exposed cliff faces. Once extraction ceases at the existing quarry current approvals will stop water from being discharged to the surrounding natural environment which will impact wetlands, fish habitat and watercourses that depend on this water. The revised rehabilitation plan would maintain the current discharge of water to surrounding natural heritage features and allow the existing quarry to be rehabilitated to a more diverse landform including wetlands, lakes, forests, grasslands and large area for active recreation. See Figure 5.

3.0 REHABILITATION / AFTER USE POLICIES

The following is a summary of the objectives and policies from the Niagara Escarpment Plan, Provincial Policy Statement, Region of Halton Official Plan and City of Burlington Official Plan regarding rehabilitation and after use for mineral aggregate operations.

3.1 Niagara Escarpment Plan

Objectives of the Niagara Escarpment Plan include:

3. to provide adequate opportunities for outdoor recreation;

6. to provide for adequate public access to the Niagara Escarpment;

1.2.2.3 In evaluating applications for amendments to the Niagara Escarpment Plan to re-designate Escarpment Rural Area to Mineral Resource Extraction Area, the following matters, in addition to all other relevant policies of this Plan, will be considered:

b) opportunities for achieving the objectives of the Niagara Escarpment Planning and Development Act through the final rehabilitation of the site;

c) the protection of prime agricultural areas, the capability of the land for agricultural uses, and its potential for rehabilitation for agricultural uses; and

d) opportunities to include rehabilitated lands in the Niagara Escarpment Parks and Open Space System.

1.2.2.4 Amendment applications must be accompanied by:

c) information on the ultimate use of the site in conformity with the applicable land use designations.

Section 1.9.1 of the Niagara Escarpment Plan includes the following Objectives for the Mineral Resource Extraction Area:

3. To encourage progressive rehabilitation of mineral aggregate operations.

4. To encourage rehabilitated mineral aggregate operations to be restored to a state that is of equal or greater ecological or agricultural value than the original characteristics of the site.

5. *To ensure that, after a licence is surrendered, the land is re-designated to a land use designation that is compatible with the rehabilitation of the site, the designation criteria of adjacent lands, the surrounding Escarpment environment and existing land uses in the area.*

6. *To encourage, where possible, the integration of rehabilitated lands into the Niagara Escarpment Parks and Open Space System.*

1.9.5 After Uses – Following the surrender of the licence issued pursuant to the Aggregate Resources Act, an amendment to the Niagara Escarpment Plan is required. The amendment will change the land use designation of the lot from Mineral Resource Extraction Area to a land use designation that has designation criteria consistent with the rehabilitation completed on the property, and will be processed in accordance with Part 1.2.

2.7.10 Any forest management activities shall include natural regeneration or rehabilitation through reforestation, using native tree species where necessary.

2.9.3 In addition to all other relevant policies of this Plan, proposals for mineral aggregate operations including wayside pits and quarries, accessory uses, accessory facilities and haul routes shall:

h) complete progressive and final rehabilitation of the licensed site to provide equal or greater ecological values, including utilizing native species, in order to accommodate subsequent land use designations compatible with the surrounding land uses;

2.9.7 Progressive rehabilitation may include the use of off-site material, where on-site material is not available. Off-site material shall only be used where required to stabilize and revegetate disturbed areas. The use of off-site material shall be minimal and shall not be used for any major regarding toward a planned after-use with the deposition of off-site material.

2.9.8 The use of off-site material for progressive rehabilitation shall meet the applicable provisions of Part 2.13 (Scenic Resources and Landform Conservation) of this Plan and such material shall also meet the relevant standards of the Ministry of the Environment and Climate Change, the Ministry of Natural Resources and Forestry and the municipality where it has approved such standards.

2.9.9 The use of off-site material shall not be permitted unless it is determined through appropriate environmental, technical and planning studies that doing so will achieve greater long-term ecological and land use compatibility (e.g., the importation of topsoil to improve site capability for agriculture, forestry or habitat diversity) and the implementing authority is satisfied that the use of off-site material does not constitute a commercial fill or landfill operation.

2.9.10 All accessory uses to the Mineral Resource Extraction Area operation shall be discontinued and be required to vacate the property as soon as extraction ceases, including any on-site processed aggregate material.

2.9.11 Rehabilitation shall incorporate the following:

a) natural heritage and hydrologic features and functions shall be restored or enhanced;

b) aquatic areas remaining after extraction shall be rehabilitated as representative of the natural ecosystem in that particular setting or ecodistrict, and the combined terrestrial and aquatic rehabilitation shall protect and where possible enhance the ecological value of the site;

c) excess topsoil and overburden are to be retained and stabilized for future rehabilitation;

d) all excavated pit and quarry walls are to be sloped and rehabilitated in accordance with best practices. On sites where a higher standard of rehabilitation is justified (e.g., to improve land use compatibility) or on sites where topsoil and/or land fill material is scarce, alternative approaches to slope standards may be applied. Sections of pit or quarry faces may be left exposed for aesthetic or educational purposes or to create habitat diversity in an approved rehabilitation plan;

e) vegetation, including seeding, crops, trees and shrubs, shall be planted as soon as possible as part of progressive rehabilitation of the pit or quarry;

f) rehabilitation of the site shall contribute to the open landscape character and be compatible with the surrounding scenic resources;

g) in prime agricultural areas, other than specialty crop areas, Mineral Resource Extraction Areas shall be rehabilitated to a condition in which substantially the same areas and same average soil capability for agriculture are restored;

h) in specialty crop areas, Mineral Resource Extraction Areas shall be returned or rehabilitated to 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, and, where applicable, the microclimate on which the site and surrounding area may be dependent for specialty crop production are maintained or restored;

i) in prime agricultural areas, where rehabilitation to the conditions set out in (g) and (h) above is not possible or feasible due to the depth of planned extraction or due to the presence of a substantial deposit of high quality mineral aggregate resources below the water table warranting extraction, agricultural rehabilitation in the remaining areas will be maximized as a first priority;

j) in areas with below-water table extraction, mineral aggregate operations requiring perpetual water management after rehabilitation is complete should be avoided but may be considered where it can be demonstrated that such actions would support other public water management needs; and

k) comprehensive rehabilitation shall be considered and encouraged where feasible.

3.1 The Niagara Escarpment Parks and Open System

3.1.1 Objectives

1. To protect the Niagara Escarpment's natural heritage resources and conserve its cultural heritage resources;

2. To provide opportunities for outdoor education and recreation;

3. To provide for public access to the Niagara Escarpment;

4. *To complete a public system of major parks and open spaces through land acquisition and Master/Management planning;*

5. *To secure a permanent route for the Bruce Trail;*

6. *To protect and enhance the natural environment of the Niagara Escarpment, including the protection of natural heritage and hydrologic features and functions;*

7. *To support tourism by providing opportunities on public land for discovery and enjoyment by Ontario's residents and visitors;*

8. *To provide a common understanding and appreciation of the Niagara Escarpment; and*

9. *To show leadership in supporting and promoting the principles of the Niagara Escarpment's UNESCO World Biosphere Reserve designation through sustainable park planning, ecological management, community involvement, environmental monitoring, research and education.*

3.2.1 The Bruce Trail is an essential component of the NEPOSS, linking parks, open spaces and natural heritage features through the establishment of the Bruce Trail corridor, in conjunction with Bruce Trail access points and overnight rest areas. The long-term goal is to secure a permanent route for the Bruce Trail along its entire length.

3.2.5 Securing a permanent continuous route for the Bruce Trail will be accorded the same priority as establishing and completing the other parks and open spaces in the NEPOSS.

3.2 Provincial Policy Statement

1.1.5.2 On rural lands located in municipalities, permitted uses are:

b) resource-based recreational uses (including recreational dwellings);

1.1.5.3 Recreational, tourism and other economic opportunities should be promoted.

1.5.1 Healthy, active communities should be promoted by:

b) planning and providing for a full range and equitable distribution of publicly-accessible built and natural settings for recreation, including facilities, parklands, public spaces, open space areas, trails and linkages, and, where practical, water-based resources;

1.7.1 Long-term economic prosperity should be supported by:

c) optimizing the long-term availability and use of land, resources, infrastructure and public service facilities;

h) providing opportunities for sustainable tourism development;

2.5.3.1 Progressive and final rehabilitation shall be required to accommodate subsequent land uses, to promote land use compatibility, to recognize the interim nature of extraction, and to mitigate negative impacts to the extent possible. Final rehabilitation shall take surrounding land use and approved land use designations into consideration.

2.5.3.2 Comprehensive rehabilitation planning is encouraged where there is a concentration of mineral aggregate operations.

2.5.4.1 In prime agricultural areas, on prime agricultural land, extraction of mineral aggregate resources is permitted as an interim use provided that the site will be rehabilitated back to an agricultural condition.

Complete rehabilitation to an agricultural condition is not required if:

a) outside of a specialty crop area, there is a substantial quantity of mineral aggregate resources below the water table warranting extraction, or the depth of planned extraction in a quarry makes restoration of pre-extraction agricultural capability unfeasible;

b) in a specialty crop area, there is a substantial quantity of high quality mineral aggregate resources below the water table warranting extraction, and the depth of planned extraction makes restoration of pre-extraction agricultural capability unfeasible;

c) other alternatives have been considered by the applicant and found unsuitable. The consideration of other alternatives shall include resources in areas of Canada Land Inventory Class 4 through 7 lands, resources on lands identified as designated growth areas, and resources on prime agricultural lands where rehabilitation is feasible. Where no other alternatives are found, prime agricultural lands shall be protected in this order of priority: specialty crop areas, Canada Land Inventory Class 1, 2 and 3 lands; and

d) agricultural rehabilitation in remaining areas is maximized.

3.3 Region of Halton Official Plan

107. The objectives of the Mineral Resource Extraction Areas are:

(5) To ensure the progressive and final rehabilitation of mineral aggregate operations to the appropriate after use.

109. Subject to other policies of this Plan, applicable policies of the Greenbelt Plan and Niagara Escarpment Plan, applicable Local Official Plan policies and Zoning By-laws, and site plan and conditions of the licence under the Aggregate Resources Act, the following uses may be permitted:

(4) associated facilities to a mineral aggregate operation used in extraction, transport, beneficiation, processing or recycling of mineral aggregate resources and derived products such as asphalt and concrete, or the production of secondary related products, provided that such associated facilities are:

d) located in a manner that does not affect the final rehabilitation or enhancement of the site in accordance with an approved rehabilitation and enhancement plan.

110. It is the policy of the Region to:

(6) Consider mineral aggregate resource extraction as an interim use and require the rehabilitation of all such sites to form part of the Greenbelt or Regional Natural Heritage System or the Agricultural Area, with the proposed after-uses being in conformity with the applicable policies of that land use designation.

(6.1) Require the rehabilitation of mineral aggregate operations on prime agricultural lands, within Prime Agricultural Areas to be carried out so that substantially the same areas and same average soil quality for agriculture are restored.

On prime agricultural lands, complete agricultural rehabilitation is not required if:

a) There is a substantial quantity of mineral aggregate resources below the water table warranting extraction, or the depth of planned extraction in a quarry makes restoration of pre-extraction agricultural capability unfeasible;

b) Other alternative locations have been considered by the applicant and found unsuitable. The consideration of other alternatives shall include resources in areas of Canada Land Inventory Class 4 to 7 soils, resources on lands identified as designated growth areas, and resources on prime agricultural lands where rehabilitation is feasible. Where no other alternatives are found, prime agricultural lands shall be protected in this order of priority: specialty crop areas, and Canada Land Inventory Class 1, 2 and 3 lands; and

c) Agricultural rehabilitation in remaining areas is maximized.

(7.2) In accordance with Section 118(3)d), apply the following systems based approach in the assessment of the impact of a new or expanded mineral aggregate operation on the Region's Natural Heritage System:

d) Where the proponent has satisfied the requirements of Sections 110(7.2)a) through 110(7.2)c) as applicable, require any application for a new or expanded mineral aggregate operation to consider a "net environmental gain" approach to the preservation and enhancement of the Greenbelt and/or Regional Natural Heritage System based on the following principles:

A) Outside Prime Agricultural Areas, or where agricultural rehabilitation is not required in accordance with Section 110(6.1), the site is to be rehabilitated to function as part of the Greenbelt and/or Regional Natural Heritage Systems.

B) The Key Features and ecological functions of the Greenbelt and/or Regional Natural Heritage Systems will, where possible, be enhanced both in the short and long terms as a result of implementing the rehabilitation plan of the proposed extractive operation and/or an off-site enhancement plan. Such enhancements may include but not necessarily be limited to:

- *[i] increase in the spatial extent of the Greenbelt and/or Regional Natural Heritage Systems,*
- *[ii] increase in biological and habitat diversity,*
- *[iii] enhancement of ecological system function,*
- *[iv] enhancement of wildlife habitat,*
- *[v] enhancement of natural succession,*
- *[vi] creation of new wetlands or woodlands, [vii] enhancement of riparian corridors,*
- *[viii] enhancement of groundwater recharge or discharge areas, and*
- *[ix] establishment or enhancement of linkages between significant natural heritage features and areas.*

C) Priorities for restorations or enhancements to the Greenbelt and/or Regional Natural Heritage Systems through post-extraction rehabilitation shall be based on the following in descending order of priority:

[i] restoration to the original features and functions on the areas directly affected by the extractive operations,

[ii] enhancements to the Greenbelt and/or Regional Natural Heritage Systems by adding features and functions on the balance of the site,

[iii] enhancements to the Greenbelt and/or Regional Natural Heritage Systems by adding features and functions in areas immediately surrounding the site,

[iv] enhancements to that part of the Greenbelt and/or Regional Natural Heritage Systems in the general vicinity of the site, and

[v] enhancements to other parts of the Greenbelt and/or Regional Natural Heritage Systems in Halton.

D) Restorations or enhancements shall proceed immediately after extraction in a timely fashion.

E) Consideration should be given to the transfer of the ownership of any privately owned rehabilitated or enhanced lands to a public body.

F) A detailed implementation plan of the proposed restorations and enhancements shall form part of the rehabilitation plan in the site plan or be included as a condition of the licence under the Aggregate Resources Act.

(8) Evaluate each proposal to designate new or expanded Mineral Resource Extraction Areas based on its individual merits and consideration of all the following factors:

d) proposed rehabilitation plan and compatibility of the proposed after-use with the goals and objectives of this Plan, and

e) risk of public financial liability during and after extraction where continuous active on-site management is required.

(8.1) Support the progressive and final rehabilitation of extractive operations that:

a) takes place in a timely fashion;

b) limits the amount of disturbed area on an on-going basis ;

c) adopts prevailing best management practices; and

(8.2) Discourage the use of adaptive management plans or similar measures that will require continuous or perpetual active on-site management post rehabilitation.

118. It is the policy of the Region to:

(9) Promote, in conjunction with other public agencies and through stewardship programs, the donation of privately owned lands in the Regional Natural Heritage System to public agencies or charitable organizations, or the transfer of the responsibilities for the protection of the ecological functions and features on such lands to a public agency or charitable organization through a conservation easement agreement.

146. The objectives of the Region are:

(5) To promote the concept of a Regional trail system by providing the needed connections, through acquisitions or easements, between local trails and/or interregional trails such as the Bruce Trail and the Waterfront Trail.

147. It is the policy of the Region to:

(3) Adopt and maintain, in consultation with the Halton community and in collaboration with the appropriate agencies, a Land Securement Strategy that would identify how the overall environmental quality of Halton can be enhanced through acquisitions of land ownership or land management rights through purchases, conservation easements, or private-public partnership agreements.

3.4 City of Burlington Official Plan

2.7 Mineral Resource Extraction Area

2.7.1 Objectives

c) To ensure the progressive rehabilitation of pits and quarries to an appropriate after-use that is compatible with the applicable Plan designation, the surrounding environment and existing uses.

f) To encourage the rehabilitation of pits and quarries to an agricultural after-use if the lands are located in an agricultural area or to be integrated into the Niagara Escarpment Parks and Open Space System, where appropriate. (2004)

2.7.2 Policies

e) The City shall consider mineral resource extraction areas as an interim use and encourage their progressive rehabilitation for an appropriate after-use.

f) Recreation uses shall be permitted only when buildings and structures are minor in scale, and are located to preserve an open-space character in the area; landscaping and berms are provided to maintain an open-space character of the area; if the use involves significant taking of ground or surface waters, the proponent must demonstrate, through a detailed study and to the satisfaction to the City, that the water resources in the general area will not be adversely affected and the impact on adjacent agricultural operations is minimized, through the preparation of an Agricultural Impact Assessment to the satisfaction of the Region of Halton.

g) Where rehabilitation is being undertaken by reforestation, the after use shall aim to re-establish a functioning ecosystem similar in condition to the natural ecosystem in the region.

h) Where rehabilitation is being undertaken to agriculture, substantially the same acreage and average soil capability for agriculture shall be restored. (2004)

4.0 REHABILITATION AND AFTER USE POLICY ANALYSIS

Nelson currently has plans to significantly reduce extraction levels and operate the existing quarry for approximately 50 years and potential underground mining could further extend the life of the quarry, subject to required approvals. Current approvals require the existing quarry to be rehabilitated to a private 185 hectare lake with shoreline wetlands, an island, vegetated shorelines ranging from 30 m to 250 m and exposed cliff faces. Once extraction ceases at the existing quarry current approvals will stop water from being discharged to the surrounding natural environment which will impact wetlands, fish habitat and watercourses that depend on this water.

As part of the Burlington Quarry Extension application Nelson is prepared to enter into an agreement requiring extraction at the existing quarry and proposed extension to conclude within +/- 30 years of approval of the extension and revise the existing quarry rehabilitation plan.

If the extension is approved, Nelson's after use vision for the extension and existing quarry is to convey 382 hectares of land to a public authority consisting of the following:

- 71 hectares of existing natural heritage system;
- 13 hectares recreational swimming area / beach;
- 47 hectares of additional lake / ponds;
- 89 hectares of new forest areas and wetlands; and
- 162 hectares of grassland area that could be used for active parkland.

The application includes a revised rehabilitated landform for the existing quarry to maximize ecological diversity, opportunities for parkland, conservation areas, and water management. The overall landform is suitable for a range of after uses including conservation, recreational and water management uses and is compatible and appropriate taking into account surrounding land uses and designations.

The rehabilitation plan for the existing quarry would be revised to no longer flood the quarry and create one large lake. Instead the quarry would be rehabilitated to:

- Retain the rehabilitated area in the eastern 1/3 of the existing quarry which currently includes large pond areas, wetland habitat, islands, cliff faces and forested side slopes;
- Retain the side slopes along the south, north and easterly boundary to provide additional terrestrial habitat;

- Rehabilitate the quarry floor to a vegetated grassland to provide a landform suitable for parkland; and
- Establish a pond in the northwest corner of the site.

The proposed rehabilitation plan maintains the existing pumping regime from the existing quarry to maintain water to surrounding natural features that currently depend on this water and provides additional land area for conservation and recreational after uses. The water management system is straight forward and involves water being stored in onsite lakes and ponds on the quarry floor and pumped off-site to the north and south similar to the existing quarry operation. The only addition to the system is the passive discharge from the pond to the wetland north of No. 2 Sideroad via a control valve. The management of the site is similar to activities routinely conducted by conservation authorities to manage water resources to the benefit of the public by storing water during snow melt and storm events and releasing water during droughts or periods of low flow to help maintain and enhance surrounding natural heritage features. The conditions of the Aggregate Resources Act Site Plans ensure that there is no risk of public financial liability as a result of active management.

The various planning documents promote and encourage rehabilitated sites to be transferred into public ownership and incorporated in the Niagara Escarpment Parks and Open System. As part of the application Nelson is prepared to convey the lands to a public authority in phases:

- Phase 1: 48 hectares immediately following approval of the proposed extension. Phase 1 includes the lands designated natural heritage system to the east of the South Extension. See Figure 6.
- Phase 2: 89 hectares +/- 10 years following extraction commencing in the proposed extension. Phase 2 includes two parcels: i) 31 hectares including the South Extension lands that will be rehabilitated to a lake and beach area and lands designated natural heritage system to the west of the South Extension. Rehabilitation of the final lake could be accelerated by transferring water from the existing quarry to convert this to parkland in +/- 10 years; and ii) 58 hectares of the rehabilitated eastern portion of the existing quarry. This area is already rehabilitated to large pond areas, wetland habitat, islands, cliff faces and forested side slopes. See Figures 7 and 8.
- Phase 3: 245 hectares +/- 30 following extraction commencing in the proposed extension. Phase 3 includes the West Extension lands and the western 2/3 of the existing quarry. Rehabilitation of this area includes forested areas, ponds, wetlands, islands, cliff faces and a vegetated quarry floor. This landform would also include the existing hill that has created on the existing quarry floor. See Figure 9.

This after use vision represents a unique opportunity to significantly enhance parkland that is well-connected to the Bruce Trail. The value of 382 hectares of contiguous publically-accessible parkland to a rapidly growing centre such as Burlington is significant. The landholdings are 5 times larger than any City of Burlington park and are the size and scale that is suitable for a Provincial park within the Greater Golden Horseshoe. See Figures 10 and 11.

Parkland is an integral part of modern urban systems, offering array of social, environmental and health benefits. As the population of the Greater Toronto Area (GTA) continues to grow beyond its current 6 million people, so too will the demand on the regions existing park network.

In terms of uses, the potential Mount Nemo Park would support a balance of conservation, recreation and leisure uses and could include, subject to the required approvals trails, wildlife habitat, cross country skiing, various field sports, water sports and recreation, dog parks, an amphitheatre, pavilions, camping facilities, and other programmed uses.

Setting it apart from others in the GTA, the Mount Nemo Park would offer a network of inland lakes and rivers which could support an array of aquatic recreation and leisure activities, as well as habitat and conservation purposes. The inland lakes would offer a different experience in terms of paddling, swimming, or watersport versus the much larger, open-water recreation and leisure experiences offered by Lake Ontario.

For the citizens of Burlington in particular, the 382-hecatre potential Mount Nemo Park area offers a considerable injection of publicly-accessible park space to the current 580-hectare inventory of (municipally held) publicly accessible parkland within the City. Mount Nemo Park would be a 10-minute drive from the Queen Elizabeth Expressway and 15-minute drive from Lakeshore Road, offering a central and accessible resource for citizens of the community.

This landholding is a good fit for Conservation Halton. The site is in close proximity to their head office and is adjacent to the Mont Nemo Conservation Area which is already operated by Conservation Halton. Conservation Halton's areas of focus include:

- Water Resources Management: Conservation Halton manages water resources using integrated, ecologically sound environmental practices to maintain secure supplies of clean water to protect communities from flooding and erosion to ensure that environmental planning is an integral part of community development.
- Forest Resources Management: Conservation Halton manages a large forest resource using sound sustainable forest management practices involving silviculture and wildlife habitat improvements which contribute to the health of the watershed's natural environment.
- Lifelong Education and Recreation: Conservation Halton creates educational and recreational experiences in natural environments that enrich the lives of people of all ages by instilling awareness and appreciation of the watershed's natural heritage.

Conservation Halton has acquired other quarry sites to assist with their mandate. To date, Conservation Halton currently owns the former Milton Limestone Quarry which is now known as Kelso Quarry Park (71 hectares). During the Milton Quarry Extension, Conservation Halton negotiated the transfer of 405 hectares of land for conservation recreational and water management purposes. As part of the Acton Quarry Extension, the Town of Halton Hills negotiated the transfer of 438 hectares of land for conservation, recreational and water management purposes to the Town and Conservation Halton has agreed to manage water resources at the site to assist with overall watershed objectives.

If Conservation Halton is not interested, Nelson would consider other public or private partnerships to implement the after use vision.

As part of this vision, the rehabilitation plan for the Burlington Quarry Extension includes the following landforms:

- South Extension (18.3) includes:

  Setback Area (3.8 hectares)
  - 2.5 hectares of setback area to be forested during operations in Phases 1 and 2
  - 0.4 hectares of setback area to be forested once berms are removed
  - 0.9 hectares of setback area of existing trees and grasslands

  Extraction Area (14.5 hectares)
  - 1.6 hectares of beach
  - 0.8 hectares of shallow lake
  - 9.8 hectares of deep lake
  - 1.5 hectares of forested sideslopes
  - 0.8 hectares of wetland

- West Extension (60.1 hectares) includes:

  Setback Area (24.4 hectares)
  - 17.4 hectares of existing trees and grasslands
  - 4.3 hectares of pond to be built prior to extraction in Phase 3
  - 2.0 hectares of setback area to be forested prior to extraction in Phases 3
  - 0.4 hectares of setback area to be forested once berms are removed
  - 0.3 hectares existing wetland

  Extraction Area (35.7 hectares)
  - 13.4 hectares of forested slideslopes
  - 9.8 hectares of lake
  - 0.9 hectares restored to original grade and forested
  - 8.1 hectares gradual grade with trees and vernal pools, including islands
  - 0.7 hectares of pond
  - 2.8 hectares of wetlands

The rehabilitation plan has been designed to:

- Restore and enhance natural heritage and hydrologic functions;
- Enhance the ecological value of the site;
- Use all available on-site soil;
- Permit importation of fill in accordance with MNRF and MECP requirements to stabilize and revegetate sideslopes and the quarry floor;
- Implement side slopes and portions of exposed quarry faces;
- Timely planting;
- Contribute to open landscape character; and
- Create a landform suitable for conservation, recreation and water management.

From a natural heritage perspective the proposed ecological enhancements have been phased to provide both short term and long term enhancements. In addition to changes to the existing quarry rehabilitation plan, the extension application includes:

- 4.5 hectares of the setback areas adjacent to key natural heritage features that do not include berms will be planted to expand the natural heritage system during operations. Following berm removal another 0.8 hectares will be planted. This tree planting will expand the Regional Natural Heritage System by 5.3 hectares.
- 4.0 hectare off-site ecological enhancement plan on land regulated as Jefferson Salamander habitat is proposed. These lands are located to the south of the South Extension, on lands owned by Nelson and currently in active agricultural production. The off-site ecological enhancement plan will be completed during extraction of Phase 1 and 2 of the proposed extension. The ecological enhancement plan is focused on improving Jefferson Salamander habitat; improving local landscape connectivity; improving buffering of existing features. The off-site ecological enhancement plan will result in an additional 4 ha of upland forest and vernal pools, which is the preferred habitat for Jefferson Salamanders. This will enhance an area already included in the Regional Natural Heritage System.
- 32.8 hectares of the extraction area will be rehabilitated to a key natural heritage feature, including 29.2 ha of woodlands and 3.6 ha of wetlands. These features in the long term will enhance and enlarge the natural heritage system by 32.8 hectares.
- Collectively the off-site ecological enhancement plan and rehabilitation plan for the extension will result in the creation of 33.2 hectares of new woodlands, of which 8.5 ha will be planted prior to the removal of woodlands in the West Extension.

The application does not rehabilitate the site back to agriculture based on the presence of a substantial deposit of high quality resource located below the water table. The proposed extension is not a specialty crop area but is considered prime agricultural land within a prime agricultural area. Aggregate extraction is a permitted use on the proposed extension lands and an agricultural impact assessment was completed and concluded that rehabilitation back to agricultural is not required based on the applicable policies. In total, only 12.7 hectares of prime agricultural land that is in agricultural use will be removed. Although the golf course lands are mapped as prime agricultural land, construction of the course has disturbed these soils and the property is no longer in agricultural use.

The Burlington Quarry Extension Aggregate Resources Act Site Plans, outline the required landform that will be created, however any subsequent after use cannot occur until the Aggregate Resources Act License is surrendered and required approvals are obtained for after uses.

The approval process for after uses will ultimately depend on ownership of the land and whether the property is part of the Niagara Parks and Open Space System.

As required by Section 1.9.5 of the Niagara Escarpment Plan, lands designated Mineral Resource Extraction Area will require an amendment to change the land use designation based on the designation criteria of the plan compared to the rehabilitation completed on the property. Based on previous experience, it is anticipated that the natural heritage features and hydrologic features would be designated Escarpment Natural Area and Escarpment Protection Area and the open grassland areas would be designated Escarpment Rural Area.

If the land is included as part of the Niagara Escarpment Parks and Open Space System, each of these designations permit "uses permitted in the Parks and Open Space Master / Management

Plans that are not in conflict with the Niagara Escarpment Plan". If the Open Space Master / Management Plan is approved by the Niagara Escarpment Commission and the Ministry of Natural Resources and Forestry, Regulation 828 / 90, under the Niagara Escarpment Planning and Development Act provides exemptions for the need for a Niagara Escarpment Development Permit subject to certain requirements.

If the lands are designated Escarpment Natural Area, Escarpment Protection Area and Escarpment Rural Area each of these designations permit a range of active and passive recreational uses, with limited permissions within the Escarpment Natural Area. If the lands are not included in the Niagara Escarpment Parks and Open System a Niagara Escarpment Development Permit would be required for proposed after uses and certain structures.

Overall, there will be a future public process prior to any after use being permitted on-site, however for the rehabilitation design of the site it is important to understand what potential after uses are being considered since this will guide the final grading plan for the rehabilitated landform. Once the earthworks are complete it is difficult to change the overall vision for the site so it is important to proactively plan for the desired after use during the initial stage of the quarry design.

5.0 PROGRESSIVE AND FINAL REHABILITATION

The following are the rehabilitation requirements as outlined on Drawing 3 of 4 of the Burlington Quarry Extension Aggregate Resources Act Site Plans.

5.1 Progressive Rehabilitation

5.1.1 General

Area Calculations:

i.	To be extracted (total)	50.2 ha
	• South Extension	14.5 ha
	• West Extension	35.7 ha
ii.	To be rehabilitated (total)	50.2 ha
	• South Extension	14.5 ha
	• West Extension	35.7 ha

5.1.2 Phasing

1. As excavation reaches the limit of extraction or maximum depth, progressive rehabilitation shall commence.

2. Progressive rehabilitation shall follow the direction and sequence of extraction identified on the plan view and described in the notes on drawing 2 of 4.

3. Prior to extraction commencing in Phase 6, side sloping within Phase 3 shall be completed.

4. During extraction in Phase 3, finalize progressive and final rehabilitation of Phase 1 and 2.

5.1.3 Sloping and Grading

1. Progressive rehabilitation will utilize a variety of rehabilitation techniques including:

    i. Backfilling extraction faces and quarry floors;
    ii. Partially backfilling extraction faces to create a cliff with talus slope; or
    iii. Leaving extraction faces vertical

See Rehabilitation Landform Schematics 1 to 4 in Section 5.4 of this report.

2. Clean inert fill may be imported to facilitate the establishment of 3:1 and 2:1 (horizontal: vertical) slopes on the quarry faces and/or applied to the quarry floors to achieve the final contour elevations shown on the plan view. The licensee must ensure that the material is tested at the source, before it is deposited on-site, to ensure that the material meets the MECP's criteria under Table 1 of MECP's Soils, Ground Water and Sediment Standards for use under Part XV.1 of the Environmental Protection Act. Sampling results will be provided to the MNRF upon request.

3. Notwithstanding the above, where the imported material is not being placed within 1.5 metres of the surface, the criteria under Table 1 for sodium absorption ratio and electrical conductivity do not have to be met.

4. The final rehabilitated landforms established in the South and/or West Extension using the rehabilitation techniques will consist of lakes, islands, shoreline wetlands, beach, pond, woodlands with gradually sloping grades, 2:1 and 3:1 side slopes, cliff with talus slopes, and vertical faces.

5. Beach sand may be imported to establish the beach area in the South Extension.

6. As part of rehabilitation of the site, regrade the area along the north boundary of Phase 3 to provide surface water flow to the adjacent wetland to reinstate its catchment area.

5.1.4 Seeding, Planting and Monitoring

1. The side slopes and backfilled portions of the quarry floor will be seeded with the Ministry of Transportation's (MTO) Ontario Roadside Seed Mix (Creeping Red Fescue, Kentucky Bluegrass, Perennial Ryegrass and White Clover) or equivalent.

2. Ponds, wetlands, and tree planting areas shall be planted in accordance with the: Rehabilitation Plant List Recommendations. See Table 1, Section 5.3 of this report.

3. The planting design and approach will be guided by the Conservation Halton Landscaping and Tree Preservation Guidelines (2010).

4. Planting densities shall be determined based on the restoration objectives and presence/absence of existing natural features. For example, planting densities will be highest where the objective is to restore/establish a woodland, but may be reduced if/when objective is to establish a buffer adjacent to a naturalized area. The type of species planted will also be dependent on adjacent habitat (e.g., greater reliance on shrub plantings when restoration occurs adjacent to a meadow, and tree plantings when planting next to woodland).

5. Where the restoration objective is the establishment of a woodland, trees will be planted at a density of 10 trees per 100 m^2. Within this area, the shrub to tree ratio will be 5:1, with trees planted no closer than 2.5 m on centre and shrubs planted between 0.75 m and 1.5 m apart.

6. Where the restoration objective is the establishment of a setback adjacent to a natural feature, planting densities will be dependent on the features they abut (e.g., densities will be higher when planting next to an existing forest relative to the densities when planting next to an

anthropogenic or cultural feature). The planting design of a proposed setback adjacent to a natural feature will follow a 3-band approach, where woody planting densities will be highest within Band 1 (closest to the existing adjacent feature) and reduced in Band 2. No woody species will be planted in Band 3, which will be seeded with a soil and moisture-appropriate seed mix. Where trees will be planted, the following planting densities will be applied: Band 1 - five trees per 100 m^2. Where shrubs are also being proposed, these will be planted at a shrub to tree ratio of 5:1; Band 2 - three trees per 100 m^2. Where shrubs are also being proposed, these will be planted at a shrub to tree ratio of 5:1.

7. Competing herbaceous vegetation will be controlled by placing mulch around each planted tree or shrub (50 cm radius of mulch around each planting). Rodent protection will be installed as necessary. Where access permits, planting will be watered during periods of drought (defined as a 30 day period between May and September with less than 25mm of precipitation) until establishment has occurred.

8. For planting in areas not extracted, plantings shall be monitored at least annually until "free-to-grow" conditions have been achieved. "Free-to-grow" is a condition in which the plantings are considered established based on a minimum stocking standard, a minimum height and freedom from competition that could impede growth. At the free-to-grow condition the survival (stocking standard) of planted trees shall be a minimum of 80%. If survival is less than 80%, additional planting will take place.

9. For plantings in areas extracted, plantings shall be monitored at least annually until "free-to-grow" conditions have been achieved. "Free-to-grow" is considered established based on a minimum stocking standard, a minimum height and freedom from competition that could impede growth. At the "free-to-grow" condition, the survival (stocking standard) of planted trees shall be a minimum of 50%. If survival is less than 50%, additional plantings will take place.

5.1.5 Drainage

1. Final surface drainage will follow the rehabilitated contours and directional arrows shown on the plan.

2. Once the South Extension is depleted, pumping will cease and portions of the site below the ground water table will fill with water.

3. Runoff within the South Extension will drain into the lake.

4. Construct overflow outlet in the southwest corner of the South Extension.

5. Once the West Extension is depleted, the West Extension will remain in a dewatered state. Runoff within the West Extension will either drain north towards the lake or southeast into existing Licence #5499.

6. Maintain discharge to fish habitat to the north and south from Quarry Sump 0100 and 0200 within License #5499 and passive discharge from a control valve in the West Extension pond to provide water to the wetland north of No. 2 Side Road adjacent to West Extension.

7. The licensee shall operate in accordance with the conditions of the MECP, PTTW and ECA for the ongoing dewatering of the site. This pumping regime is consistent with current management from License #5499 and provides long term public water management benefits and mitigates impacts to natural heritage features that depend on quarry discharge from the adjacent License #5499.

5.1.6 Adaptive Management Plan

1. During operations and until surrendering the licence, the licensee is required to operate in accordance with the Adaptive Management Plan, prepared by EarthFX Inc., Savanta and Tatham Engineering, dated April 2020, as may be amended from the time to time with approval from MNRF, in consultation with NEC, Region of Halton, City of Burlington and Conservation Halton.

5.2 Final Rehabilitation

1. All equipment shall be removed from the South and West Extension.

2. No internal haul roads shall remain in either Extension.

3. The residence and barn at 2280 Side Road No. 2 in the South Extension shall remain.

4. The residence and barn located at 2015 Side Road No. 2 in the southwest corner of the West Extension shall remain.

5. A field/property access entrance shall remain to access the residence and barn located at 2280 and 2015 Side Road No. 2.

6. The groundwater table post rehabilitation varies between 263.5 masl to 271 masl in the South Extension and 255.5 masl to 265 masl in the West Extension (EarthFX 2020).

7. The licensee, prior to the surrender of the licence, shall complete a Record of Site Condition for the Extensions in accordance with the Environmental Protection Act.

8. Prior to the surrender of the Aggregate Resources Act Licence, the Licensee will provide to the satisfaction of the MNRF, confirmation that any long-term monitoring, pumping or mitigation will not result in a financial liability to the public.

5.3 Rehabilitation Plant List Recommendations

- Pond/Wetland (PW)
- Grassland and Existing Trees (GL)
- Gradual Grade/Side Slope with Trees (GG)
- Forested Setback During Operation (FSO)
- Forested Setback Post Berm (FSB)
- Restored to Existing Grade and Forested (REG)

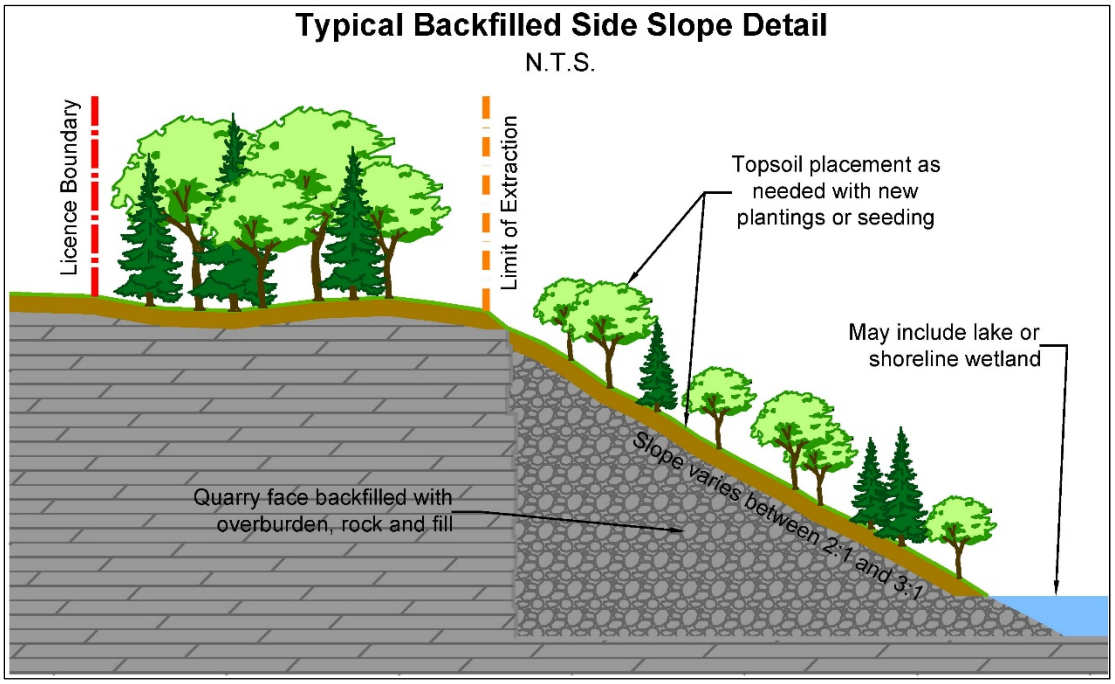
Location	LATIN NAME	COMMON NAME	COEFFICIENT OF CONSERVATISM	WETNESS INDEX	OWES WETLAND SPECIES	PROVINCIAL STATUS (S-RANK)	LOCAL STATUS HALTON (Varga 2005)
FSB, REG	*Sambucus racemosa ssp. pubens*	Red Elderberry	5	3		S5	X
FSB, REG	*Cornus alternifolia*	Alternate-Leaved Dogwood	6	3		S5	X
FSB, REG	*Cornus racemosa*	Grey Dogwood	2	0	T	S5	X
PW, FSB, REG	*Cornus sericea*	Red-Osier Dogwood	2	-3	I*	S5	X
FSB, REG	*Ribes cynosbati*	Eastern Prickly Gooseberry	4	3		S5	X
FSB, REG	*Prunus virginiana var. virginiana*	Chokecherry	2	3		S5	X
FSB, REG	*Rubus allegheniensis*	Alleghany Blackberry	2	3		S5	X
FSB, REG	*Rubus occidentalis*	Black Raspberry	2	5		S5	X
PW	*Salix discolor*	Pussy Willow	3	-3	I	S5	X
PW, FSB, REG	*Salix eriocephala*	Cottony Willow	4	-3	T	S5	X
PW, FSB, REG	*Salix interior*	Sandbar Willow	1	-3	T	S5	U
PW	*Salix petiolaris*	Meadow Willow	3	-3	I	S5	X
GG, FSB, REG	*Betula alleghaniensis*	Yellow Birch	6	0	T	S5	X
GG, FSO, FSB, REG	*Betula papyrifera*	Paper Birch	2	3	T	S5	X
GG, FSB, REG	*Carpinus caroliniana ssp. virginiana*	Blue-Beech	6	0	T	S5	X
GL, GG, FSO, FSB, REG	*Ostrya virginiana*	Eastern Hop-Hornbeam	4	3		S5	X
GL, GG, FSO, FSB, REG	*Fagus grandifolia*	American Beech	6	3		S4	X
GL, GG, FSO, FSB, REG	*Quercus macrocarpa*	Burr Oak	5	3	T	S5	X
GL, GG, FSO, FSB, REG	*Quercus rubra*	Northern Red Oak	6	3		S5	X
GL, GG, FSB, REG	*Carya cordiformis*	Bitternut Hickory	6	0		S5	X
GL, GG, FSO, FSB, REG	*Tilia americana*	Basswood	4	3		S5	X
GL, GG, FSO, FSB, REG	*Prunus serotina var. serotina*	Black Cherry	3	3		S5	X
GG, FSB, REG	*Populus balsamifera*	Balsam Poplar	4	-3	T	S5	X
GL, GG, FSO, FSB, REG	*Populus deltoides ssp. deltoides*	Eastern Cottonwood	4	0	T	S5	U
GL, GG, FSO, FSB, REG	*Populus tremuloides*	Trembling Aspen	2	0	T	S5	X
PW, GG, FSB, REG	*Salix amygdaloides*	Peach-Leaved Willow	6	-3	T	S5	U
GL, GG, FSO, FSB, REG	*Acer nigrum*	Black Maple	7	3		S4?	X
GG, FSB, REG	*Acer saccharinum*	Silver Maple	5	-3	I	S5	X
GL, GG, FSO, FSB, REG	*Acer saccharum*	Sugar Maple	4	3		S5	X
GG, FSB, REG	*Thuja occidentalis*	Eastern White Cedar	4	-3	T	S5	X
GG, FSB, REG	*Abies balsamea*	Balsam Fir	5	-3	T	S5	U
GL, GG, FSO, FSB, REG	*Picea glauca*	White Spruce	6	3	T	S5	U
GL, GG, FSO, FSB, REG	*Pinus strobus*	Eastern White Pine	4	3	T	S5	X
GL, GG, FSO, FSB, REG	*Tsuga canadensis*	Eastern Hemlock	7	3	T	S5	X

Herbaceous seed mixes will be applied where appropriate (e.g. if soil seedbank is deemed unsuitable). Potential mixes could include Upland Dry Meadow Mix, Early
Succession/Riparian Mix, and Meadow Marsh Mix, following Conservation Halton guidelines.

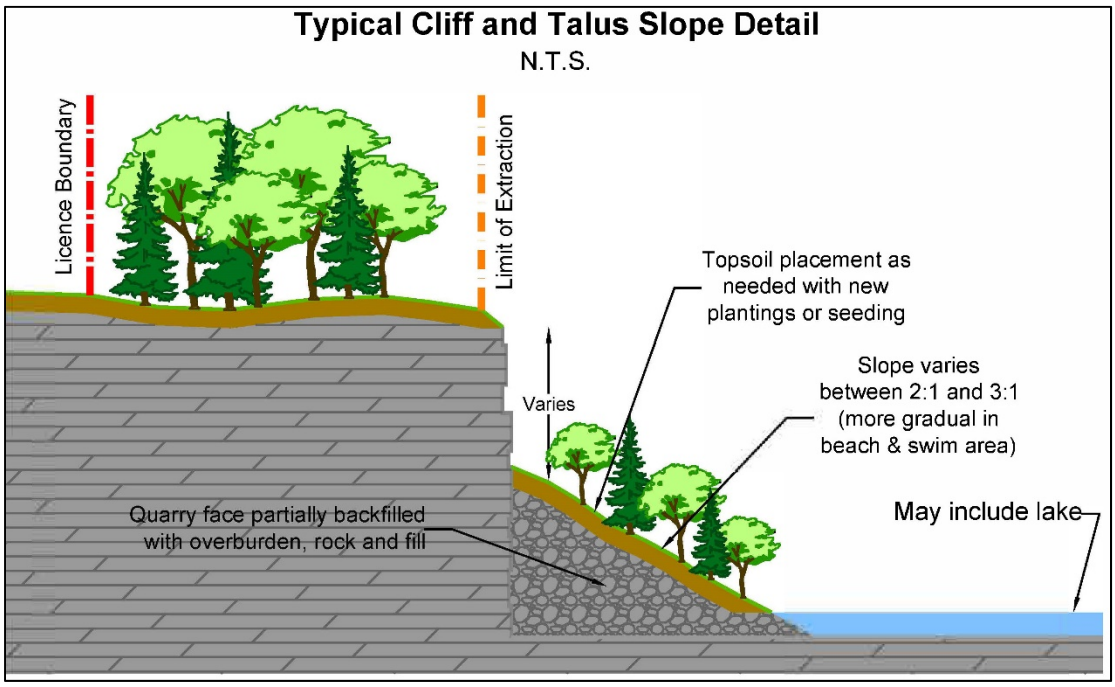
A nurse crop will be applied to exposed soil, the species of which will depend on season of application but will follow Conservation Halton guidelines.

Table 1 - Rehabilitation Plant List Recommendations

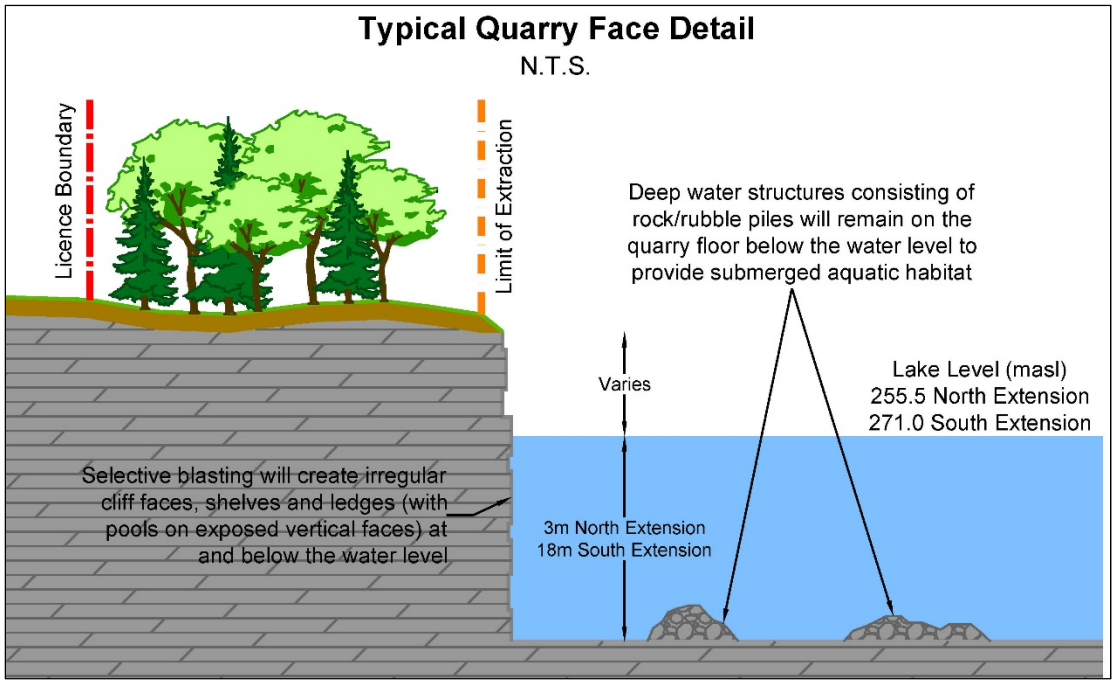
5.4 Rehabilitation Landform Schematics



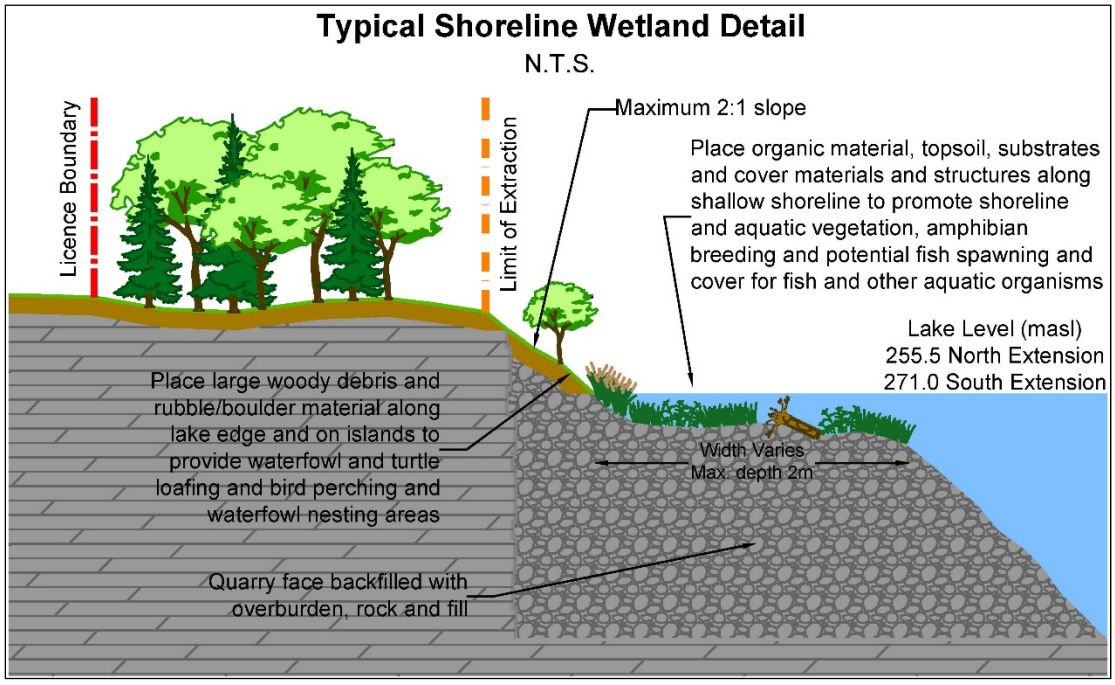
Schematic 1



Schematic 2



Schematic 3



Schematic 4

6.0 ADAPTIVE MANAGEMENT PLAN

The following are excerpts from the Adaptive Management Plan (April 2020) outlining the proposed groundwater and surface water monitoring during progressive and final rehabilitation of the site.

6.1 Groundwater Monitoring Program

The groundwater monitoring program is outlined in the Tables below. For Locations, please refer to Figure 7 in the Adaptive Management Plan (April, 2020).

Extraction Area	Borehole	Well ID	Water Level Monitoring		Water Quality Sampling	
			Monthly Manual	Continuous (4-hour frequency)	Semi-Annual	Annual
Southern Extraction Area	M03-01	M03-01A	X	X	X	
		M03-01B	X	X	X	X
	M03-07	M03-07A	X	X	X	
		M03-07B	X	X	X	X
	M03-09	M03-09A	X	X	X	
		M03-09B	X	X	X	X
	M03-14	M03-14A	X	X	X	
		M03-14B	X	X	X	X
	M03-15	M03-15A	X	X	X	
		M03-15B	X	X	X	X
	M03-17	M03-17A	X	X	X	
		M03-17B	X	X	X	X
	M03-19	M03-19A	X	X	X	
		M03-19B	X	X	X	X
	M03-20	M03-20A	X	X	X	
		M03-20B	X	X	X	X
	M03-21	M03-21A	X	X	X	
		M03-21B	X	X	X	X
	M03-28	M03-28A	X	X	X	
		M03-28B	X	X	X	X
	M03-29	M03-29A	X	X	X	
		M03-29B	X	X	X	X
	M03-30	M03-30A	X	X	X	
		M03-30B	X	X	X	X
Western Extraction Area	BS-01	BS-01A	X		X	
		BS-01B	X	X	X	X
	BS-02	BS-02A	X		X	
		BS-02B	X	X	X	X
	BS-03	BS-03A	X		X	
		BS-03B	X	X	X	X
	BS-04	BS-04A	X		X	
		BS-04B	X	X	X	X

	BS-05	BS-05A	X		X	
		BS-05B	X	X	X	X
	BH-07	BS-07	X		X	
Proposed West Extension	P-MW-08	MW-08	X	X	X	X
	P-MW-09	MW-09	X	X	X	X
	P-MW-10	MW-10	X	X	X	X
	P-MW-11	MW-11	X	X	X	X

Table 2 - On-Site Groundwater Monitoring and Evaluation Program

Water Quality Sampling Frequency	Parameters
Semi-Annual	pH, Conductivity, Alkalinity, Hardness, Bicarbonate, Total Phosphorus, Metals (Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Cobalt, Copper, Lead, Iron, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Sodium, Silver, Strontium, Sulfur, Thallium, Thorium, Tin, Titanium, Tungsten, Uranium, Vanadium, Zinc),
Annual	Petroleum Hydrocarbons (BTEX, F1-F4)

Table 3 - Groundwater Quality Parameters

6.2 Surface Water Monitoring Program

Surface water monitoring will continue during the operational lifespan of the quarry. The post approvals surface water monitoring program recommended for the proposed quarry extension is outlined in the following tables. For Locations, please refer to Figure SW-2 in the Adaptive Management Plan (April, 2020). The monitoring frequency for Tables 4 and 5 is continuous readings and monthly manual checks.

Monitoring Location	Northing	Easting	Watershed
SW1	4805833	589015	Bronte Creek
SW2	4806693	587340	Bronte Creek
SW6	4805071	590629	Grindstone Creek
SW7	4805441	588320	Bronte Creek
SW9	4805317	591235	Grindstone Creek
SW10	4803358	591283	Grindstone Creek
SW14	4804107	589227	Bronte Creek
SW15	4806484	589550	Bronte Creek
SW24	4803691	594181	Shoreacres Creek
SW28	4803823	591609	Grindstone Creek
SW29	4804364	590180	Grindstone Creek
SW30	4809849	589826	Bronte Creek
SW31	4809367	592092	Bronte Creek
SW35	4805699	594624	Appleby Creek

Table 4 - Post Approvals Steamflow Monitoring Locations

Monitoring Location	Northing	Easting	Wetland
SW5	4805331	591477	13031
SW11	4805245	591177	13027
SW12	4805393	591127	13022
SW13	4805707	590935	13016
SW16	4804900	590889	13037
SW36	To be Established Spring 2020		13021
SW37	To be Established Spring 2020		13020

Table 5 - Post Approvals Wetland Hydroperiod / Shallow Groundwater Monitoring Locations

It is recommended that the surface water monitoring associated with the south extension, specifically Phases 1 and 2, continue throughout extraction and post extraction for a period of two years following rehabilitation of the south extension.

Similarly, it is recommended that the surface water monitoring associated with the west extension, specifically Phases 3 through 6, continue throughout extraction until the licence is surrendered. The only exceptions to this are the surface water monitoring that occurs at SW6 and SW36. Monitoring at SW6 should continue for the duration of extraction in all six Phases until the licence is surrendered. Monitoring at SW36 should continue long-term or until a long-term discharge protocol for the release of water into wetland 13201 has been developed to maintain the wetland hydroperiod. During Phases 3 through 6 of extraction, a long-term discharge protocol will be developed by Nelson to aid the operating authority of the Mount Nemo Park with the release of water into wetland 13201 after the licence is surrendered.

To identify an adverse impact on a wetland, the wetland hydroperiod monitoring frequency will be increased to weekly starting March 1st each year until the spring hydroperiod threshold date presented in Adaptive Management Plan. Also, weekly site visits should be conducted to surface water monitoring location SW29 from March 1st until the spring hydroperiod threshold date specified for SW36 to confirm the baseflows in the unnamed tributary of Lake Medad are maintained.

Water quality sampling is also recommended during the operational lifespan of the quarry to assess the effectiveness of the quarries surface water management system in treating the quarry water prior to off-site discharge and assess the impacts the off-site discharge has on the water quality of the surface water features. The recommended post approvals water quality sampling is detailed in the following table.

Water Sampling Locations	Sampling Frequency	Parameters
SW1, SW2, SW6, SW10, SW14, SW24, SW28, SW29, SW30, SW31, SW35	Quarterly	Dissolved Organic Carbon, Ammonia, Alkalinity, BOD, COD, Conductivity, Total Hardness, Total Metals, Turbidity, Total Dissolved Solids, Total Suspended Solids, pH, Carbonate, Bicarbonate

Table 6 - Post Approvals Water Quality Sampling Summary

In addition to the water quality sampling prescribed above, Environmental Compliance Approval Number 5203-AN6NGV issued by the Ministry of the Environment and Climate Change specifies an effluent monitoring program Nelson must conduct to confirm the effluent discharge from the quarry remains in compliance with the concentration limits stipulated within the ECA. The ECA requires monthly and quarterly (once every three months) effluent grab samples be collected from the two off-site discharges and analyzed for a variety of parameters to confirm compliance. In addition, quarterly field temperature monitoring is required at the various key points of interest downstream of the Quarry Sump 0100 discharge location to assess seasonal impacts. The effluent monitoring program as stipulated will remain in place moving forward unless modified by the Director of the Ministry of the Environment, Conservation and Parks (MECP).

Nelson is authorized to withdraw water from the quarry sumps in accordance with Permit to Take Water No. 96-P-3009. As per the conditions of their PTTW, Nelson is responsible to measure, record and submit the quantities of water taken daily to the Ministry, notify the Ministry of any complaints arising from the water taking, and address any adverse impacts caused by the water taking. As long as Nelson withdraws water from the quarry sumps, they will be required to adhere to the conditions of their PTTW.

After the property is rehabilitated and the licence is surrendered, off-site discharge is proposed continue from Quarry Sump 0100 and 0200 in accordance with the conditions of Nelson's ECA and PTTW to maintain the quarry lake water levels and baseflows in the tributary of Willoughby Creek and the West Arm of the West Branch of the Mount Nemo Tributary of Grindstone Creek. Prior to surrender of the Aggregate Resources Act Licence, the Licencee will provide to the satisfaction of the MNRF, confirmation that long-term monitoring, pumping or mitigation will not result in financial liability to the public.

6.3 **Post-Extraction Monitoring Program**

The proposed groundwater and surface water monitoring programs discussed above shall continue through the rehabilitation phases. The proposed South Extension groundwater and surface water monitoring programs will continue for two years after it has been determined that the quarry has reached final rehabilitation (creation of the lake feature) and a new groundwater equilibrium as been reached. Since the proposed West Extension will remain dewatered for final rehabilitation, the groundwater and surface water monitoring programs shall continue until rehabilitation has been completed and drawdown associated with the water management system has reached an equilibrium state.

The existing quarry operation continues to pump discharge water, accumulated through surface runoff, direct precipitation and intercepted groundwater, from Sumps 0100 and 0200 to the Unnamed Tributary of Willoughby Creek and the West Arm of the West Branch of the Mount Nemo Tributary, respectively. Current approvals for the existing quarry will stop the water discharge pumping at both locations once extraction is complete, which would have a negative impact on and associated fish habitat in both watercourses. The proposed revised rehabilitation plan recommends that the dewatering and pumping should continue at the same locations and in the same manner to ensure there are no negative impacts to any of the hydrological features that rely on this water input. This will result in long-term enhancements to downstream fish habitat compared to the existing approved post-extraction water management plan.

7.0 CONCLUSION

Based on the above analysis the proposed rehabilitation plan and after use vision for the Burlington Quarry Extension conforms to the Niagara Escarpment Plan, Region of Halton Official Plan and City of Burlington Official Plan and is consistent with the Provincial Policy Statement.

In conclusion, the Aggregate Resources Act Site Plans include the appropriate monitoring and rehabilitation requirements to ensure the site is rehabilitated consistent with the requirements of applicable policy documents.

Respectfully Submitted,
MacNaughton Hermsen Britton Clarkson Planning Limited

Brian Zeman, BES, MCIP RPP
President

Figures

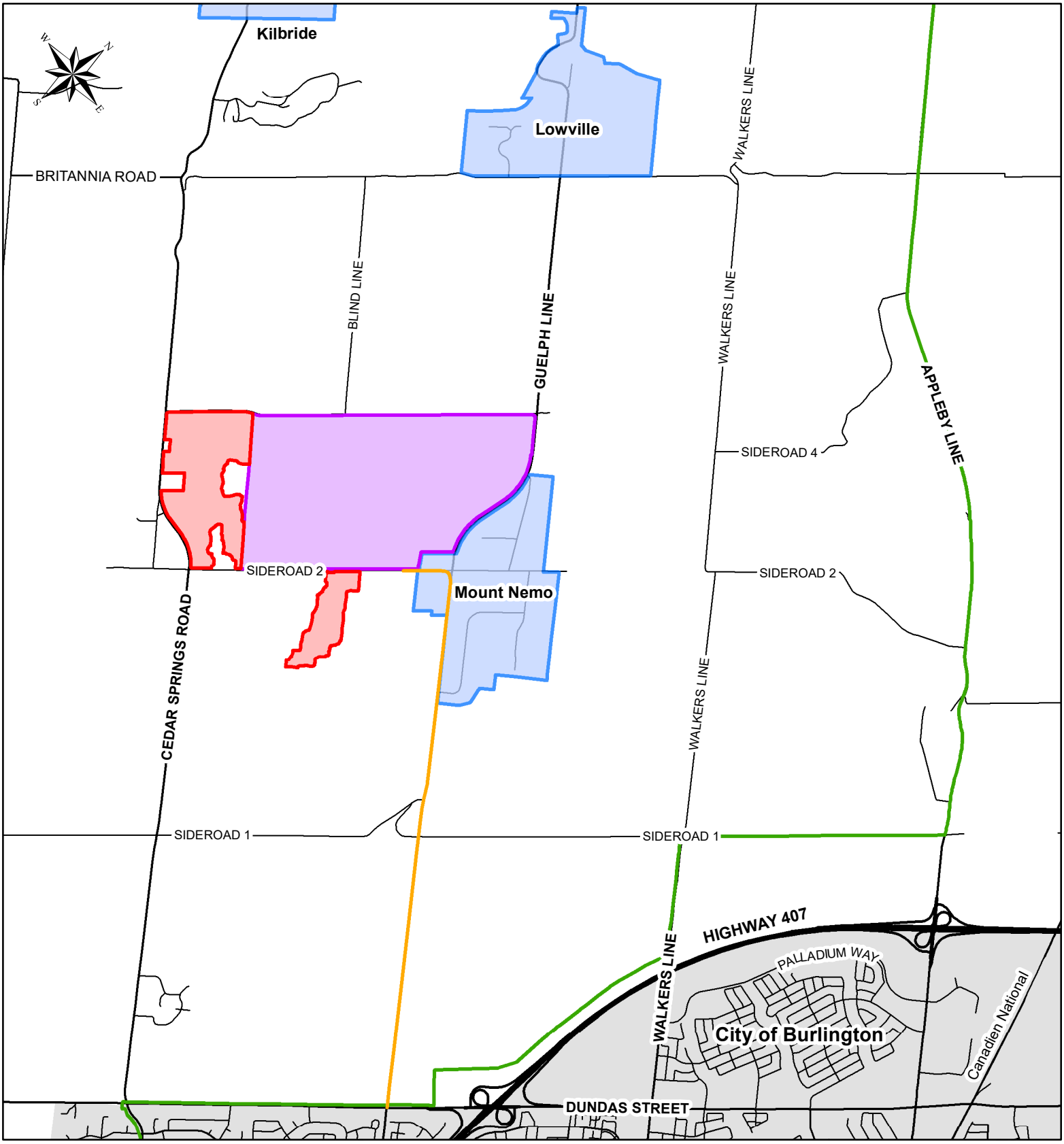


Figure # 1

Location

Burlington Quarry Extension
Part Lots 1 & 2, Concession 2 and
Part Lot 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Legend

- Proposed Licence Boundaries
- Existing Burlington Quarry
- Settlement Boundaries
- Niagara Escarpment Plan Boundary
- Urban Area
- Primary Haul Route

DATE: April 2020

SOURCES
Land Information Ontario
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0 200 400 800 1,200 1,600
Meters (1:40,000)

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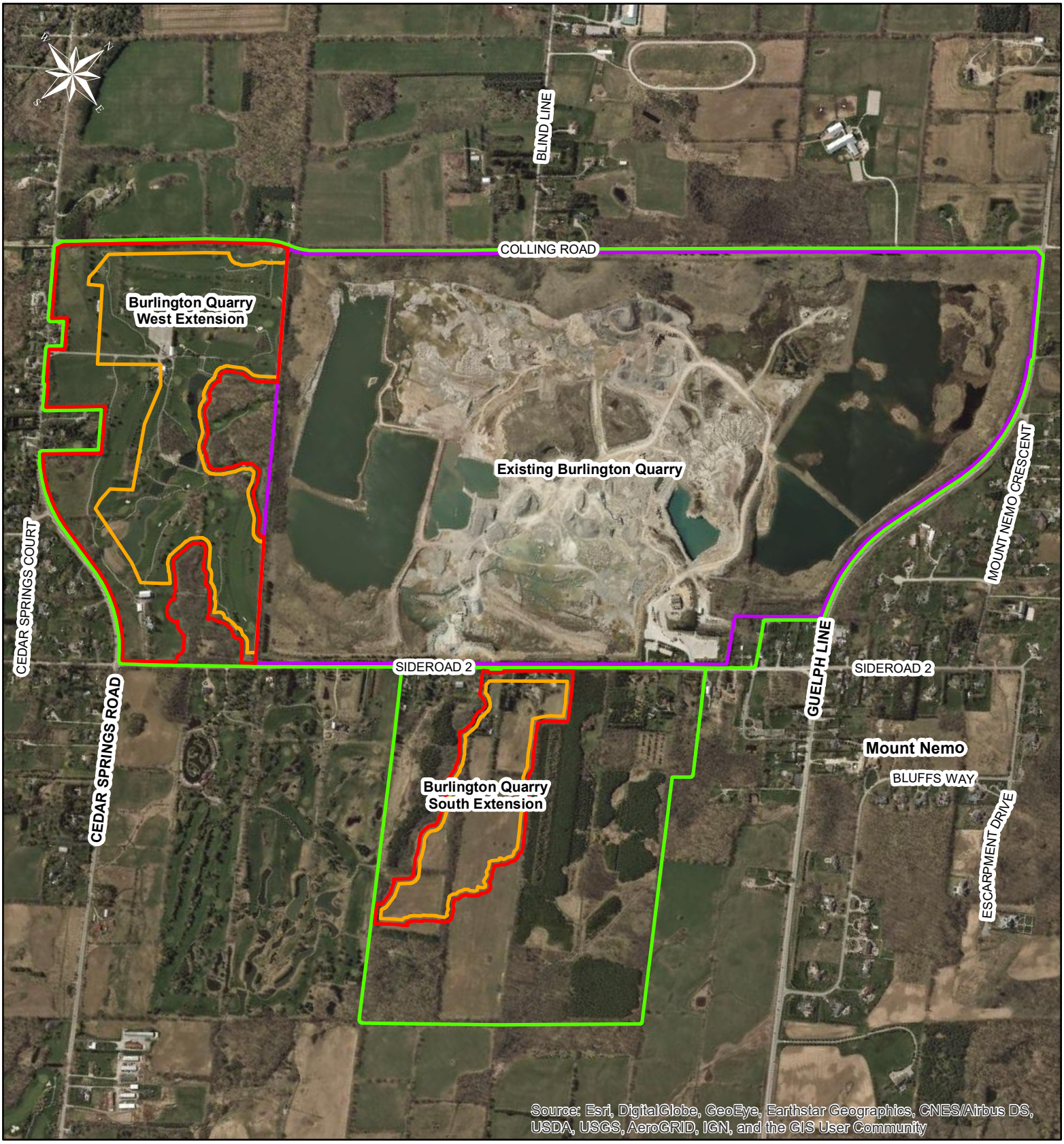

Figure # 2

Overview of Nelson Aggregates Landholdings

Burlington Quarry Extension
Part Lots 1 & 2, Concession 2 and
Part Lot 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Legend

- Proposed Licence Boundaries
- Proposed Limit of Extraction
- Existing Burlington Quarry
- Land Owned or Controlled by Nelson Aggregates

DATE
April 2020

SOURCES
Land Information Ontario
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Open Government Licence - Ontario

0 75 150 300 450 600
Meters (1:15,000)

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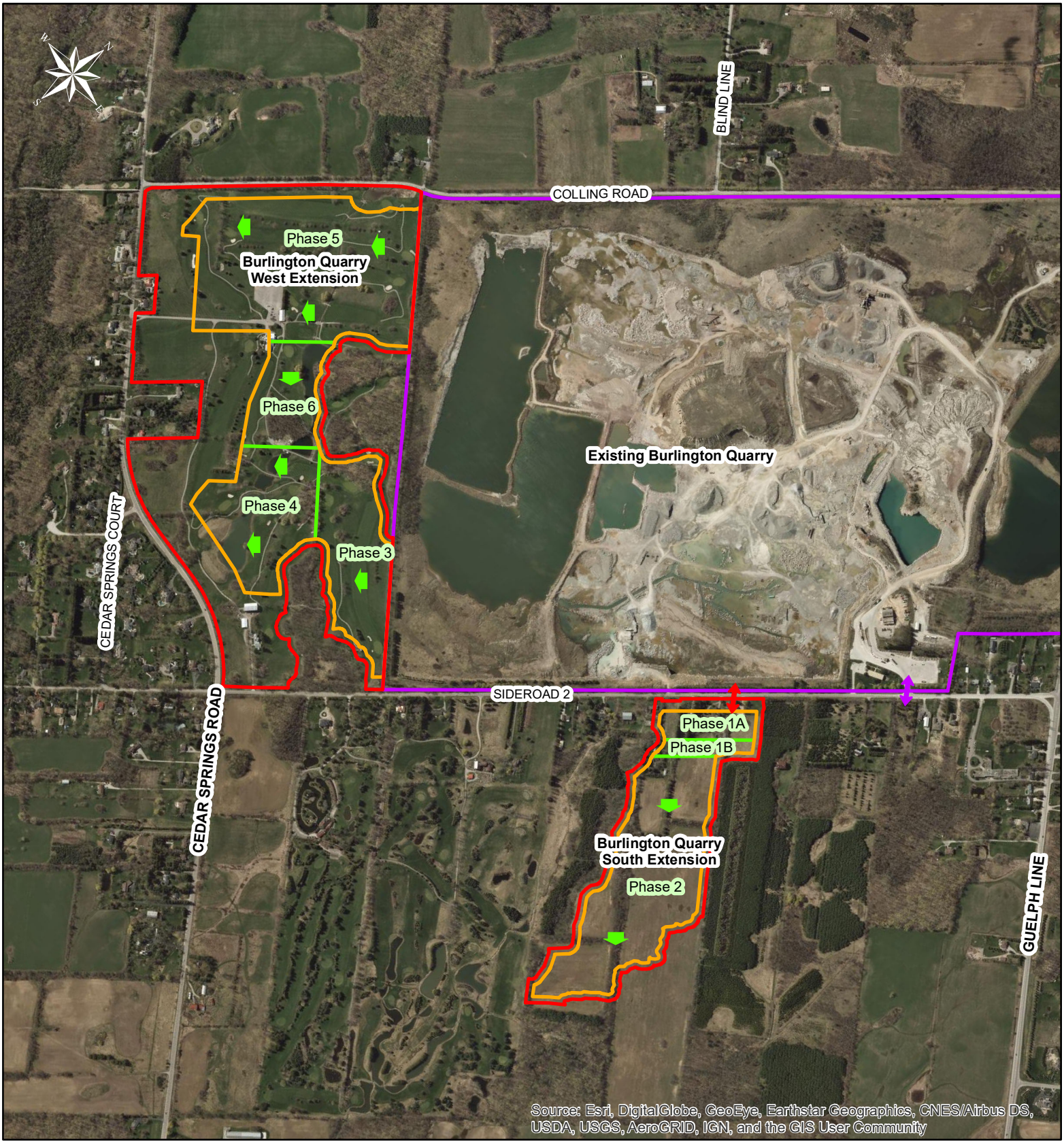

Figure # 3

Operations Sequence

Burlington Quarry Extension
Part Lots 1 & 2, Concession 2 and
Part Lot 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Legend

- Proposed Licence Boundaries
- Proposed Limit of Extraction
- Existing Burlington Quarry
- Extraction Sequence Boundary
- Main Entrance/Exit
- Roadway Crossing

DATE: April 2020

SOURCES
Land Information Ontario
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0 62.5 125 250 375 500
Meters (1:12,500)

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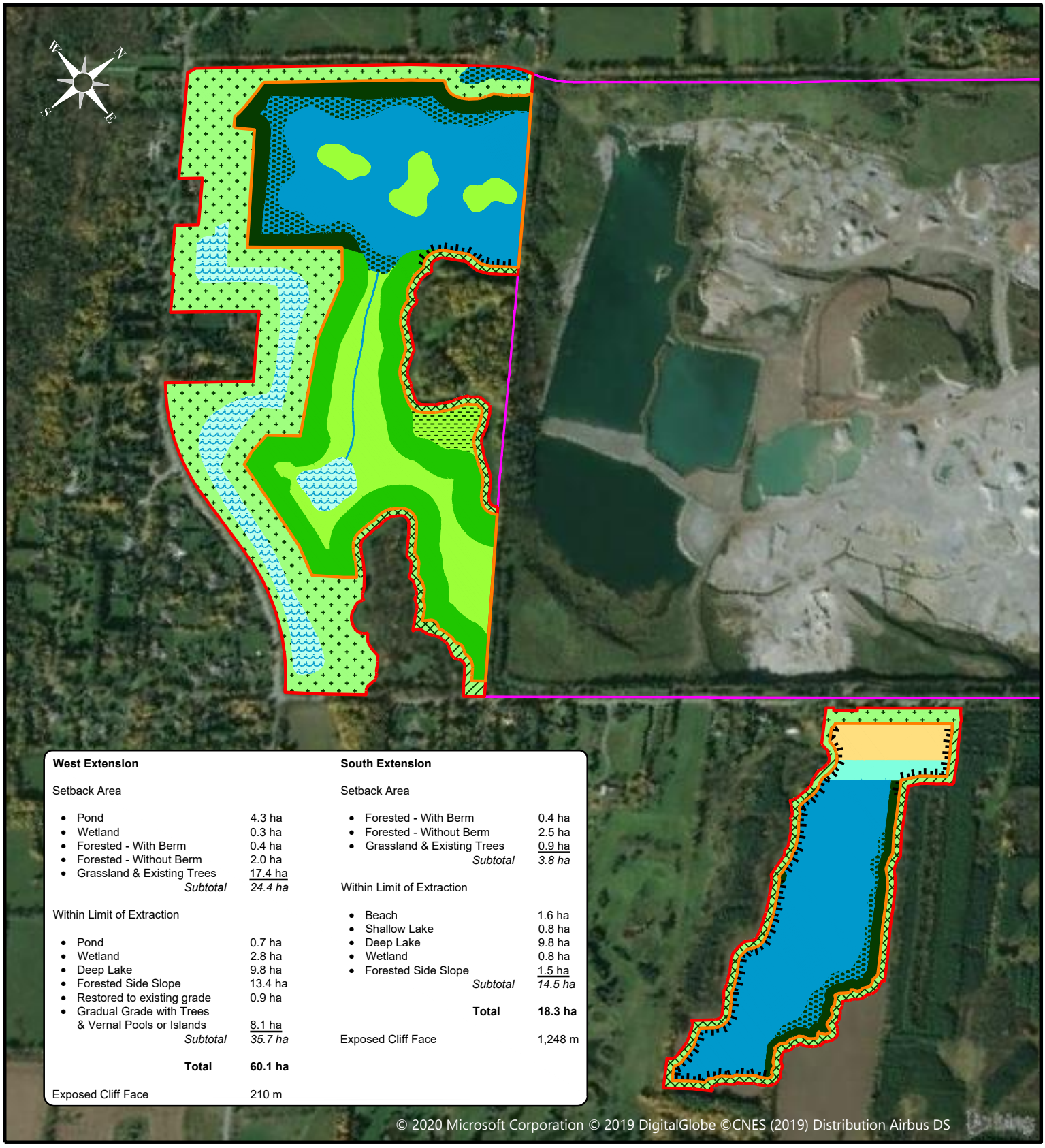

West Extension	
Setback Area	
• Pond	4.3 ha
• Wetland	0.3 ha
• Forested - With Berm	0.4 ha
• Forested - Without Berm	2.0 ha
• Grassland & Existing Trees	17.4 ha
Subtotal	*24.4 ha*
Within Limit of Extraction	
• Pond	0.7 ha
• Wetland	2.8 ha
• Deep Lake	9.8 ha
• Forested Side Slope	13.4 ha
• Restored to existing grade	0.9 ha
• Gradual Grade with Trees & Vernal Pools or Islands	8.1 ha
Subtotal	*35.7 ha*
Total	**60.1 ha**
Exposed Cliff Face	210 m

South Extension	
Setback Area	
• Forested - With Berm	0.4 ha
• Forested - Without Berm	2.5 ha
• Grassland & Existing Trees	0.9 ha
Subtotal	*3.8 ha*
Within Limit of Extraction	
• Beach	1.6 ha
• Shallow Lake	0.8 ha
• Deep Lake	9.8 ha
• Wetland	0.8 ha
• Forested Side Slope	1.5 ha
Subtotal	*14.5 ha*
Total	**18.3 ha**
Exposed Cliff Face	1,248 m

Figure # 4

Rehabilitated Land Formation

Burlington Quarry Extension
Part Lots 1 & 2, Concession 2 and
Part Lots 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Legend

- Proposed Licence Boundaries
- Proposed Limit of Extraction
- Beach
- Pond / Wetland
- Shallow / Deep Lake
- Grassland & Existing Trees
- Gradual Grade/Side Slope with Trees
- Forested Setback - During Operation
- Forested Setback - Post Berm
- Restored to Existing Grade & Forested
- Exposed Cliff Face

Date: April 2020

Sources: Nelson Aggregate's Burlington Quarry Extension Site Plan, Rehabilitation Plan, updated April 20, 2020.

Scale: 0 150 300 Meters (1:10,000)

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Figure # 5
After-Use Vision

Burlington Quarry Extension
Part Lots 1 & 2, Concession 2 and
Part Lots 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Legend

- Conservation Halton - Managed Lands
- Existing Bruce Trail

Date: April 2020

Sources
Google Earth Pro aerial photography
Captured September 10, 2016

Scale
0 300 600
Meters (1:20,000)

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Figure # 6

Mount Nemo Park
Phase 1

South Extension

Burlington Quarry Extension

Part Lots 1 & 2, Concession 2 and
Part Lots 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Date	April 2020
Sources	Google Earth Pro aerial photography Captured September 10, 2016
Scale	0 100 200 Meters (1:7500)

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Figure # 7

Mount Nemo Park Phase 2

South Extension

Burlington Quarry Extension

Part Lots 1 & 2, Concession 2 and
Part Lots 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Date	April 2020
Sources	Google Earth Pro aerial photography Captured September 10, 2016
Scale	0 100 200 Meters (1:7500)

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Activities could include, subject to required approvals:

1. 1.5 km side trail of Bruce Trail
2. Lookout
3. Lake
4. Picnic area
5. Parking
6. Swimming
7. Fishing
8. Canoeing
9. Kayaking
10. Paddleboard
11. Hiking
12. Skating
13. Bird sanctuary

Figure # 8

Mount Nemo Park Phase 2

East Portion of Existing Quarry

Burlington Quarry Extension

Part Lots 1 & 2, Concession 2 and
Part Lots 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Date	April 2020
Sources	Google Earth Pro aerial photography Captured September 10, 2016
Scale	0 100 200 Meters (1:7500)

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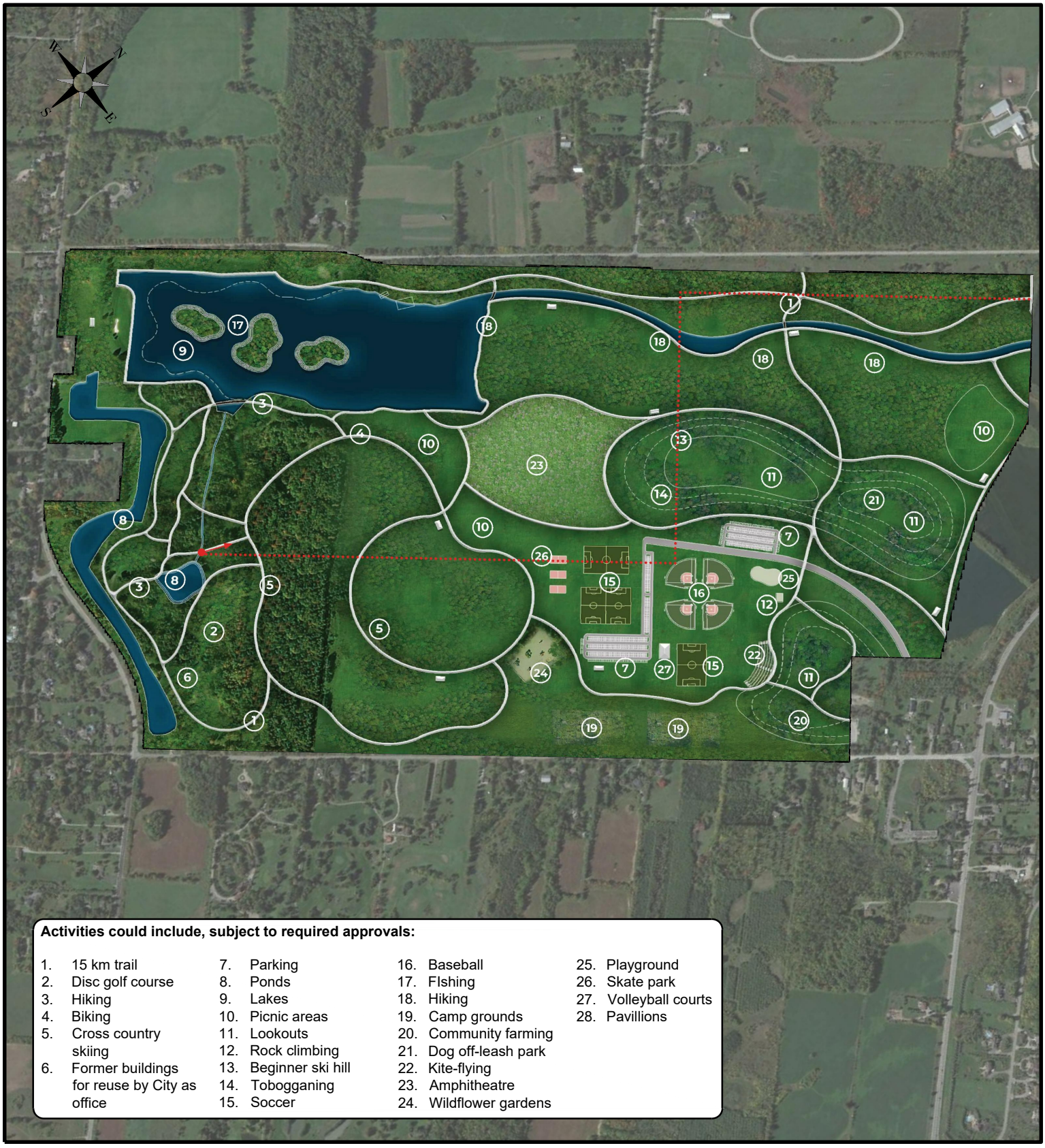

Figure # 9

Mount Nemo Park Phase 3

West Extension and Existing Quarry

Burlington Quarry Extension

Part Lots 1 & 2, Concession 2 and
Part Lots 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Date	April 2020
Sources	Google Earth Pro aerial photography Captured September 10, 2016
Scale	0 200 400 Meters (1:12,500)

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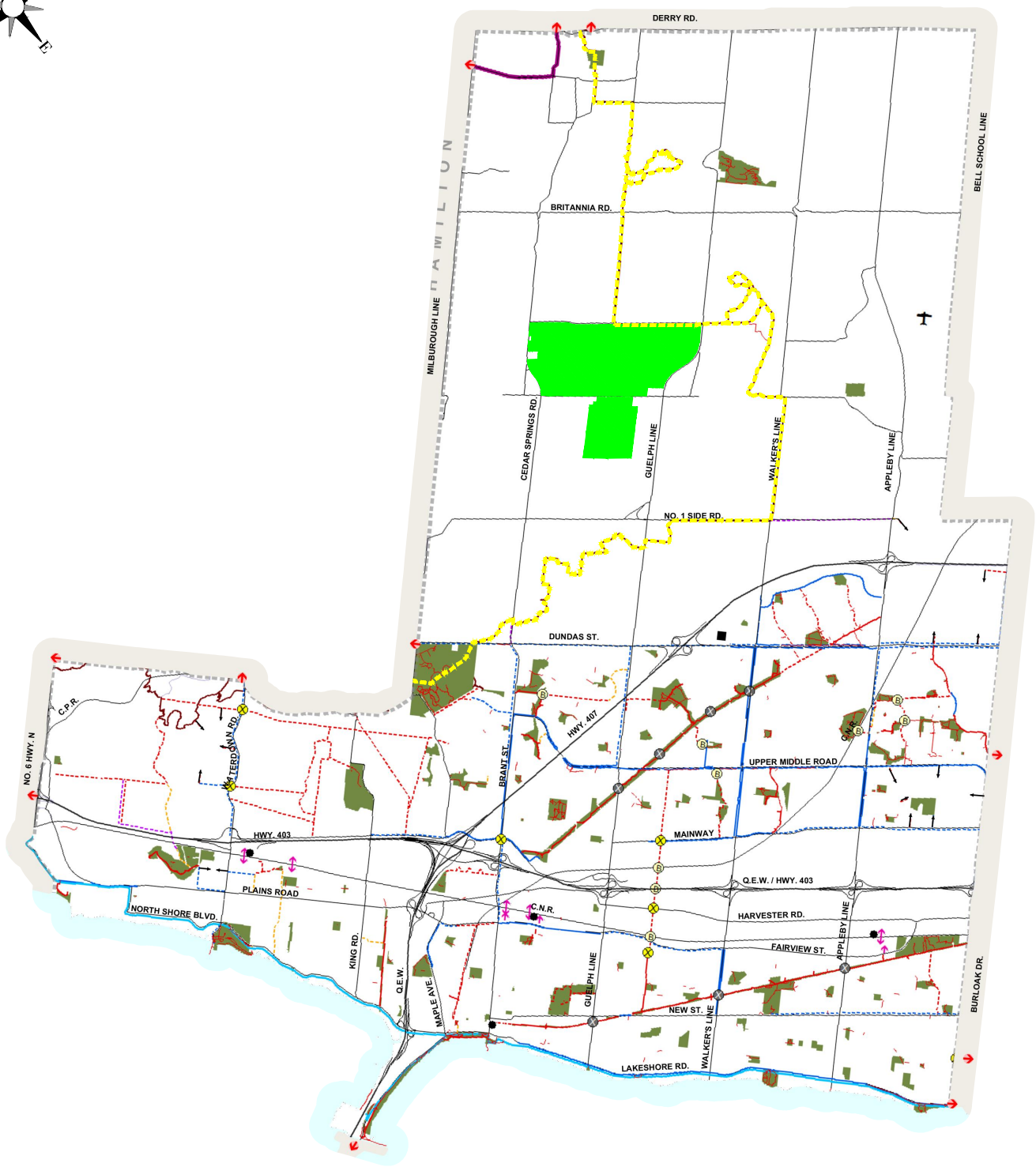

Figure # 10

City of Burlington Parkland System

City of Burlington Official Plan

Burlington Quarry Extension

Part Lots 1 & 2, Concession 2 and
Part Lots 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Legend

- Potential Mount Nemo Park
- City Park
- Existing Bruce Trail & Side Trail

Date: April 2020

Sources: City of Burlington Official Plan - Schedule Q - Trails Strategy, dated November 2017

Scale: 0 1500 3000 Meters (1:100,000)

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Figure # 11

Provincial Parks in GGH

Burlington Quarry Extension
Part Lots 1 & 2, Concession 2 and
Part Lot 17 & 18, Concession 2 NDS
City of Burlington
Region of Halton

Legend

- Potential Mount Nemo Park
- Provincial Park within GGH
- Growth Plan Area

DATE: April 2020

SOURCES
Land Information Ontario
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0 5 10 20 30 40
Kilometers

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Appendices

Appendix **1**

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& LANDSCAPE
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CURRICULUM**VITAE**

Brian A. Zeman, BES, MCIP, RPP

EDUCATION

1998
Bachelor of Environmental Studies, Honours, Urban and Regional Planning, University of Waterloo

Brian Zeman, President of MHBC, joined MHBC as a Planner in 1998 after graduating from the University of Waterloo with a Bachelors Degree in Urban and Regional Planning.

Mr. Zeman provides planning services for all aspects of the firm's activities including residential, commercial and industrial uses while specializing in aggregate resource planning. He has experience in aggregate site planning and licensing and processes relating to aggregate applications.

Mr. Zeman is a member of the Canadian Institute of Planners and Ontario Professional Planners Institute.

PROFESSIONAL ACCREDITATIONS / ASSOCIATIONS

- Full Member, Canadian Institute of Planners
- Full Member, Ontario Professional Planners Institute
- Member, Ontario Expropriation Association
- Certified by the Province of Ontario to prepare Aggregate Resources Act Site Plans

PROFESSIONAL HISTORY

2014 - Present	**President**, MacNaughton Hermsen Britton Clarkson Planning Limited
2010 - 2014	**Vice President and Partner**, MacNaughton Hermsen Britton Clarkson Planning Limited
2005 - 2009	**Partner**, MacNaughton Hermsen Britton Clarkson Planning Limited
2004 - 2005	**Associate**, MacNaughton Hermsen Britton Clarkson Planning Limited
2001 – 2004	**Senior Planner**, MacNaughton Hermsen Britton Clarkson Planning Limited
1998 - 2001	**Planner**, MacNaughton Hermsen Britton Clarkson Planning Limited

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CURRICULUM**VITAE**

Brian A. Zeman, BES, MCIP, RPP

PUBLICATIONS

- Co Author of the "State of the Aggregate Resource in Ontario Study Paper 2 – Future Aggregate Availability & Alternatives Analysis, Prepared for the Ministry of Natural Resources dated December 2009.

SELECTED PROJECT EXPERIENCE

- Research, preparation and co-ordination of reports / applications under the Planning Act, Niagara Escarpment Planning and Development Act, Oak Ridges Moraine Conservation Act, and the Aggregate Resources Act.
- Facilitate public meeting on major development applications.
- Project management for major development applications.
- Undertake aggregate Compliance Assessment Report inspections and preparation of reports.
- Planning evaluations and analysis for mineral aggregate development and resource management.
- Conduct notification and consultation procedures under the Aggregate Resources Act.
- Aggregate Resources Act site plan amendments.
- Planning evaluations for residential developments.
- Registration and planning of residential developments.
- Planning assessment for commercial, retail, office and industrial developments.
- Restoration planning for pits and quarries and preparation of recreational afteruse plans.
- Research and preparation of reports /evidence for hearings before the Ontario Municipal Board, Environmental Review Tribunal, Joint Board.
- Provide expert planning evidence before the Ontario Municipal Board, Environmental Review Tribunal and the Joint Board.

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CURRICULUM**VITAE**

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SAMPLE PROJECT LIST

- Activa Group - Laurentian Subdivision, Kitchener
- Adventure Farm – Kirkwall Subdivision, Hamilton
- Aecon - Oliver Pit - Site Plan Amendment/Compliance Assessment Report
- Aggregate Producers Association of Ontario - Caledon Official Plan
- Aggregate Producers Association of Ontario - PPS Review
- Aggregate Producers Association of Ontario - Region of Halton Official Plan
- Blue Mountain Aggregates-Pit Deepening and Expansion
- Brampton Brick - Cheltenham Quarry Site Plan Amendment
- Brampton Brick - Niagara Escarpment Development Permit
- Cayuga Material & Construction - Property Investigation
- Cliff's Natural Resources – Chromite Aggregate Project
- Crisdawn Construction Inc. – Barrie Annexation Lands
- Dufferin Aggregates - Acton Quarry Afteruse Plan
- Dufferin Aggregates - Acton Quarry Expansion
- Dufferin Aggregates – City of Hamilton Official Plan
- Dufferin Aggregates - Milton Comprehensive Zoning By-law
- Dufferin Aggregates - Milton Quarry Afteruse Plan
- Dufferin Aggregates - Milton Quarry Extension
- Dufferin Aggregates - Property Investigations
- Dufferin Aggregates - Region of Halton Official Plan
- Dufferin Aggregates - Town of Halton Hills Official Plan
- Dufferin Aggregates – Town of Halton Hills Zoning By-law
- E.C. King Contracting - Sydenham Quarry Expansion Erie Sand & Gravel - Pelee Quarries
- Gies Construction - Old Chicopee Drive, Waterloo
- Hazad Construction - Conestoga Golf Course Subdivision Hallman Construction Limited - Consent for Church Site
- Home Depot - Barrie, Kitchener, Markham, Mississauga, Richmond Hill and Whitby
- J.C. Duff - Property Investigations
- Kulmatycky Rezoning/Plan of Subdivision/Area Study - Town of Paris
- Lafarge Canada – Brechin Quarry Site Plan Amendment
- Lafarge Canada – City of Hamilton Official Plan
- Lafarge Canada - Dundas Quarry Expansion
- Lafarge Canada - Lawford Pit
- Lafarge Canada – Limbeer Pit
- Lafarge Canada – Mosport Pit Site Plan Amendments
- Lafarge Canada - Oster Pit

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Brian A. Zeman, BES, MCIP, RPP

- Lafarge Canada - Property Investigations
- Lafarge Canada - Warren Merger Due Diligence
- Lafarge Canada-Wawa Site Plans
- Lincoln Village Subdivision - Phase 2 and 3, Waterloo
- Livingston Excavating - Simcoe Pit
- Nelson Aggregates Co., Burlington Quarry Extension
- Ontario Stone, Sand & Gravel Association – Region of Halton Aggregate Strategy
- Ontario Stone, Sand & Gravel Association - Region of Halton Official Plan
- Paris Land Development Limited - Subdivision
- Pitway Holdings - Brillinger Pit
- Pitway Holdings - Naylor/Forman Pit
- Pine Valley Homes - Ainsley Estates, Town of Wasaga Beach
- Pioneer Construction-Aggregate Resources Act Licensing-Thunder Bay
- Region of Durham - Homefounders Subdivision Riverbank Estates Inc. - Subdivision, Kitchener
- St. Marys Cement – Alternative Fuels
- St. Marys Cement - Bowmanville Quarry Deepening
- St. Marys Cement - Bowmanville Quarry Site Plan Amendment
- St. Marys Cement - Clarington Comprehensive Zoning By-law
- St. Marys Cement – Westside Marsh Project
- Steed & Evans - Contractor's Yard/Site Plan Amendment
- Tanem Developments - Bridge Street Subdivision University of Guelph - Canadian Tire
- University of Guelph - Commercial Centre University of Guelph - Office/Research Park
- YMCA – Redevelopment of Site, Barrie
- Zavarella Construction Ltd. - Consent/Rezoning/Plan of Subdivision/Area Study, Town of Paris

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