LANARK COUNTY SCOP - OFFICIAL PLAN AMENDMENT APPLICATION FORM

LANARK COUNTY

FILE NO. 09__ -OP-_____

THE CORPORATION OF THE COUNTY OF LANARK
99 Christie Lake Road
Perth, ON K7H 3C6

(613)-267-4200 Fax(613)-267-2964

OFFICIAL PLAN AMENDMENT APPLICATION FORM

applying for approval under Section 17 or 22 of the Planning Act, R.S.O. 1990, as amended

COUNTY OF LANARK OFFICE USE ONLY

Date Received _____ **Application Fee** _____ **Receipt No.**_____

File Number _____**Application Complete:** **Yes** _____ **No** _____

Note: **Please type or print**
See Appendix I and II for submission requirements/processing procedures.
Additional Information may be provided in an accompanying letter.

PURSUANT TO THE PLANNING ACT, THE UNDERSIGNED HEREBY APPLIES TO THE CORPORATION OF THE COUNTY OF LANARK FOR AMENDMENT TO THE OFFICIAL PLAN FOR THE COUNTY OF LANARK.

This application is to be completed in all respects and submitted to the Planning Department, County of Lanark

PART 1 – APPLICATION INFORMATION

1. Complete and indicate the primary contact.

Name of Owner: Thomas Cavanagh Construction Limited
Address: 9094 Cavanagh Road, Ashton, ON

Telephone: 613-257-2918

Name of Applicant: Thomas Cavanagh Construction Limited
Address: 9094 Cavanagh Road, Ashton, ON

Telephone: 613-257-2918

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Name of Agent: MHBC Planning
Address: 540 Bingemans Centre Drive

Telephone: 519-576-3650

Name of Solicitor
Address:

Telephone:

PRIMARY CONTACT: Agent

2. **Interest of Applicant in Land (e.g. Owner, Purchaser)** Owner

3. **Location of Land (if applicable)**

Lot: 5 Concession: 10

Registered Plan No.: Lot or Block No.:

Other: Dalhousie Township, Township of Lanark Highlands

Abutting Roads Highland Line, Anderson Lane

4. **Dimensions of Land Affected:**

Frontage: Depth:
Area: 50.6 Hectares

5. **Existing Local Official Plan Designation:** Rural

6. **Existing Local Zoning** Mar-h & RU **By-law No.** 2003-451 **OR**

Existing Development Permit Designation

a) Is a Zoning By-law amendment required if Proposed Official Plan amendment is approved? Yes [X] No [ ]

b) If the answer is YES, has an application been made for an amendment to the Zoning By-law? Yes [X] No [ ]

c) Is a Development Permit required if Proposed Official Plan amendment is approved? Yes [ ] No [X]

b) If the answer is YES, has an application been made for a Development Permit? Yes [ ] No [X]

7. **Existing Land Use:** Agricultural Purposes

8. **Previous Land Uses:** Agricultural, Open Space/Woodlot

9. **Additional Land Uses Authorized by the proposed designation:** Mineral Aggregate Operation (Pit)

10. **Adjacent Land Uses within 500 metres of the subject lands:**
Rural residential, agricultural, aggregate extraction operations, The Wheelers Pancake House, and natural environment (lakes, unevaluated wetland)

11a. **Is the subject land, or lands within 120 metres of the subject land, the subject of an application under the Act made by the applicant, such as, an application for approval of an official plan amendment, a zoning by-law amendment, development permit, a minister's zoning order amendment, a minor variance, a plan of subdivision, a consent or a site plan?**
Yes [X] No [ ]

11b. **If yes, identify the file number of the application, the name of the approval authority considering the application, the lands affected by the application, the purpose of the application, the status of the application and the effect of the application on the proposed amendment.**

Approval Authority: County Of Lanark & Township of Lanark Highlands
The entirety of the lands are subject to both County and Township OPAs.
Applications have been submitted concurrently.
A license application under the Aggregate Resources Act has also been submitted.

12. **Proposed Land Use:** Licensed Aggregate Extraction Operation

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13. Requested Official Plan Amendment

(a) Map Schedule A

From Rural To Licensed Aggregate Extraction Operation

(b) Text

Section (s) _____

Paragraph _____

14. Specific Amendment Requested to Text (Please attach separate sheet if necessary)

N/A

15. Specific Proposed Schedule to the Official Plan if the proposed amendment changes or replaces a schedule in the Official Plan (Please attach as a separate sheet)

See Planning Justification Report

16a. Does the proposed amendment change, replace or delete a policy in the Official Plan?

Yes ☐ No ☒

16b. If yes, identify the policy to be changed, replaced or deleted.

N/A

17. Does the proposed amendment add a policy to the Official Plan?

Yes ☐ No ☒

18. If the answer to 16 or 17 is Yes, provide the purpose of the proposed Official Plan Amendment. (Please attach separate sheet if necessary)

N/A

19a. Does the proposed amendment change or replace a designation in the official plan?

Yes [X] No [ ]

19b. If the proposed amendment changes or replaces a designation in the official plan, identify the designation to be changed or replaced.

Change the land use designation of the subject lands from 'Rural' to a 'Licensed Aggregate Extraction Operation

20. Detailed Reasons Supporting Requested Change: See Planning Justification Report

PART II – OTHER INFORMATION

1. Is there any other information that you think may be useful to the Municipal Plan Review Team or other agencies in reviewing this application? If so, explain below or attach a separate page.

See application materials.

PART III - MISCELLANEOUS REQUIREMENTS

1. It will be necessary to submit the following:

a) Description and/or sketch of the existing uses, previous uses and complete description (i.e. frontage and depth) of the subject lands;

b) Description and/or sketch of the existing land uses adjacent to and within 500 metres of the subject lands;

c) Description and/or sketch of the natural features on the subject lands and within 500 metres of the subject land.

2. When deemed necessary by the County of Lanark, copies of an Ontario Land Surveyors survey for the lands

affected.

3. When deemed necessary by the County, copies of a site plan, acceptable to the County, accurately displaying the proposed use of the subject land.

PART IV – FEES

1. A processing fee, made payable to the LANARK COUNTY, shall be submitted at the time of the application.

PART V – APPLICANT'S / OWNERS AFFIDAVIT or SWORN DECLARATION

1. AFFIDAVIT OR SWORN DECLARATION:

I/We Neal DeRuyter of the City of Kitchener in the County/District/Regional Municipality of Waterloo make oath and say (or solemnly declare) that the information contained in this application is true and that the information in the documents that accompany this application is true.

Sworn (or Declared) before me at the City of Kitchener in the Region of Waterloo this 12th day of December, 2022

David William Astor, a Commissioner, etc., Province of Ontario, for MacNaughton Hermsen Britton Clarkson Planning Limited. Expires January 9, 2023.

Commissioner of Oaths (include stamp below)

Signature of Owner/Solicitor or Authorized Agent
(Please note that if the applicant is a corporation, the application must be signed by a representative of the corporation and the corporation's seal must be affixed)

Signature of Owner

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PART VI – AUTHORIZATION

If the applicant is not the owner of the land that is the subject of this application, the written authorization of the owner that the applicant is authorized to make the application must be included with this form or the authorization set out below must be completed.

Authorization of Owner for Agent to Make the Application

I/We Thomas Cavanagh Construction Limited am/are the owner(s) of the land that is the subject of this application for approval of an Official Plan amendment and I authorize MHBC Planning to make this application on my behalf.

Dec 12, 2022
Date

Signature of Owner

Signature of Owner

PART VII – AGENT AUTHORIZATION

If the applicant is not the owner of the land that is the subject of this application, complete the authorization of the owner concerning personal information set out below.

Authorization of Owner(s) for Agent to Provide Personal Information

I/We Thomas Cavanagh Construction Limited am/are the owner(s) of the land that is the subject of this application for approval of an Official Plan amendment and for the purposes of the **Freedom of Information and Protection of Privacy Act**, I authorize MHBC Planning, as my agent for this application, to provide any of my personal information that will be included in this application or collected during the processing of the application.

Dec 12, 2022
Date

Signature of Owner

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PART VIII - CONSENT OF THE OWNER

Complete the consent of the owner concerning personal information set out below.

Consent of the Owner to the Use and Disclosure of Personal Information

I/We, Thomas Cavanagh Construction Limited am/are the owner(s) of the land that is the subject of this application for approval of an Official Plan amendment and acknowledge that certain personal information is collected and distributed to public bodies under the authority of the **Planning Act**.

For the purposes of the **Freedom of Information and Protection of Privacy Act**, I further authorize and consent to the use of my name in any Notices required under the authority of the Planning Act for the purpose of processing this application.

Dec 12, 2022
Date

Signature of Owner

Signature of Owner

AGREEMENT TO INDEMNIFY

The Owner/Applicant agrees to reimburse and indemnify the Corporation of the County of Lanark (hereinafter referred to as the *"County"*) for all fees and expenses incurred by the County to process the application for amendment to the Official Plan, including any fees and expenses attributable to proceedings before the Ontario Municipal Board or any court or other administrative tribunal if necessary to defend the County's decision to support the application.

Without limiting the foregoing, such fees and expenses shall include the fees and expenses of consultants, planners, engineers, lawyers and such other professional and technical advisors as the County may, in its absolute discretion acting reasonably, consider necessary or advisable to more properly process and support the application.

Attached to this application is a cheque payable to *Lanark County* representing payment of the application fee.

The Owner/Applicant further agrees to provide the municipality, upon request, a deposit against which the County may, from time to time charge against the deposit of any fees and expenses incurred by the County in order to process the application. If such fees and expenses exceed the deposit, the Owner/Applicant shall pay the difference forthwith upon being billed by the County with interest at the rate of 1.25% per month (15% per annum) on accounts overdue more than 30 days.

The Owner/Applicant further agrees that, upon request by the County from time to time, the Owner/Applicant

shall make such additional deposits as the County considers necessary, and until such requests have been complied with, the County will have no continuing obligation to process the application or attend or be represented at the Ontario Municipal Board or any court or other administrative proceeding in connection with the application.

Dec 12, 2022
Date

Signature of Owner/Applicant

Signature of Owner/Applicant

MHBC
PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

KITCHENER
WOODBRIDGE
LONDON
BARRIE
BURLINGTON

January 13, 2023

Julie Stewart, MCIP, RPP
County Planner
County of Lanark
99 Christie Lake Road
Perth, ON K7H 3C6

Avery Dowdall
Planning, Building, Clerk Administrative Assistant
Township of Lanark Highlands
75 George Street, PO Box 340
Lanark, ON K0G 1K0

Dear Julie and Avery:

RE: Thomas Cavanagh Construction Limited Proposed Highland Line Pit
Part Lot 5, Concession 10 (Dalhousie), Township of Lanark Highlands, County of Lanark
OUR FILE 0851E

Thomas Cavanagh Construction Limited ('Cavanagh') is applying for amendments to the County's Official Plan, and Township's Official Plan and Zoning By-law to permit a below water pit on lands located on Part of Lot 5, Concession 10 (Geographic Township of Dalhousie).

The area proposed to be licensed is approximately 50.6 ha with 35.1 ha proposed for extraction. The maximum annual tonnage is proposed to be 1,000,000 tonnes. The pit is proposed to operate on a 24-hour basis with limitations on what equipment can operate between the hours of 7 pm and 7 am.

An application for a Class A Licence under the Aggregate Resources Act has been submitted to the Ministry of Natural Resources and Forestry concurrently with these applications.

The proposed extraction area contains at least two million tonnes of high quality sand and gravel resources. These resources will be used for concrete and asphalt sand, Granular A, Granular B, and SSM aggregate product.

The subject lands currently include deciduous, mixed and coniferous forest and wetland, interspersed with small patches of active agriculture. There are no buildings or structures on the site. The proposed extraction area has been delineated to avoid significant natural features including species at risk habitat and unevaluated wetlands.

Aggregate material extracted from the site will be primarily transported eastward via Highland Line to County Road 12 which are existing haul routes for nearby pits. Except for local deliveries when required, trucks will not head west on Highland Line from the pit.

Rehabilitation of the site will be progressive, and the site will be rehabilitated to natural features in the form of a lake with shallow littoral zones located in areas having shallower slopes, as proposed in the Rehabilitation Plan.

The subject lands are designated Rural Area within the County's Official Plan, Rural Communities in the Township's Official Plan, and are zoned Rural (RU) and Mineral Aggregate Reserve Hold (MAR-h) in the Zoning By-law. In order to permit the proposed Highland Line Pit, amendments are required to the County and Township Official Plans, and the Zoning By-law.

A pre-consultation meeting occurred with County and Township staff and their consultants as well as Mississippi Valley Conservation on October 18, 2021 to discuss the proposal and application requirements. The list of studies included with this submission was reviewed and discussed with staff.

Included in the Dropbox link below are the following application materials:

- County OPA Application
- Township OPA Application
- Zoning By-law Amendment Application
- Stage 1 and 2 Archaeological Assessment (Golder, October 5, 2020)
- Stage 1 Archaeological Assessment (Golder, April 14, 2021)[1]
- Stage 3 Archaeological Assessment, Duncan Site (Golder, February 2021)
- Stage 3 Archaeological Assessment, Turnbull Site (Golder, May 17, 2021)
- Stage 4 Archaeological Mitigation, Turnbull Site (WSP Golder, May 14, 2021)
- Stage 4 Archaeological Mitigation, Duncan Site (WSP Golder, June 8, 2021)
- Traffic Impact Study (Castleglenn Consultants, September 15, 2022)
- Acoustic Assessment (Freefield Ltd., September 23, 2022)
- Level 1 and 2 Water Report (WSP Golder, December 2022)
- Maximum Predicted Water Table Report (WSP Golder, December 12, 2022)
- Natural Environment Report (WSP Golder, December 12, 2022)
- Planning Justification Report and ARA Summary Statement (MHBC, December 2022)
- ARA Site Plan (Cavanagh/WSP Golder, December 2022)

Application materials available for download from the following link:
https://www.dropbox.com/scl/fo/1xfrn8lrt8p2zonwnae3g/h?dl=0&rlkey=yy59d6r6im5qg8zebuwfzo41v

If you require any hard copies of the application materials, please let us know.

Cheques for the following application fees will be sent to the Township and County under separate cover:

[1] The Oct 2020 Stage 1/2 assessed the extraction area and the April 2021 Stage 1 assessed the remainder of the proposed licensed area.

- County OPA: $3,000 plus $3,000 deposit
- Township of Lanark Highlands (Combined OPA/Rezoning): $1,100 plus $2,000 deposit

Copies of the draft amendments are included in the appendices of the MHBC Planning Report.

We look forward to working with the Township and County on these proposed applications. If you have any questions regarding this application, please do not hesitate to contact us.

Yours truly,

MHBC

Neal DeRuyter, BES, MCIP, RPP

Encl.

cc. *Forbes Symon, Jp2g Consultants*
Phil White, Cavanagh
Kris Marentette / Brian Henderson, WSP Golder
Dawson McKenzie, MHBC

MHBC
PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE

KITCHENER
WOODBRIDGE
LONDON
KINGSTON
BARRIE
BURLINGTON

Planning Justification Report & Aggregate Resources Act Summary Statement

Highland Line Pit

Part of Lot 5, Concession 10 (Dalhousie)
Township of Lanark Highlands
County of Lanark

Date:
December 2022

Prepared for:
Thomas Cavanagh Construction Limited

Prepared by:
MacNaughton Hermsen Britton Clarkson Planning Limited (MHBC)
540 Bingemans Centre Drive, #200
Kitchener ON N2B 3X9
T: 519-576-3650

Our File: 0851'E'

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1.0

EXECUTIVE SUMMARY

Thomas Cavanagh Construction Limited (herein referred to as 'Cavanagh') is applying for a "Class A", below water pit license under the ARA. These subject lands are legally described as Part of Lot 5, Concession 10, Geographic Township of Dalhousie, in the Township of Lanark Highlands (**Figure 1**). The proposed Highland Line Pit will extract sand and gravel resources from below the water table. The size of the licensed area is approximately 50.6 hectares (125 acres) with an extraction area of 35.1 hectares (86.7 acres).

The subject lands currently include deciduous, mixed and coniferous forest and wetland, interspersed with small patches of active agriculture. Adjacent land uses consist of residential dwellings and farmland. Other land uses nearby include aggregate extraction operations, notably the McKinnon Pit operated by Arnott Brothers Construction Ltd located directly across Highland Line. In total, four licensed operations (609261, 4257, 4267, and 4155) are located within 2 kilometres of the pit, two of which (License nos. 4257 and 609261) are located within 200 metres of the site.

The ARA site plans have been designed in a strategic way to minimize and mitigate adverse impacts to natural features and archeological resources by ensuring extraction boundaries are reasonably set. Setbacks from these resources are indicated on the site plans to ensure the proposed pit does not impede on these resources.

In accordance with ARA regulations, Cavanagh is applying for a Class 'A' Licence to operate a pit below the water table. The proposed maximum annual tonnage to be extracted is 1,000,000 tonnes. The pit is proposed to operate on a 24-hour basis with limitations on what equipment can operate between the hours of 7 pm and 7 am.

This extracted aggregate will serve the local economy by providing resources from a close-to-market area. The subject lands are mapped on ARIP as having sand and gravel resources of primary and tertiary significance.

To permit this proposal, applications are required to amend the Lanark County Sustainable Communities Official Plan (SCOP), and the Township of Lanark Highlands Official Plan and Zoning By-law. Most of the property is currently zoned 'Rural' (RU), with a portion of the property zoned as 'Mineral Aggregate Reserve' (MAR). According to mapping from the Township's Official Plan, the Zoning By-law, and ARIP, the subject lands have been identified to contain significant aggregate resources.

Aggregate material will be extracted and then primarily transported eastward via Highland Line to County Road 12. It is expected that 30 two-way truck trips will be generated during the morning and afternoon peak hours assuming maximum production e.g. worst case. Both study area intersections, County Road 12/Highland Line-McCulloch Road and Highland Line/North Pit Access, are expected to continue to operate acceptably during the peak hours of travel demand. The proposed amount of traffic generated will not exceed acceptable limits.

The site is proposed to be divided into two portions, extraction area 1 (east end), and extraction area 2 (west end). The two portions are divided by Anderson Lane, a Township road. The extraction will commence simultaneously in the north portions of each extraction area, and proceed until the southern portions of the site have been extracted. The extraction area has been divided into 2 phases as indicated on the ARA site plans by WSP Golder. Extraction will occur below the established water table which currently exists at an elevation of approximately 183m to 195mASL.

The processing of aggregate materials will occur through the use of an on-site mobile screening plant. The plant will be brought to site whenever needed and will be situated near the extraction face. Occasional crushing will occur onsite in accordance with the Site Plans. There will be visual and noise control berms located along Highland Line to reduce visual and noise impacts. The mobile screening plant and crushing will only operate from 07:00 to 19:00.

Due to extraction below the water table, the site will be rehabilitated to a pond. The land which the site is on is currently classified as Class 7 agricultural land meaning the soil is not of a high quality. Rehabilitation will occur progressively through the life of the operation.

In support of the proposed aggregate licence application, the following technical reports and plans had been prepared:

- Stage 1 through 4 Archaeological Assessments (WSP Golder);
- Traffic Impact Study (Castleglenn Consultants)
- Acoustic Assessment (Freefield Ltd.);
- Level 1 and Level 2 Water Report (WSP Golder);
- Natural Environment Level 1 and 2 Technical Report (WSP Golder);
- Planning Report and ARA Summary Statement (MHBC);
- Site Plan (WSP Golder).

Based on the natural environment fieldwork, significant natural features found on the Site include habitat of endangered species (Blanding's turtle, tri-coloured bat and black ash), unevaluated wetlands and significant wildlife habitat. Significant natural features on adjacent lands within 120 m of the Site include potential habitat for endangered and threatened species, unevaluated wetlands, fish habitat and potential significant wildlife habitat. The proposed extraction area has been delineated to avoid significant natural features. The Natural Environment Report concluded that the proposed pit will be no negative impacts to the

significant natural features and functions on the Site or in the Study Area, subject to the implementation of the recommended mitigation measures.

The Level 1 and Level 2 Water Reports conducted by WSP Golder state that given extraction will occur below the water table without dewatering, there will be no significant lowering of the groundwater table in the overburden and underlying bedrock, and thus no potential for the proposed extraction activities to cause drawdown of the groundwater table such that it interferes with local water supply wells. No adverse effects to groundwater and surface water resources are anticipated as a result of the proposed Pit.

As part of the rehabilitation plan, a permanent pond will be located within the subject lands after extraction ceases. This pond level will be approximately 186mASL.

Through the completion of a Stage 1 and 2 Archaeological Assessment, Golder Associates identified potential for archeological resources to exist on site. The Assessment identified two locations, Duncan and Turnbull, which required further evaluation in the form of a Stage 3 & 4 Archeological Assessment. The Stage 3 & 4 Assessments have been completed with appropriate acceptances obtained from the Ministry of Tourism, Culture, and Sport. Areas of the site still requiring Stage 2 assessment have been identified on the site plan and will be protected from extraction until such assessment is completed and accepted by Ministry of Tourism, Culture, and Sport.

The Aggregate Resources Act Licence application has been prepared to meet the provincial requirements specified for a Class 'A' pit. This application package also includes an in-depth analysis of the policies and information presented in Section 12 of the Aggregate Resources Act which will aid in ensuring the proposed extractive aggregate operation will prioritize the minimization of any potential adverse effects from occurring.

The Planning Act applications have been prepared in accordance with County and Township Requirements.

2.0
BACKGROUND

2.1 Description of the Subject Lands

The site is comprised of two parcels separated by Anderson Lane. The two parcels are similar in size and shape (**Figures 1 & 2**). Anderson Lane is a local township roadway which provides access to the dwelling located adjacent to the Subject Lands. Both parcels comprising the site have frontage on Highland Line. A small section in the most eastern portion of the site has an unevaluated wetland within it, however the entirety of the wetland is located outside of the limit of extraction and will not be disturbed. The site boundaries established have been decided based on a combination of the location of viable aggregate material, avoiding impacts to the surrounding natural environment, and ensuring impacts on nearby sensitive land uses are minimized.

There are no buildings or dwellings on the site. The site is currently used for agricultural purposes, and are zoned Mineral Extractive Reserve and Rural.

2.2 Adjacent and Surrounding Land Uses

The surrounding area around the proposed Highland Line Pit is primarily rural (**Figures 1 & 2**). The majority of the area is not developed, most of the land uses include rural residential, agricultural, and aggregate extraction operations. Four licensed operations (609261, 4257, 4267, and 4155) are located within 2 kilometres of the pit, two of which (License nos. 4257 and 609261) are located within 200 metres of the site. The Town of Lanark is approximately 17 km from the site. Additional surrounding uses include nearby campgrounds, lakes (including Barbers Lake located immediately southeast of the site), private dwellings, parks, and natural features.

Wheelers Pancake House, a well-known restaurant and recreational operation, is located directly to the west of the subject lands. The Wheelers Pancake House operation includes a number of buildings, such as the Maple Heritage Museum, the Forest & Farm Museum, the Original Sugar Shack, the Barn, and the Pump House. These structures are all located approximately 500-600 metres from the Subject Site. Wheelers Pancake House also includes a number of recreational trails which run throughout the property. Visual and Acoustic berms will be used to mitigate potential impacts from the proposed Highland Line Pit on Wheeler's Pancake House operations.

The Natural Environment Report (NER) identified features adjacent (and within) the site. This includes Habitat of Endangered Species, the unevaluated wetland located on the east side of the site, Fish Habitat, and Significant Wildlife Habitat.

Sensitive land uses located within 120 metres of the proposal are limited. Only 1 house is located within 120 metres of the site, located along Leo Jay Lane. There are 6 houses located within 500 metres, mostly concentrated along Leo Jay Lane, but also including the residence with access via Anderson Lane. Wheelers Pancake House (described above) is located 500-600 metres away.

2.3 Mineral Aggregate Resources

According to ARIP 189, the majority of the identified sand and gravel deposits located on the Subject Lands fall under Selected Sand and Gravel Resource Area 3 in the County of Lanark (**Figure 3**). The site is located in a selected sand and gravel area which is comprised of an east-trending glaciofluvial ice-contact-esker ridge, and have a coarse-textured esker core. According to the ARIP 189 MAP 1: Sand and Gravel Resources for the County of Lanark, the site's aggregate resources are of primary and tertiary significance. The granular resources within the site have the capability to be used for concrete and asphalt sand, Granular A, Granular B, and SSM aggregate products. Most of the aggregate consists of fine to coarse sand and gravel.

A test pitting program was undertaken through the Water Report which evaluated the resources on site. Cross sections of the test pit logs indicate that the coarsest materials are primarily found in the open area in the centre/western half of the property, and finer materials found at the perimeter of the property.

2.4 Agricultural Resources and Soils

The Canada Land Inventory (CLI) soil classification for the proposed Highland Line Pit is Class 7 (**Figure 4**). As a result, the proposed Highland Line Pit is not considered to be located on Prime Agricultural Land as defined by the Province. Further, the lands are not designated as a Prime Agricultural Area in the County or Township Official Plan.

2.5 Natural Heritage Features

A Natural Environment Level 1 and 2 Technical Report (NER) had been prepared by WSP Golder to ensure that the planning policy considerations of the Province, County, Township, and ARA had been met.

The assessment involved the investigation of existing conditions on the Site and in the Study Area included a background information search and literature review to gather data about the local area and provide context for the evaluation of the natural features. Additionally, A SAR screening was completed for the Site and Study Area, focusing on the review of records and range maps pertaining to species that are designated as threatened, endangered or special concern under the ESA, and species that are protected under Schedule 1 of the SARA.

The habitats and communities on the Site were characterized through field surveys, which included:

- Three plant community surveys.
- Three rounds of anuran point-counts.
- Five rounds of VES surveys for turtles completed when air temperatures reached at least 10°C.
- Diurnal breeding bird point counts
- Three grassland bird surveys
- Three crepuscular/nocturnal breeding bird surveys
- Bat surveys.
- General wildlife surveys which included track and sign surveys, area searches, and incidental observations, concurrent with other field surveys.

The assessment classified the lands as consisting of mixed, deciduous forest, and coniferous forest, as well as unevaluated wetlands, agricultural fields, open woodland, and thicket. Much of the forests had undergone intensive selective logging in recent years.

Based on the background review and field surveys, the following significant natural heritage features were identified onsite and within the study area:

- Significant natural features confirmed on-Site: Habitat for endangered species (Blanding's turtle, tri-coloured bat and black ash); unevaluated wetlands; significant wildlife habitat (seeps).

- Significant natural features off-Site, with 120 m of the Site: Potential habitat for endangered and threatened species; unevaluated wetlands; fish habitat; potential significant wildlife habitat (various types).

Mitigation measures to ensure the protection of significant natural features include:

1. Delineating the extraction areas to avoid significant features
2. No clearing of vegetation within core breeding bird season.
3. Fence and protect area identified as maternity roost habitat for tri-coloured bat.
4. Preparation and implementation of a SAR awareness package, encounter protocol and training program.

WSP Golder concluded that there would be no negative impact to the significant natural features and functions on the Site or in the Study Area.

2.6 Water Resources

The Highland Line Pit will be applying for a Class "A" License under the Aggregate Resource Act to extract below the groundwater table. A Level 1 and 2 Water Report was completed by Golder Associates to analyze the potential impacts to groundwater quality and quantity from the proposal. In addition to this assessment, a Maximum Predicted Water Table report was completed to determine the level of the water table on site.

This assessment involved recording and monitoring water levels via test-pitting and the installation of groundwater table monitoring equipment. Through the combination of these observations WSP Golder was able to analyze and model the existing, operational, and rehabilitation conditions of the site.

The assessment concluded that the groundwater throughout the site generally flows from the southwest portion to the eastern portion. The highest groundwater elevations are found in monitoring wells installed on the southern corner of the site (MW20-6) and the lower groundwater elevations are found in the monitoring wells installed along the eastern edge of the extraction area (MW20-3). Secondly, the water balance assessment determined that the change from site runoff to infiltration is expected to decrease peak flow contributed from the site and slightly increase a steadier base flow from the site.

Ultimately, the report concluded that local water supply wells will not be impacted by the proposed Highland Line Pit because they won't be lowered by a significant amount. There is no potential for the extraction of aggregate to cause significant drawdown of the groundwater table. The report concluded that based on the findings of the assessment, no adverse effects to groundwater and surface water resources and their uses are anticipated as a result of the proposed Highland Line Pit.

2.7 Archaeological Resources

Archaeological assessments are required by the planning policies of the Province, County, and Township to ensure that the proposed development conserves significant archaeological resources.

A Stage 1 and 2 Archaeological Assessment had been conducted for the proposed subject lands in (April of 2021) by Golder Associates as required under the ARA and *Planning Act* application process.

The Stage 2 Archaeological Assessment recommended further assessment of two identified sites archaeological sites; Turnbull and Duncan, which have been interpreted as 19th century farmsteads. Within these sites the archaeological assessment had found approximately 20 mid-19th century artifacts including a large amount of mid-19th century ceramic tableware.

Additionally, the archaeological assessment states that the Duncan and Turnbull sites possess Cultural Heritage Value/Interest and are subject to stage 3 and 4 archaeological assessment. The stage 3 and 4 Assessments have been completed, and the archeological resources have been conserved as confirmed by the Ministry.

Areas with remaining archaeological work have been identified on the ARA site plans. Prior to any extraction or disturbance of these areas, additional archaeological assessment will be required in addition to appropriate clearances obtained from the Ministry of Culture.

3.0
PLANNING ANALYSIS

The following is an assessment of the proposed Highland Line Pit relative to the planning policies and provisions of the following documents:

- Provincial Policy Statement, 2020;
- County of Lanark Sustainable Communities Official Plan (adopted June 27, 2012);
- Township of Lanark Highlands Official Plan (August 2016);
- Township of Lanark Highlands Zoning By-Law No. 2003-451 (November 18, 2003);
- Aggregate Resources Act Provincial Standards.

3.1 Provincial Policy Statement

The 2020 Provincial Policy Statement (PPS) came into effect on May 1, 2020, and replaced the PPS, 2014. Planning decisions made on or after May 1, 2020, must be consistent with the PPS, 2020.

The PPS provides policy direction on matters of provincial interest related to land use planning and development. The PPS provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality of the natural environment. (Part I, Preamble).

The PPS is a policy-led planning approach that recognizes the complex inter-relationship among environmental, economic and social factors in land use planning. The PPS supports a comprehensive, integrated and long-term approach to planning and recognizes linkages among policy areas. (Part III, How to Read the Provincial Policy Statement).

The PPS recognizes that the Province's natural heritage resources, water, agricultural lands, mineral aggregate resources, cultural heritage, including those of indigenous communities; and, archaeological resources, provide important environmental, economic and social benefits. The wise use and management of these resources over the long term is a key Provincial interest. The Province must ensure that its resources are managed in a sustainable way to protect essential ecological processes and public health and safety, minimize environmental and social impacts, including those brought on by climate change, and meet its long-term economic needs. (Part IV, Vision for Ontario's Land Use Planning System).

Part V of the PPS, 2020, is made-up of the Policies, broken-down into three main Sections. Of relevance to the proposed Highland Line Pit are Section 1.0, Building Strong Healthy Communities, and Section 2.0, Wise Use and Management of Resources. (Section 3.0 provides policies on Protecting Public Health and Safety relating to natural and human-made hazards).

As part of this Planning Analysis, each specific and relevant PPS, 2020, Part V Section 1.0 and 2.0 policy provision is excerpted below in italics, and a response is provided to demonstrate how the Highland Line Pit Proposal is consistent with the PPS:

1.1.5.2 On rural lands located in municipalities, permitted uses are:
a) the management or use of resources;…

1.1.5.5 Development shall be appropriate to the infrastructure which is planned or available, and avoid the need for the unjustified and/or uneconomical expansion of this infrastructure.

1.1.5.7 Opportunities to support a diversified rural economy should be promoted by protecting agricultural and other resources-related uses and directing non-related development to areas where it will minimize constraints on other uses.

The proposed Highland Line Pit is located on rural lands. Section 1.1.5.2 of the PPS states that 'the management or use of resources' is permitted on rural lands in municipalities. The Highland Line Pit proposal represents the wise use and management of a non-renewable resource from a long-established and Provincially mapped aggregate supply area which is not located on prime agricultural lands. This proposal will provide close-to-market aggregate products and will support long-term economic prosperity within the Township and County.

1.2.6.1 Major facilities and sensitive land uses shall be planned and developed to avoid, or if avoidance is not possible, minimize and mitigate any potential adverse effects from odour, noise and other contaminants, minimize risk to public health and safety, and to ensure the long-term operational and economic viability of major facilities in accordance with provincial guidelines, standards and procedures.

The proposed Highland Line Pit has been designed in a way which minimizes and mitigates any potential adverse effects to sensitive uses. Through the preparation of technical reports and studies, ARA site plans, and adherence to Provincial and local policies, the proposed Highland Line pit will minimize risk to public health and safety. Additionally, the site has been identified to contain significant sand and gravel resources through municipal planning documents and Provincial geological mapping.

1.6.7.1 Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs.

1.6.7.2 Efficient use should be made of existing and planned infrastructure…

The proposed Highland Line Pit would utilize an existing local haul route (Highland Line to County Road 12).

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;…

The proposed Highland Line Pit ensures the long-term availability and optimization of mineral aggregate resources.

Section 2.0 of Part V of the PPS is entitled "Wise Use and Management of Resources". The introduction to this section reads:

"Ontario's long-term prosperity, environmental health, and social well-being depend on protecting natural heritage, water, agricultural, mineral and cultural heritage and archaeological resources for their economic, environmental and social benefits."

2.1.1 Natural features and areas shall be protected for the long term.

The subject lands are predominately active agricultural land with woodlot cover. The woodlot on site is not identified as significant. The unevaluated wetland onsite is not proposed to be within the limit of extraction, and thus will not be disturbed. Natural features in the area will be protected for the long term.

2.1.5 Development and site alteration shall not be permitted in:

a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E[1];

b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)[1];

c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)[1];

d) significant wildlife habitat;

e) significant areas of natural and scientific interest; and

f) coastal wetlands in Ecoregions 5E, 6E and 7E[1] that are not subject to policy 2.1.4(b) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

The subject lands are located within Ecoregion 5E and are therefore not subject to the no negative impacts test for significant woodlands and significant valleylands.

The Natural Environment Report identified potential significant wildlife habitat onsite (seeps), but outside of the limit of extraction. As the habitat is located outside of the limit of extraction, the report concluded that there would be no negative impacts to its features or ecological functions. There are no other significant features identified in 2.1.5 that are located on the site.

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

No fish habitat exists on site.

2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

Five endangered or threatened species and/or their defined habitat were identified on the Site and/or in the Study Area, which included barn swallow, eastern meadowlark, little brown myotis, northern myotis, and tri-coloured bat.

Foraging and Maternity Roost habitat for the bat species was found onsite. These areas have been identified on the site plan and removed from the area proposed to be extracted, and thus will not be disturbed.

Through the impact assessment, WSP Golder concluded that there would be no negative impacts to the habitats of the species identified above as a result of the proposed Pit.

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

As noted, the subject lands are located within Ecoregion 5E. The definition of "natural heritage features and areas" in the PPS specifically excludes fish habitat, significant woodlands and significant valleylands in Ecoregion 5E. This means that the no negative impacts test does not apply to these features in Ecoregion 5E and this proposed application.

Regardless, the Natural Environment Report concluded that, subject to the recommendations outlined in the report, there would be no negative impacts to significant natural features or functions as a result of the proposed pit.

2.2.2 Development and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related hydrologic functions will be protected, improved or restored.

Mitigative measures and/or alternative development approaches may be required in order to protect, improve or restore sensitive surface water features, sensitive ground water features, and their hydrologic functions.

Barbers Lake is located adjacent to the proposed site to the east. As established in the WSP Golder Level 1 and 2 Water Report, there is no anticipation that there will be any adverse impacts on the groundwater and surface resources including Barbers Lake as a result of the operations being conducted at the Highland Line Pit.

2.3.1 Prime agricultural areas shall be protected for long-term use for agriculture.

The proposed Highland Line Pit is not located on lands classified as a 'prime agricultural area'.

2.5.1 Mineral aggregate resources shall be protected for long-term use and, where provincial information is available, deposits of mineral aggregate resources shall be identified.

The subject lands contain mineral aggregate resources which consist of high quality sand and gravel resources which are identified in provincial geological mapping.

2.5.2.1 As much of the mineral aggregate resources as is realistically possible shall be made available as close to markets as possible. Demonstration of need for mineral aggregate resources, including any type of supply/demand analysis, shall not be required, notwithstanding the availability, designation or licensing for extraction of mineral aggregate resources locally or elsewhere.

2.5.2.2 Extraction shall be undertaken in a manner which minimizes social, economic and environmental impacts.

The proposed Highland Line Pit operation has been designed to ensure that social, economic and environmental impacts are minimized. The proposal will make available close to market aggregate which will serve local eastern Ontario markets.

2.5.2.3 Mineral aggregate resource conservation shall be undertaken, including through the use of accessory aggregate recycling facilities within operations, wherever feasible.

Mineral aggregate resource conservation will be undertaken by making available primary aggregate resources, which can then be blended or mixed with former aggregate products as part of the aggregate recycling process. Additionally, aggregate stockpiles may include recyclable materials and imported aggregate materials required for blending processes. Recycling of concrete and asphalt will be permitted as an accessory activity on this site. Asphalt materials will be stored at least 30 metres horizontally from any water source. Recycling activities will not preclude or hinder the progressive or final rehabilitation requirements. Once final rehabilitation has been completed, all recycling activities will cease and recyclable materials will be removed from the site.

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.

Rehabilitation of the pit will be progressive, culminating in the final rehabilitation of the site once the pit is depleted and processing operations have ceased. The final landform will be rehabilitated to a natural feature in the form of a lake, with the remaining above water table areas on site being naturalized. The proposed final land use is compatible with surrounding land use and conforms to the current land use designations in the Township and County Official Plans.

2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved.

There are no significant built heritage resources or significant cultural heritage landscapes on the subject lands.

2.6.2 *Development and site alteration shall not be permitted on lands containing archaeological resources or areas of archaeological potential unless significant archaeological resources have been conserved.*

Significant archaeological resources identified on the site have been conserved through the completion of Stages 1-4 Archaeological Assessments as accepted by Ministry of Culture. Remaining areas requiring assessment have been identified on the site plan and will be protected until further assessment has been completed in addition to appropriate clearances obtained from the Ministry of Culture.

In conclusion, based on the planning analysis described above, the proposed Highland Line Pit is consistent with the Provincial Policy Statement, 2020.

3.2 County of Lanark Sustainable Communities Official Plan

The County of Lanark Sustainable Communities Official Plan (SCOP) was adopted by the County on June 27, 2012.

The proposed Highland Line Pit applications are required to conform to the SCOP. Within the SCOP, the subject lands are designated Rural Area (**Figure 5**). Also of note is that the site lies outside of the following designations: Agricultural Land, Provincially Significant Wetland (PSW), Area of Natural and Scientific Interest (ANSI), and Significant Woodland and Floodplain. This site is located nearby two Licensed Aggregate Extraction Operations.

An amendment to the SCOP is required to permit any new mineral aggregate operations within the County by adding them to the Licensed Aggregate Extraction Operation Designation. The proposed SCOP Official Plan Amendment (OPA) will be to amend the current designation from 'Rural' to 'Licensed Aggregate Extraction Operation', which requires several policy provisions to be addressed. The relevant policies are excerpted below, in the order they appear in SCOP, with a response provided to each specific policy:

5.4 General Land Use Policies
5. Where the policies in this Plan provide for the undertaking of an Environmental Impact Statement (EIS), it is understood that, on the basis of consultation with the appropriate review agency, the EIS may be scoped or eliminated in those instances where the potential impact of development is reduced or non-existent.

The Natural Environment Report (NER) completed by WSP Golder for the proposal has been prepared to address the SCOP requirement of an EIS as well as the Aggregate Resources Act technical reporting standards. The report concluded that the proposed pit would have no negative impacts to the significant wildlife features and functions on the Site or in the Study Area.

6.2.2.5 Zoning and Development Control

The establishment of any new pit or quarry or the expansion to existing licensed areas shall be in accordance with the Aggregate Resources Act and will require an amendment to this plan and to the local Official Plan. Studies and site plans required under the Aggregate Resources Act shall be reviewed prior to any Official Plan Amendment or rezoning. The licensed area of pits and quarries shall be zoned for extraction and associated accessory uses in local zoning by-laws. Unlicensed areas may also be zoned for aggregate related uses, such as portable asphalt plants and concrete plants. The municipality may use zoning, holding provisions or interim control by-laws to implement any of the policies stated in this section The Ministry of Natural Resources will provide advice to the municipality or the County with respect to any license required under the Aggregate Resources Act.

The proposed Highland Line Pit, its site plans, and the completed technical studies are in accordance with the ARA. An amendment is being submitted to the SCOP and the local Official Plan.

7.8 Noise and Vibration

Noise and vibration impacts shall be addressed for new sensitive land uses adjacent to stationary or line sources where noise and vibration may be generated. The approval authority may require the proponent to undertake noise and/or vibration studies to assess the impact on existing or proposed sensitive land uses within minimum distances identified in Ministry of Environment guidelines including Publication LU– 131, Noise Assessment Criteria in Land Use Planning. Noise and/or vibration attenuation measures will be implemented, as required, to reduce impacts to acceptable levels.

7.9 Incompatible Land Uses

Every effort shall be made to prevent or minimize future land use conflicts which can arise when incompatible land uses develop in close proximity to one another. Ministry of the Environment guidelines on Land Use Compatibility (Guidelines D–1, D-2, D-4 and D-6 and any other relevant or future MOE Guideline documents) should be considered when preparing and adopting local Official Plans and Zoning By-laws and when considering amendments to this Plan.

In order to ensure that land use conflicts are minimized, an Acoustic Assessment Report was prepared which provides recommendations that are included on the ARA site plans and will be implemented during the design and operation phases. These mitigation measures include noise barriers and berms, equipment restrictions in terms of permitted locations and hours of operation, and on-site speed limits for trucks. These measures will minimize acoustic impacts on surrounding land uses from the extractive operation. Vibration impacts are not addressed because sand and gravel pit operations do not cause any significant forms of vibration.

To provide for visual screening from Highland Line, a berm is proposed along the site frontage where site topography does not screen the site from public view.

8.2.10 Consultation with First Nations

The Algonquins of Ontario shall be consulted on any Archaeological Studies related to proposed developments where areas of Algonquin Interest and/or Native Values and/or the potential for aboriginal artifacts to be encountered have been identified.

The Algonquins of Ontario shall be consulted on any Environmental Impact Studies related to proposed developments where areas of Algonquin interest and/or Native Values and/or the potential for aboriginal artifacts to be encountered have been identified.

The Algonquins of Ontario will be consulted on the Natural Environment Report and Archeological Assessment as part of the ARA application process.

8.3.1 Amendments to the Sustainable Communities Official Plan

Amendments to this Plan shall be considered in accordance with related policies elsewhere in this Plan. In general, amendments will only be considered when they are justified and when the required supportive information is provided as stated in the policy sector proposed for revision. Proposed amendments to this Plan shall be accompanied by sufficient information to allow Council to fully understand and consider the following:

1. the impact of the proposed change on the achievement of the stated goals, objectives and policies expressed in this Plan;

2. the need for the proposed change;

3. the effect of the proposed change on the need for public services and facilities;

4. the physical suitability of the land for the proposed use.

Accordingly applications to amend this Plan will not be considered complete until the information and materials required under the Planning Act and Regulation 543/06 have been provided.

The proposed Highland Line Pit requires an amendment to Schedule A of the SCOP from Rural to Licensed Aggregate Extraction Operation. There is no policy section which is being proposed to be amended. This Planning Justification & Aggregate Resources Act Summary Statement Report supplies the necessary and relevant information which is required by SCOP, and is consistent with the PPS, in support of the Highland Line Pit SCOP OPA.

8.3.4 Local Official Plans and Official Plan Amendments

Lanark County is the approval authority for local Official Plans and Official plan Amendments. In addition to any requirements of the Local Official Plans, the complete application requirements which are listed in section 8.3.1 shall also apply to the review of local Official Plans and Official plan Amendments by the County.

See section 3.3 of this Report which addresses the local, i.e. Township, OPA process.

In summary, the proposed Highland Line Pit conforms to the County of Lanark Sustainable Communities Official Plan.

See **Appendix A** for a copy of the draft County of Lanark Sustainable Communities Official Plan Amendment and Schedule.

3.3 Township of Lanark Highlands Official Plan

The Township of Lanark Highlands Official Plan was approved by the Ministry of Municipal Affairs and Housing on December 17, 2012, and the Ontario Municipal Board on August 4, 2016.

The proposed Highland Line Pit is subject to the policies stated within the Township Official Plan. The Township Official Plan designates the subject lands as Rural Communities (**Figure 6**).

Additionally, the site is not within any Provincially Significant Wetland land use designation, Area of Natural & Scientific Interest, Deer Yard, nor Flood Plain which is consistent with the County SCOP and can be seen in the mapped areas on SCOP Schedule B, Development Constraints.

Portions of the site are designated as Mineral Aggregate Reserve on Schedule B (**Figure 7**). This map is being updated through the current review of the Township Official Plan (OPA 8) to be consistent with ARIP 189 which identifies the site within a Selected Sand and Gravel Resource Area.

Given the designation of the site as Rural Communities, an amendment to the Township Official Plan is required to permit the proposed Highland Line Pit. The Township Official Plan Amendment (OPA) will be to amend the designation from Rural Communities to Mineral Aggregate Resource Policy Area – Pit, which requires several policy provisions to be addressed. The relevant policies are excerpted below, in the order they appear in the OP, with a response provided to each specific policy to demonstrate how the Proposal conforms to the Township's OP:

4.0 Our Resource Lands:
Resource lands make up a significant component of land uses in Lanark Highlands. Mineral resources and forestry are important to the overall economic base of the Township. Aggregate resources such as sand, gravel and limestone have been evaluated and appropriate land use policies have been developed to ensure the wise use and conservation of these resources for future generations.

The proposed Highland Line Pit will allow for the utilization of sand and gravel resources, and will contribute to the local economic base by providing continuing employment, purchases and provision of services, and providing high quality construction materials within the Township. The ARA site plan for the proposed pit has been designed based on input from technical studies to meet the requirements of the Aggregate Resources Act. The site plan will become legally binding on the licensee at the time a license is issued by MNRF, and will provide for the wise use of this non-renewable and economically crucial natural resource.

4.1.3.2 Where an Official Plan amendment is proposed which could result in the redesignation of lands to Mineral Aggregate Resource Policy Area in order to facilitate the establishment or addition of previously unlicensed area to a licensed extraction operation and where the limits of the extraction operation could ultimately be located within 300 metres (984 feet) of a residential, institutional or commercial use on another lot for a licensed pit and 500 meters (1640 feet) for a licensed quarry, such proposed amendment shall be supported by the following:

1. Hydrogeological investigations, in accordance with the Aggregate Resources Act, conducted by a qualified professional, which demonstrate conclusively that the extraction operation will not result in negative impacts on the existing non-extraction development's water and sewer services;

2. Any other investigation as required by the approval authority such as traffic studies, noise studies, vibration studies, slope stability studies etc. are carried out and demonstrate conclusively that the

proposed extraction operation can proceed without negative impacts on the existing non-extraction development. Such studies are to carried out by qualified professionals.

WSP Golder had conducted a Maximum Predicted Water Table Report as well as a Level 1 and Level 2 Water Report which adhere to the requirements for a Provincial Standards' licence application for a Class 'A' pit licence as well as Official Plan requirements. Golder concludes that no negative impacts are anticipated on the groundwater and surface water resources will occur as a result of the extractive operations.

The extraction of aggregate materials will result in a pit base elevation of 176m asl. The Water Report states that the extraction of aggregate materials will not require dewatering which will result in no significant lowering of the groundwater table. As a result, there will not be a possibility of the groundwater table to drawdown, ultimately meaning no interference with local water supply wells should occur. Additionally, due to the primary water supply deriving from bedrock there is a considerable reduction in the potential for the local groundwater to experience impacts from the proposed aggregate extraction.

4.1.4.1:
"The establishment of a mineral aggregate operation within the lands identified as Mineral Aggregate Reserve shall require an amendment to the Official Plan."

The subject lands are located on lands that contain Mineral Aggregate Reserve (**Figure 7**). Additionally, the ARIP mapping of the Subject Lands identifies the site within a Selected Sand and Gravel Resource Area of primary significance and resources of tertiary significance. An amendment to the Official Plan is being submitted to permit the proposed pit.

Given the Mineral Aggregate Reserve mapping of part of the site, there had been prior consideration given to the OP to utilize the subject site to establish a new extractive operation. Although the OP's planning policy provisions serve as a means to identify and protect the subject sand and gravel resource from incompatible development that may preclude or hinder a future aggregate use, the most secure method by which to ensure the availability of the resource is to obtain its licensing under the ARA. For the proposed Highland Line Pit, an application to amend the Township OP is also being submitted.

4.1.6.1:
Progressive rehabilitation of extraction sites to accommodate subsequent land uses is a requirement of this plan. Where extraction is ongoing, rehabilitation is to be carried out on a progressive basis and shall be in accordance with the approved rehabilitation plan submitted to the Ministry of Natural Resources as part of the site plan for licensing purposes.

Rehabilitation will be carried out on a progressive basis and will be in accordance with the Rehabilitation Plan included with the ARA Site Plans.

6.7.2.1 Noise and vibration impacts shall be addressed for new sensitive land uses adjacent to existing railway lines, highways, sewage treatment facilities, waste management sites, industries, or aggregate extraction operations, or other stationary or line sources where noise and vibration may be generated. Council may require the proponent to undertake noise and/or vibration studies to assess the impact on existing or proposed sensitive land uses within minimum distances identified in

Ministry of Environment guidelines including Publication LU – 131, Noise Assessment Criteria in Land Use Planning. Noise and/or vibration attenuation measures will be implemented, as required, to reduce impacts to acceptable levels.

An Acoustic Assessment has addressed the requirements set out by the ARA and the Township OP. Final recommendations as to how the proposed Highland Line Pit should conduct its operation to ensure noise impacts on the area and surrounding environment are minimized are included on the Operations Plan of the ARA site Plans. Vibration is not an impact that occurs at sand and gravel operations.

The Acoustic Assessment concludes that by implementing their recommended mitigation techniques outlined in the report, all noise impacts which are a result of the proposed Highland Line Pit will adhere to the MECP Environmental Noise Guidelines. Mitigation measures include noise barriers and berms, and restrictions on operating equipment and trucking.

8.4.6.1 Potential negative impacts will be examined through a process of Environmental Impact Statement, carried out on a case by case basis, prior to development approval.

8.4.6.2 The preparation of an Environmental Impact Statement (EIS) study may be required for submission prior to the approval authority making a formal decision on a planning application (e.g. Official Plan amendment, zoning amendment, site plan control, subdivision, consent, etc.) to assess the negative impacts on the natural features and the ecological functions of the area in question. The EIS shall be completed by a qualified individual or company and shall fulfill each of the following steps…

The Natural Environment Report (NER) completed by WSP Golder for the proposal has been prepared to address the Township requirement of an EIS as well as the Aggregate Resources Act technical reporting standards. The report concluded that the proposed pit would have no negative impacts to the significant wildlife features and functions on the Site or in the Study Area.

To conclude, the proposed Highland Line Pit conforms to the Township of Lanark Highlands Official Plan.

See **Appendix B** for a copy of the draft Township of Lanark Highlands Official Plan Amendment and Schedule.

3.4 Township of Lanark Highlands Zoning By-Law No. 2003-451

The site falls under two zoning categories in the Township of Lanark Highlands Zoning By-Law (ZBL) No. 2003-451: Mineral Aggregate Reserve (MAR-h) and Rural (RU) (**Figure 8**).

The h-suffix attached to the MAR Zone identifies it as a 'holding' zone. Section 5.5 of the ZBL states the intent of a 'holding' symbol is to signify Council's approval in principle to future development of the land for the purposes indicated by the zone preceding the symbol, which in the subject case is MAR or Mineral Aggregate Reserve.

Neither the RU nor MAR zone categories permit the operation of a pit use. Accordingly, a Zoning By-law Amendment (ZBA) is being submitted, concurrent with the County and Township OPA applications, to amend the zoning from RU/MAR-h to Mineral Aggregate Resources Pit (MXP), in which zone a pit is a permitted use.

Section 4.28: Pits and Quarries
"The making or establishment of pits and quarries within the Municipality is prohibited unless within a Mineral Aggregate Resource MXP or MXQ Zone or is a wayside pit or a wayside quarry as approved by the public body having jurisdiction."

A zoning by-law amendment to an MXP Zone is being submitted to permit the proposed pit.

Section 4.32.3: Special Setbacks, Minimum Distance Separation and Influence Areas
"*the minimum setback distances for pits and quarries from property lines shall be as set out in the Aggregate Resources Act".*

This provision recognizes that extraction setbacks are outlined on the site plan approved under the Aggregate Resources Act and that the site plan prevails to the extent of any conflicts with a municipal by-law.

See **Appendix C** for a copy of the draft Township of Lanark Highlands Zoning By-law Amendment.

4.0

AGGREGATE RESOURCES ACT SUMMARY STATEMENT

Thomas Cavanagh Construction Limited ("Cavanagh") has submitted an application for a Class 'A' Licence under the Aggregate Resources Act (ARA) to be operated below the water table ("proposed Highland Line Pit"). The area to be licensed under the ARA is 50.6 hectares (125 acres) and the proposed extraction area is 35.1 hectares (86.7 acres).

The proposed maximum annual tonnage for the pit will be 1,000,000 tonnes.

4.1 Agricultural Classification of the Proposed Site – Standard 1.1

According to the Canada Land Inventory (CLI) soil capability mapping, the proposed Highland Line Pit is mapped as Class 7 soil with nearby land being Class 5 and Organic (**Figure 4**). The subject lands are therefore not considered prime agricultural land nor are they designated prime agricultural area in the County and Township Official Plans.

4.2 Applicable Planning and Land Use Considerations – Standard 1.2

The proposed Highland Line Pit is designated Rural Area within the Lanark County Sustainable Communities Official Plan (**Figure 5**), as Rural Communities in the Township of Lanark Highlands Official Plan (**Figure 6**), and zoned Rural (RU) and Mineral Aggregate Reserve Hold (MAR-h) in the Township of Lanark Highlands Zoning By-law 2004-451 (**Figure 8**). In order to permit the proposed Highland Line Pit, amendments are required to the County and Township Official Plans, and the Zoning By-law.

The lands which surround the subject lands have varying zones including Rural (RU), Limited Services Rural (LSR), Mineral Aggregate Resources Pit (MXP), and Mineral Aggregate Resources Reserve (MAR).

There are no specific provincial or Crown land plans/policies that apply to the subject lands.

The approval of the proposed Highland Line Pit represents good planning and is consistent with the Provincial Policy Statement, 2020, and conforms to the County of Lanark Sustainable Communities Official Plan (SCOP) and to the Township of Lanark Highlands Official Plan. See Sections 2.0 and 3.0 of this Report for a detailed assessment of planning and land use considerations.

4.3 Source Protection Area Considerations – Standard 1.3

The proposed pit falls outside the mapped Wellhead Protection Areas within the Mississippi-Rideau Source Protection Plan. As confirmed in the Water Report, impacts to groundwater quality or quantity at the water supply wells, where Wellhead Protection Areas have been established, as a result of the proposed pit are not predicted.

The site is located within a Significant Groundwater Recharge Area. According to the Level 1 &2 Water Report completed by WSP Golder, groundwater recharge will still occur as the proposed pit will not be dewatered, and infiltration will occur through the overburden or through the bottom and sides of the pit lake.

4.4 Quality and Quantity of Aggregate On-site– Standard 1.4

Provincial Aggregate Resources Inventory Paper (ARIP) mapping and the Township of Lanark Highlands Official Plan identifies the location of the proposed Arnott Pit as being a known deposit of sand and gravel resources. A large portion of the site is mapped by the ARIP as Selected Sand and Gravel Resource Area #3 ('Primary Significance'). This has been verified by site specific subsurface investigation carried out by Cavanagh and Golder. Material in this deposit is capable of producing Granular A, Granular B and SSM products, and contains relatively good stone quality.

The subject lands are estimated to contain at least two million tonnes of high quality sand and gravel resources. These resources will be used for concrete and asphalt sand, Granular A, Granular B, and SSM aggregate product.

4.5 Main Haulage Routes – Standard 1.5

Trucks will primarily travel east on Highland Line which is an existing haul route for other nearby aggregate operations. Limited trucks may travel west on Highland Line but only for local deliveries. From Highland Line, trucks will then primarily travel east on County Road 12.

Based on the Traffic Impact Study, it is estimated that under worst case conditions 30 trucks will leave the site on an hourly basis. This is an absolute worst-case maximum traffic scenario which is permitted by the noise study. It is more likely that the traffic generated from this pit will be significantly lower.

Four entrances are proposed onto Highland Line. The Traffic Impact Study assessed the location of the proposed entrances and provided recommendations on turning movements and restrictions. Access permits will be obtained from the Township as the applicable road authority.

4.6 Progressive and Final Rehabilitation – Standard 1.6

Rehabilitation of the site will be progressive, and the site will be rehabilitated to natural features in the form of a lake with shallow littoral zones located in areas having shallower slopes, as proposed in the Rehabilitation Plan of the site plan. Currently, the site is in an agricultural condition and contains wooded areas. The surrounding land uses are utilized for extractive, natural heritage, agricultural, and rural residential uses. The proposed rehabilitation plan is suitable and compatible with adjacent current and anticipated future land uses.

During progressive and final rehabilitation, above water slopes will be seeded with a mix of bunch and spreading grasses and forbs consisting of non-invasive species to prevent erosion. Final rehabilitation will also include the creation of shallow littoral zones at select locations to create more diverse aquatic habitat. Shallow emergent marsh vegetation will be planted in water +/- 0.15 metres deep and extend +/-5 metres from the shore and will be interspersed with cover structures (e.g., boulders and root wads). In addition, basking logs, woody debris and nesting platforms will be installed for wildlife habitat, such as turtles, waterfowl and fish. The final details of the rehabilitation planting program will be established in consultation with MNRF prior to final rehabilitation to ensure that the plan is appropriate for conditions at that time.

5.0
CONCLUSIONS

The proposed Highland Line Pit contains at least 2 million tonnes of high quality sand and gravel resources suitable for use in road based granular construction materials as well as aggregate used for the manufacture of asphalt and concrete. The aggregate resources extracted from the site will be utilized to supply material for Cavanagh's nearby construction projects.

The Highland Line Pit operation has been designed in a manner which minimizes social, economic and environmental impacts. The proposed pit will provide for a continued supply of quality aggregate material from a known and provincially and locally identified aggregate resource.

Further, the proposed pit has been designed to ensure no negative impacts on surrounding natural heritage features.

The proposed Highland Line Pit represents the wise use and management of significant aggregate resources and is in the public interest in consideration of the economic, social and environmental factors that apply to this application, and:

- Is consistent with the Provincial Policy Statement;
- Conforms to the Lanark County Sustainable Communities Official Plan;
- Conforms to the Township of Lanark Highlands Official Plan; and
- Includes information required by the Aggregate Resources Act.

Submitted by:

Neal DeRuyter, BES, MCIP,RPP

Dawson Mckenzie, MSc.

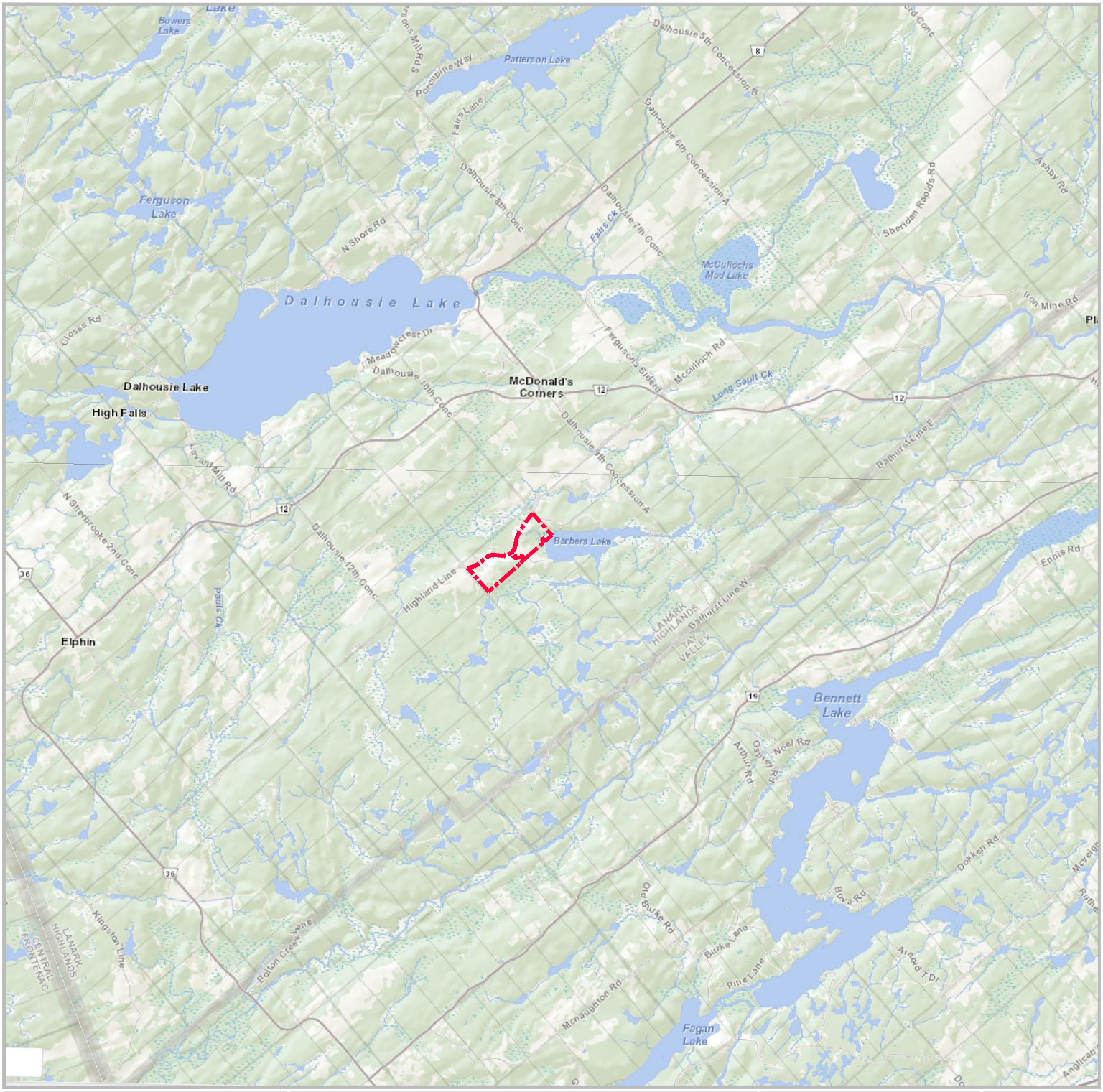

Figure 1

Location Map

LEGEND

Subject Lands

DATE: November 2022

SCALE: NTS

FILE: 0851E

DRAWN: DGS

north

K:\0851E-THOMAS CAVANAUGH CONSTRUCTION-HIGHLAND LINE\RPT\LOCATION MAP.DWG

Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

Base Map Source:
agMaps online mapping service ©Queen's Printer for Ontario 2022

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200-540 BINGEMANS CENTRE DR. KITCHENER, ON, N2B 3X9
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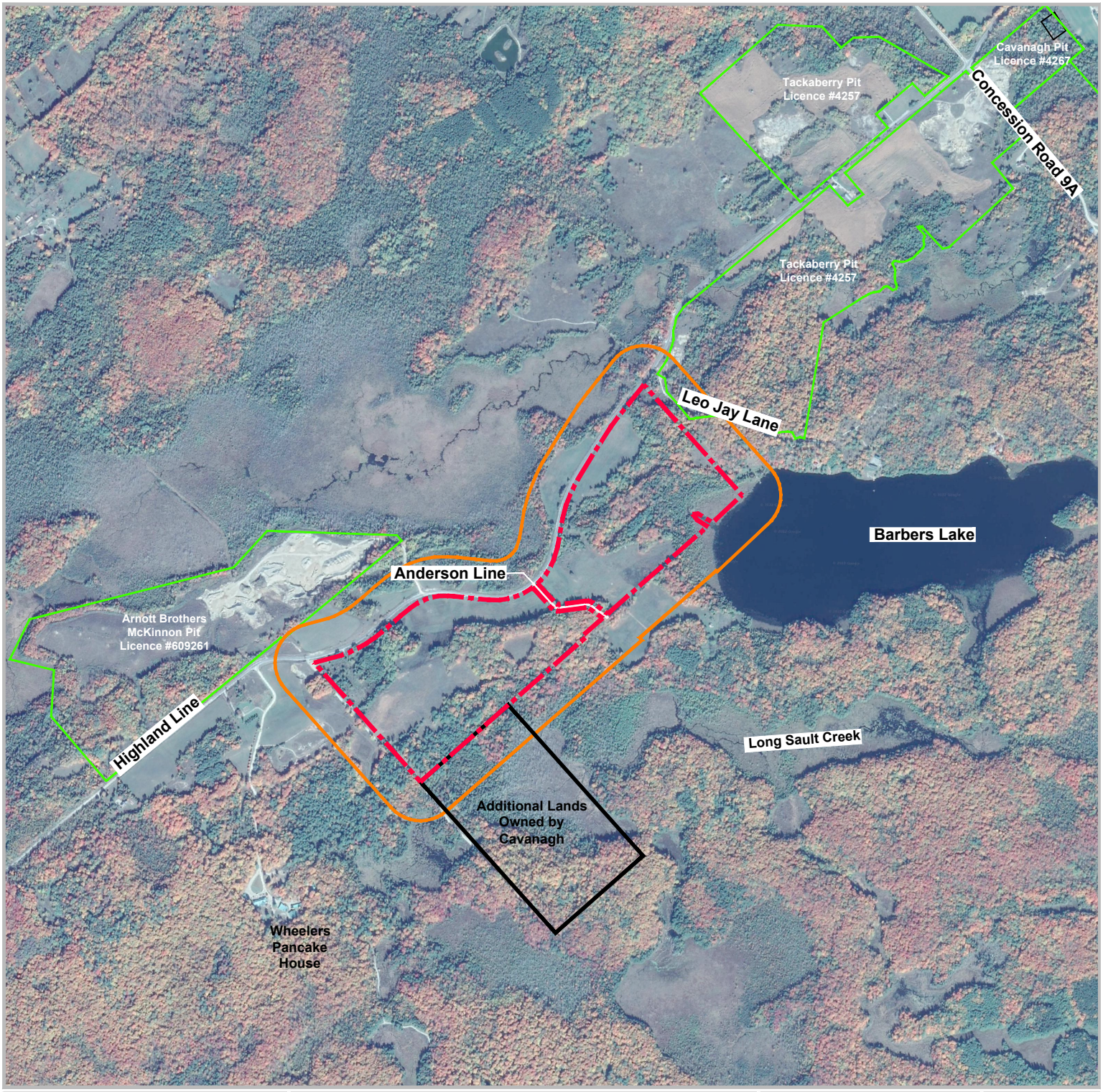

Figure 2

Imagery Map

LEGEND

Subject Lands

120m from Subject Lands

DATE: November 2022

SCALE: NTS

FILE: 0851E

DRAWN: DGS

north

K:\0851E-THOMAS CAVANAUGH CONSTRUCTION-HIGHLAND LINE\RPT\IMAGERY MAP.DWG

Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

Base Map Source:
Google Imagery 2019

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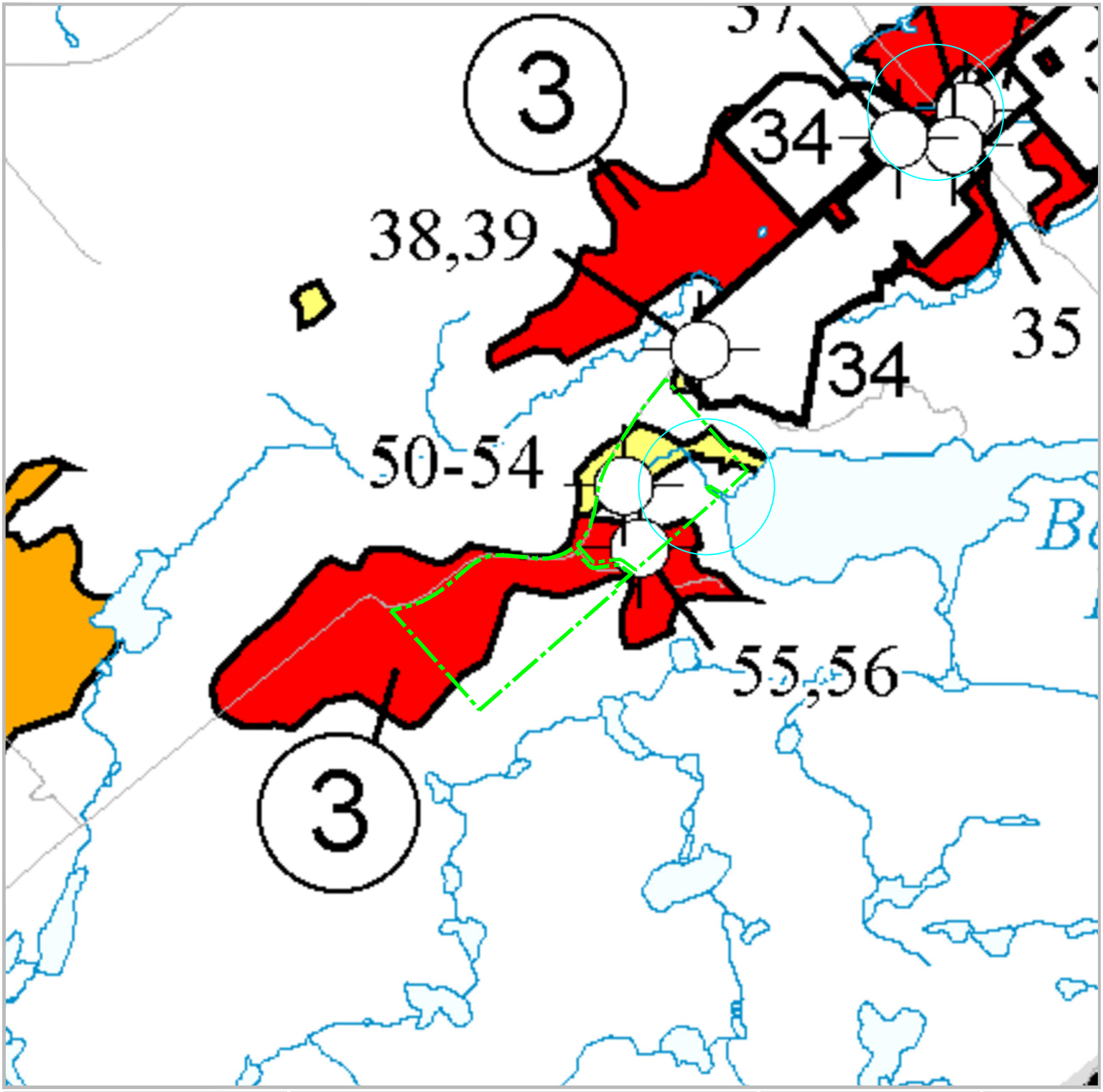

Figure 3

County of Lanark Aggregate Resources Inventory Paper 189

Sand and Gravel Resources

Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

LEGEND

Subject Lands

- Selected Sand and Gravel Resource Area, primary significance; deposit number (*see* Table 3)
- Selected sand and gravel resource area, secondary significance
- Sand and gravel deposit, tertiary significance
- Other surficial deposits or exposed bedrock
- 1 — Licenced property boundary; property number (*see* Table 2)
- 18 — Unlicenced sand or gravel pit (i.e., abandoned pit or wayside pit operating on demand under authority of a permit); property number (*see* Table 2)
- 30 — Borehole location; identification number (*see* Table 7)

Base Map Source:
Ontario Geological Survey, Aggregate Resource Inventory Paper 189, Map 1 Sand and Gravel Resources for the County of Lanark

DATE: November 2022

SCALE: 1:20,000

FILE: 0851E

DRAWN: DGS

north

K:\0851E-THOMAS CAVANAUGH CONSTRUCTION-HIGHLAND LINE\RPT\ARIP MAP.DWG

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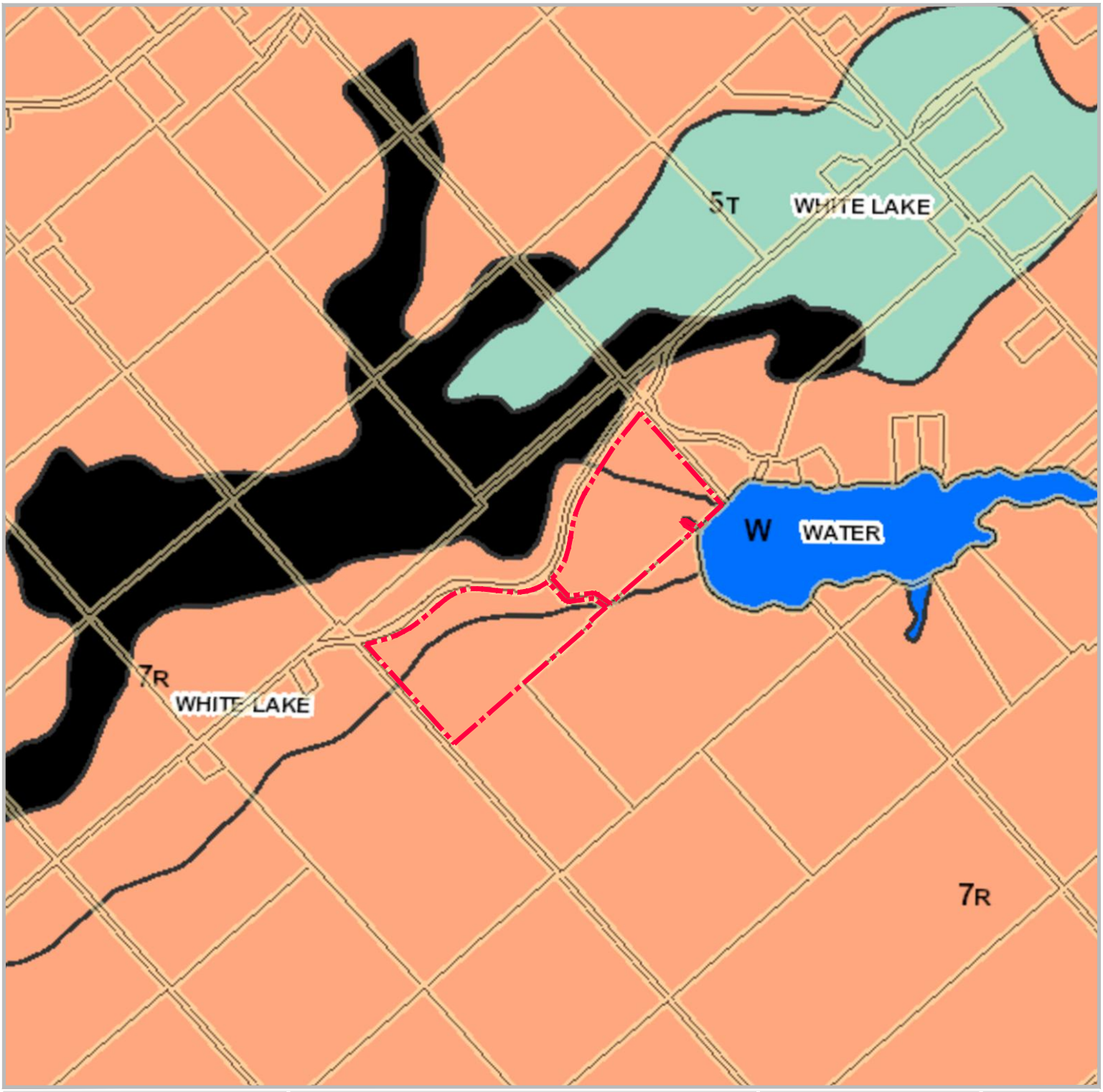

Figure 4

Soil Capability for Agriculture

LEGEND

Subject Lands

Soil Capability for Agriculture

Class 5

Class 7

Organic Soil

White Lake — Soil Name Label

Base Map Source:
Ontario Ministry of Agriculture, Food and Rural Affairs AgMaps Interactive mapping
© Queen's Printer for Ontario 2022

DATE: November 2022

SCALE: 1:20,000

FILE: 0851E

DRAWN: DGS

north

K:\0851E-THOMAS CAVANAUGH CONSTRUCTION-HIGHLAND LINE\RPT\SOIL CAPABILITY FOR AGRICULTURE.DWG

Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

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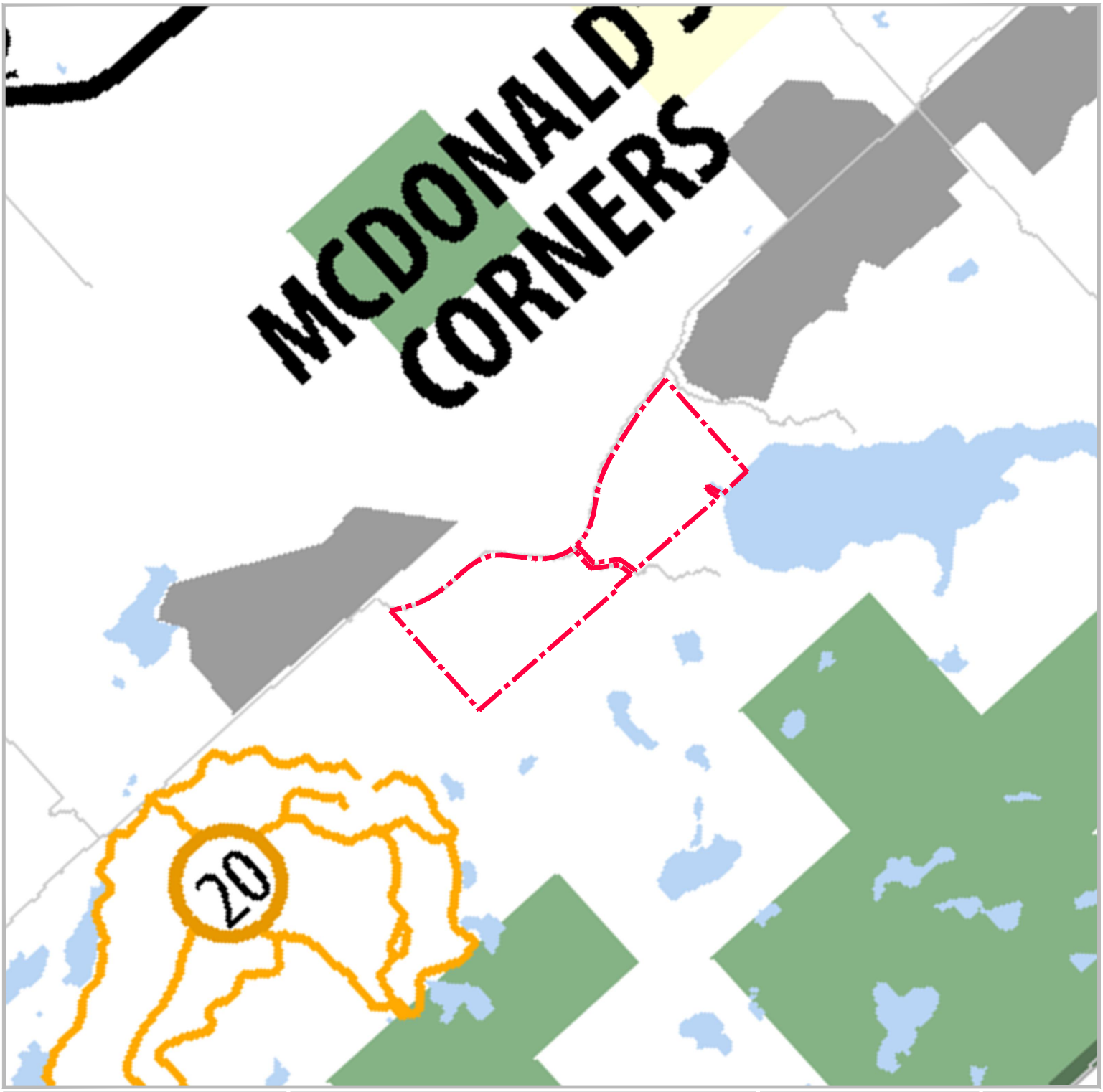

Figure 5

County of Lanark Sustainable Communities Official Plan

Schedule A

Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

LEGEND

Subject Lands

SETTLEMENT AREAS
LICENSED AGGREGATE EXTRACTION OPERATION
WATER BODIES & COURSES
SIGNIFICANT WOODLANDS
PUBLIC ACCESS TRAIL ON PRIVATE PROPERTY
20 WHEELER'S SUGAR CAMP TRAILS

Base Map Source:
County of Lanark Sustainable Communities Official Plan,
Schedule A Land Use Designations (April 16, 2013)

DATE: November 2022

SCALE: 1:20,000

FILE: 0851E

DRAWN: DGS

north

K:\0851E-THOMAS CAVANAUGH CONSTRUCTION-HIGHLAND LINE\RPT\COUNTY OP LAND USE.DWG

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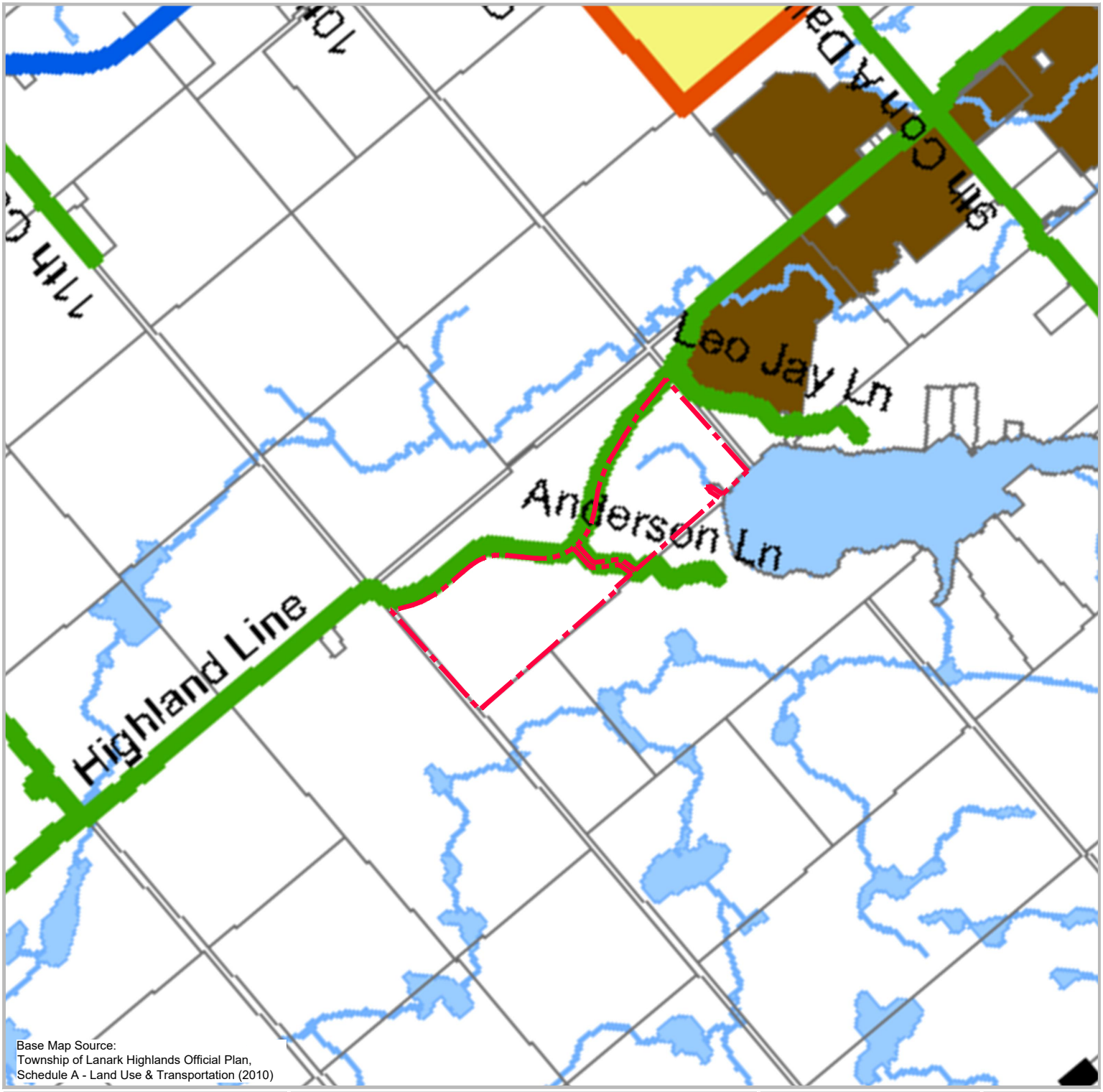

Figure 6

Township of Lanark Highlands Official Plan

Schedule A
Land Use and
Transportation

Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

LEGEND

Subject Lands

- Village Communities
- Rural Communities
- Pit
- County Road (ROW 26 metres)
- Municipal Road (ROW 20 metres)

DATE: November 2022

SCALE: 1:20,000

FILE: 0851E

DRAWN: DGS

north

K:\0851E-THOMAS CAVANAUGH CONSTRUCTION-HIGHLAND LINE\RPT\TOWNSHIP OP LAND USE.DWG

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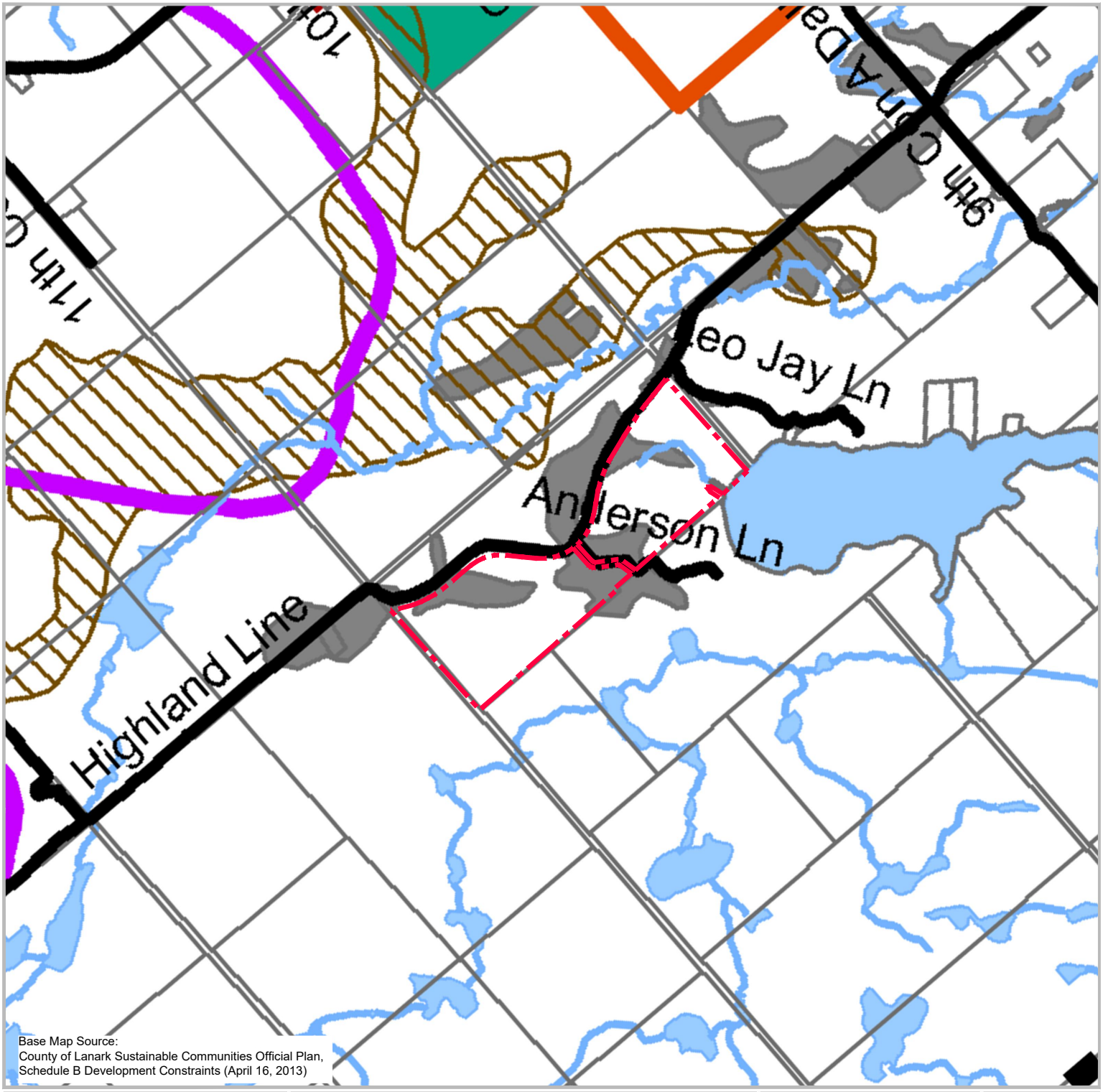

Figure 7

Township of Lanark Highlands Official Plan

Schedule B
Development Constraints

Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

LEGEND

- Subject Lands
- Mineral Aggregate Reserve
- Waste Disposal Site
- Organic Soil
- Deer Yard
- Water Courses
- Hamlets and Villages

DATE: November 2022

SCALE: 1:20,000

FILE: 0851E

DRAWN: DGS

north

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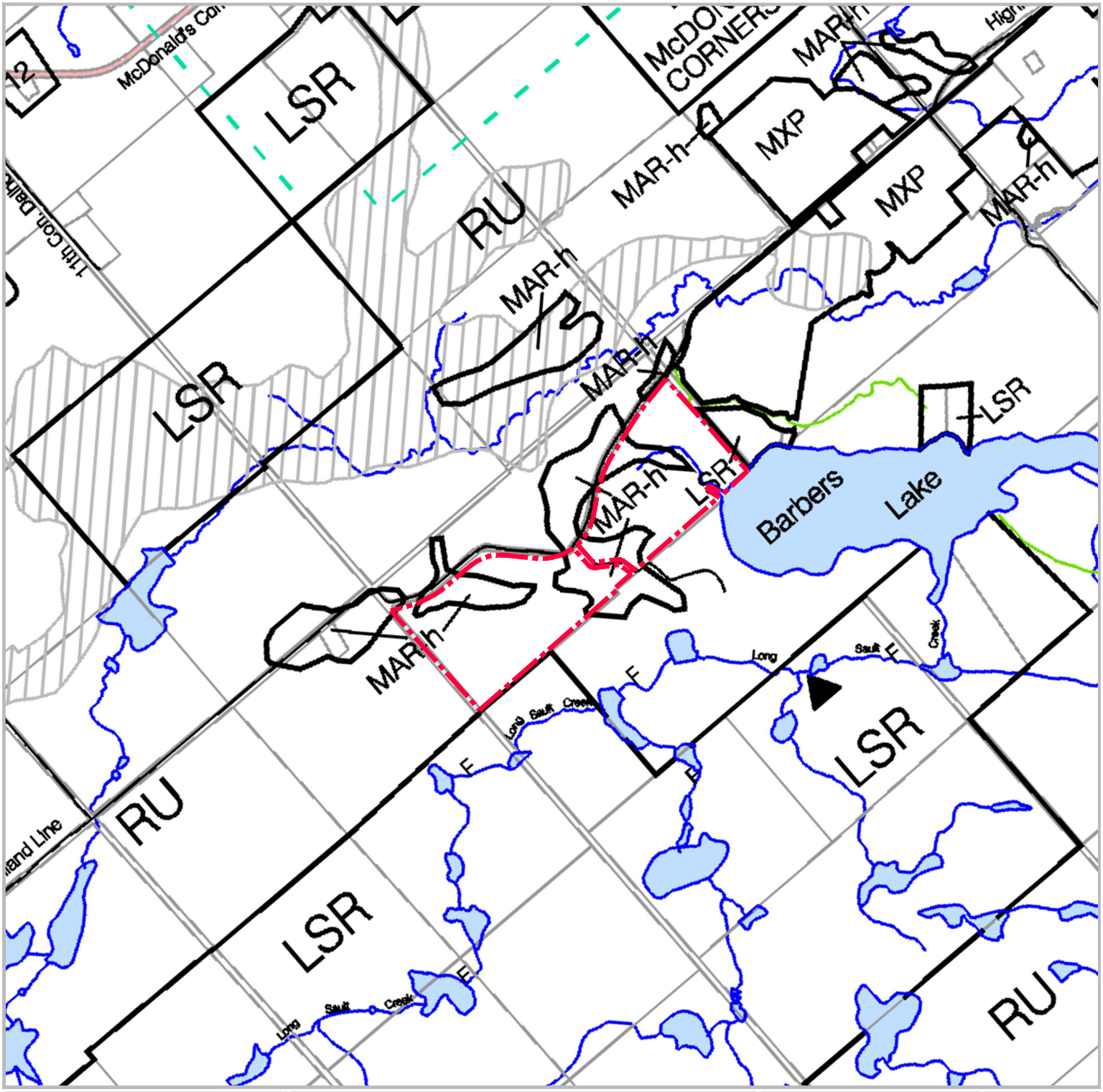

Figure 8

Township of Lanark Highlands Zoning By-law 2003-451

Schedule 'A2'

LEGEND

Subject Lands

Rural	RU
Limited Services Rural	LSR
Mineral Aggregate Resources Pit	MXP
Mineral Aggregate Resources Reserve	MAR
Organic Soils	
Bird Nesting Sites	▲

DATE: November 2022

SCALE: 1:20,000

north

FILE: 0851E

DRAWN: DGS

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Thomas Cavanagh Construction Limited
Part of Lot 5, Concession 10
(Geographic Township of Dalhousie)
Township of Lanark Highlands
County of Lanark

Base Map Source:
Township of Lanark Highlands Zoning By-law 2003-451, Schedule 'A2' (Oct.28, 2003)

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APPENDIX A: Curriculum Vitae

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& LANDSCAPE
ARCHITECTURE

CURRICULUM**VITAE**

Neal DeRuyter, BES, MCIP, RPP

EDUCATION

2008
Bachelor of Environmental Studies
Honours Planning (Co-op)
University of Waterloo

Neal DeRuyter, a Partner with MHBC, joined the firm in 2009 after graduating from the University of Waterloo in the Honours Planning Co-op program. Mr. DeRuyter has worked as a Planner in the private and public sectors with experience in aggregate resource, development and municipal planning.

Mr. DeRuyter has processed and managed several development applications including zoning by-law amendments, official plan amendments, and licence and site plan applications under the Aggregate Resources Act. He is certified by the Ministry of Natural Resources & Forestry to prepare site plans under the Aggregate Resources Act. He is a Registered Professional Planner and is a member of the Canadian Institute of Planners. He has provided expert evidence before the Ontario Municipal Board and Local Planning Appeal Tribunal.

He has participated and authored several research studies and articles related to aggregate resource management. Mr. DeRuyter has presented on several occasions for various events at the School of Planning at the University of Waterloo. Mr. DeRuyter is a member of the Pragma Council at the University of Waterloo.

PROFESSIONAL HISTORY

2017- Present	Partner MacNaughton Hermsen Britton Clarkson Planning Limited
2013- 2017	Associate, MacNaughton Hermsen Britton Clarkson Planning Limited
2009- 2013	Planner, MacNaughton Hermsen Britton Clarkson Planning Limited

PROFESSIONAL ASSOCIATIONS

Full Member, Ontario Professional Planners Institute
Full Member, Canadian Institute of Planners

CONTACT

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CURRICULUM**VITAE**

Neal DeRuyter, BES, MCIP, RPP

PROFESSIONAL SERVICE

2014-Present	Member, University of Waterloo PRAGMA Council
2012-Present	Member, Ontario Expropriation Association
2015-Present	Member, Eastern Ontario Committee, Ontario Stone, Sand & Gravel Association

PUBLICATIONS

- 'Future Aggregate Availability and Alternatives Analysis, State of the Aggregate Resource in Ontario Study, 2009' (MNR)
- 'The Future of Ontario's Close to Market Aggregate Supply: The 2015 Provincial Plan Review' (OSSGA, 2015)
- Agricultural Impact Assessment and Rehabilitation Plan Guidelines for Aggregate Extraction, 2016 (OMAFRA)

SELECTED PROJECT EXPERIENCE

- Research, preparation and coordination of reports / applications under the Planning Act, Niagara Escarpment Planning and Development Act and Aggregate Resources Act.
- Project management services for development applications.
- Conduct notification and consultation processes under the Aggregate Resources Act.
- Due diligence and property overview reports for prospective aggregate sites.
- Aggregate Resources Act site plan amendments.
- Planning assessment for commercial, residential, agricultural and industrial developments.

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CURRICULUM**VITAE**

Neal DeRuyter, BES, MCIP, RPP

- Planning assessment for proposed urban use requests in Niagara Escarpment Plan through 2015-2017 Review.
- Research and preparation of reports / evidence for hearings before the Ontario Municipal Board / Local Planning Appeal Tribunal.
- Planning research and assessment for expropriation matters on behalf of public and private sector clients.

SELECTED PROJECT EXAMPLES

- AAROC Aggregates Bardoel Pit, Township of Southwest Oxford
- Badger Daylighting Pits, Township of Puslinch and City of Ottawa
- Bell Sand Farms Grose Pit Extension, Perth County
- Brock University, Niagara Escarpment Plan Lands, City of St. Catharines
- CBM Ayr Pit Site Plan Amendment, Township of North Dumfries
- CBM Bromberg Pit, Township of North Dumfries
- CBM Dorchester Pit, Municipality of Thames Centre
- CBM Eramosa Pit Extension, Township of Centre Wellington
- CBM Lake Pit, Township of Puslinch
- CBM Lanci Pit Expansion, Township of Puslinch
- Caledon Sand & Gravel Site Plan and Licence Amendments, Town of Caledon
- Capital Paving Shantz Station Pit, Township of Woolwich
- City of Kingston, Barriefield Affordable Housing Feasibility Study
- Gallo Contracting Industrial Use, Township of Puslinch
- Graham Brothers Caledon Pit Site Plan Amendment and NEP Amendment, Town of Caledon
- Halton Crushed Stone Erin Pit Extension, Town of Erin
- James Dick Construction Ltd. Adjala Pit Extension, Township of Adjala-Tosorontio
- James Dick Construction Ltd. Erin Pit Extension, Town of Caledon
- James Dick Construction Ltd. Gamebridge Quarry Site Plan Amendment, Township of Ramara
- James Dick Construction Ltd. Reid Road Quarry, Town of Milton
- Kaneff Properties, Royal Niagara Golf Club, City of St. Catharines
- Kieswetter Excavating Heidelberg Pit Site Plan Amendment, Township of Wilmot

CONTACT

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ARCHITECTURE

CURRICULUM**VITAE**

Neal DeRuyter, BES, MCIP, RPP

- KPM Brantford Plant Expansion, Brant County
- Lillycrop Highway 6 Expropriation, Township of Puslinch
- Limehouse Clay Products Ltd. Site Plan Amendment, Town of Halton Hills
- Ministry of Transportation, Highway 410 Expropriation, Town of Caledon
- Ontario Stone, Sand & Gravel Association, Municipal Official Plan Reviews in Ontario
- Ontario Trap Rock Quarry, Town of Bruce Mines
- Queenston Quarry Reclamation Company Redevelopment, Town of Niagara-on-the-Lake
- Ramada Beacon Hotel, Town of Lincoln
- R.W. Tomlinson Ltd. Brechin Quarry, City of Kawartha Lakes
- R.W. Tomlinson Ltd. Brickyards Quarry, City of Ottawa
- R.W. Tomlinson Ltd. Moodie Quarry Expansion, City of Ottawa
- R.W. Tomlinson Ltd. Moore Quarry, City of Ottawa
- R.W. Tomlinson Ltd. Napanee Asphalt Plant, Town of Greater Napanee
- R.W. Tomlinson Ltd. Reids Mills Pit, City of Ottawa
- R.W. Tomlinson Ltd. Rideau 1 Quarry Extension, City of Ottawa
- R.W. Tomlinson Ltd. Stittsville Quarry, City of Ottawa
- R.W. Tomlinson Ltd. Storyland Pit, Renfrew County
- R.W. Tomlinson Ltd. Ready-Mix Site Plan Approval, City of Ottawa
- Thomas Cavanagh Construction Almonte Quarry Extension, City of Ottawa
- Thomas Cavanagh Construction Arnott Pit, Lanark County
- Thomas Cavanagh Construction Highland Line Pit, Lanark County
- Township of Guelph-Eramosa, Review of Tri-City Spencer Pit
- Township of West Lincoln, Preliminary Bedrock Resource Assessment in Smithville
- Walker Aggregates Inc. Amherstburg Quarry and McGregor Quarry, Town of Amherstburg

PRESENTATIONS

- "Planning as a Profession" – Faculty of Environment Open House at the University of Waterloo, March 2013
- "Rehabilitation of Licensed Pits and Quarries" – Canadian Association of Certified Planning Technicians Professional Development Conference, October 21, 2011
- Professional Practice, Public and Private Administration (PLAN 403), University of Waterloo, January 2010

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ARCHITECTURE

CURRICULUM**VITAE**

Neal DeRuyter, BES, MCIP, RPP

ARTICLES

- "Planning for a sustainable community" – Avenues Magazine (Ontario Stone, Sand & Gravel Association), Volume 1, Issue 2, 2011
- "The closer the better" – Avenues Magazine (Ontario Stone, Sand & Gravel Association), Volume 2, Issue 2, 2012
- "Diminishing supply" - Avenues Magazine (Ontario Stone, Sand & Gravel Association), Volume 3, Issue 1, 2013
- "Shipping aggregate from further afield" – Avenues Magazine (Ontario Stone, Sand & Gravel Association), Volume 3, Issue 2, 2013
- "The feasibility of alternative transportation options" – Avenues Magazine (Ontario Stone, Sand & Gravel Association), Volume 4, Issue 1, 2014
- "Keeping residents safe and dry" – Avenues Magazine (Ontario Stone, Sand & Gravel Association), Volume 4, Issue 2, 2014

CONTACT

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nderuyter@mhbcplan.com
www.mhbcplan.com

CURRICULUM**VITAE**

Dawson McKenzie, BA, MSc (Candidate)

Dawson McKenzie joined MHBC as a Planner in 2021. Prior to joining MHBC, Mr. McKenzie worked as a researcher at the University of Guelph and as a Research Associate in the private sector. Mr. McKenzie provides a range of planning services to municipal and private sector clients including land use planning advice, policy review, preparation of planning justification reports, as well as obtaining development approvals for a range of development applications

EDUCATION

2015 - 2019
Bachelor of Arts, Honours
Princeton University

2020 - Present
Masters of Science (Planning)
University of Guelph

PROFESSIONAL ASSOCIATIONS

Student Member, Canadian Institute of Planners (CIP)
Student Member, Ontario Professional Planners Institute (OPPI)

PROFESSIONAL HISTORY

2021 - Present	Planner, MacNaughton Hermsen Britton Clarkson Planning Limited
2020 - 2021	Research Assistant, University of Guelph
2019 - 2021	Research Associate, Wilton Consulting Group

CONTACT

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APPENDIX B: Draft County of Lanark Sustainable Communities Official Plan Amendment

Official Plan Amendment No. ___

To the Lanark County Sustainable Communities Official Plan

PART A – PREAMBLE

PURPOSE AND EFFECT OF THE OFFICIAL PLAN AMENDMENT

The purpose of Official Plan Amendment No.____is to remove the "Rural" designation and replace it with a "Licensed Aggregate Extraction Operation" designation on Schedule "A" to the Lanark County Sustainable Communities Official Plan (SCOP) for land located at Part of Lot 5, Concession 10, Geographic Township of Dalhousie, now in the Township of Lanark Highlands. The land subject to this Amendment comprises approximately 50.6 hectares

The location of the land subject to this Amendment is shown on Schedule "A" to Official Plan Amendment___.

The effect of Official Plan Amendment____is to allow Thomas Cavanagh Construction Limited to operate a pit extracting sand and gravel resources below the water table (known as the Highland Line Pit).

BASIS OF THE AMENDMENT

The lands subject to the proposed Amendment contain at least 2 million tonnes of high quality sand and gravel resources. These aggregate resources have been identified in both provincial geological mapping (Aggregate Resources Inventory Paper 189) as well as municipal planning documents where they are protected from incompatible development and land uses.

The Amendment would allow for the wise use of aggregate resources in the area, and has been carefully designed to minimize social, economic, and environmental impacts. The proposed pit would utilize existing haul routes (Highland Line towards County Road 12) currently used by other aggregate licenses in the area.

Technical studies have been prepared in support of the proposed pit including a Planning Justification Report and Aggregate Resources Act Summary Statement, Water Report, Maximum Predicted Water Table Report, Natural Environment Report, Noise Impact Assessment, Transportation Impact Assessment, Archaeological Assessment and Aggregate Resources Act Site Plan. The studies have demonstrated that the proposed pit can be operated in a manner in which potential impacts are minimized on surrounding land uses as well as natural features.

The following applications have also been submitted concurrently with this proposed Amendment:

1. Township of Lanark Highlands Official Plan Amendment to add the "Mineral Aggregate Resource Policy Area – Pit" designation.
2. Township of Lanark Highlands Zoning By-law Amendment to rezone the lands to "Mineral Aggregate Resources Pit (MXP)".
3. Class A Licence under the Aggregate Resources Act (administered by the Ministry of Natural Resources and Forestry).

PART B – THE AMENDMENT

The Introductory Statement

All of this part of the document entitled Part B – The Amendment constitutes Amendment No.____ to the Lanark County Sustainable Communities Official Plan.

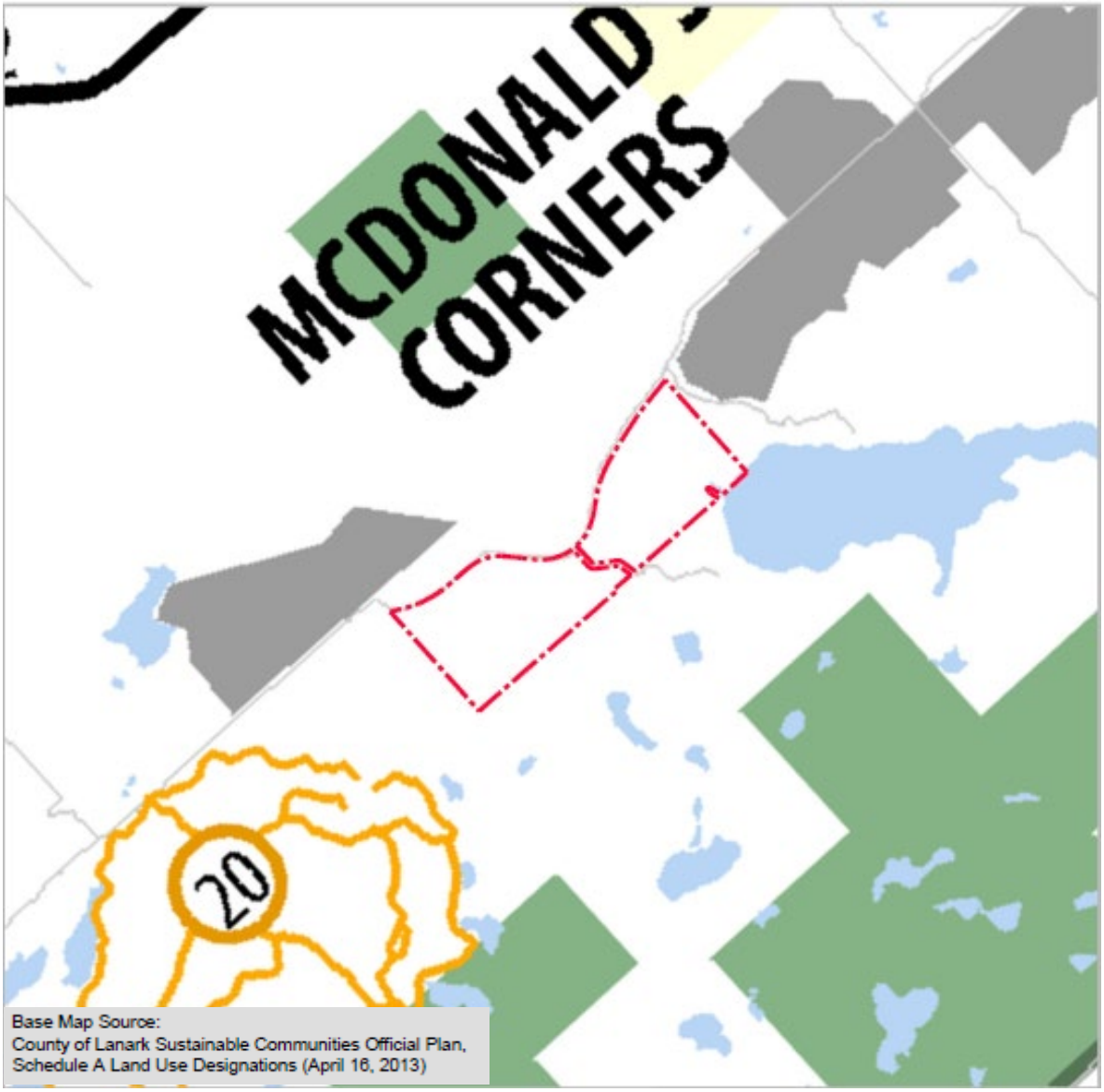
Details of the Amendment

The Lanark County Sustainable Communities Official Plan is hereby amended by amending Schedule "A" to the Official Plan by changing the designation of land described as Part of Lot 5, Concession 10, Geographic Township of Dalhousie, now in the Township of Lanark Highlands as shown on Schedule "A" to this Amendment from "Rural" to "Licensed Aggregate Extraction Operation".

LANARK COUNTY SUSTAINABLE COMMUNITIES OFFICIAL PLAN AMENDMENT NO. _____

SCHEDULE "A"

Part of Lot 5, Concession 10, Geographic Township of Dalhousie, now in the Township of Lanark Highlands



Lands to be re-designated from "Rural" to "Licensed Aggregate Extraction Operation"

APPENDIX C: Draft Township of Lanark Official Plan Amendment

Official Plan Amendment No. ___

To the Lanark Highlands Official Plan

PART A – PREAMBLE

PURPOSE AND EFFECT OF THE OFFICIAL PLAN AMENDMENT

The purpose of Official Plan Amendment No.____is to remove the "Rural Communities" designation and replace it with a "Mineral Aggregate Resource Policy Area - Pit" designation on Schedule "A" to the Lanark Highlands Official Plan for land located at Part of Lot 5, Concession 10, Geographic Township of Dalhousie, now in the Township of Lanark Highlands. The land subject to this Amendment comprises approximately 50.6 hectares.

The location of the land subject to this Amendment is shown on Schedule "A" to Official Plan Amendment___.

The effect of Official Plan Amendment____is to allow Thomas Cavanagh Construction Limited to operate a pit extracting sand and gravel resources below the water table (known as the Highland Line Pit).

BASIS OF THE AMENDMENT

The lands subject to the proposed Amendment contain at least 2 million tonnes of high quality sand and gravel resources. These aggregate resources have been identified in both provincial geological mapping (Aggregate Resources Inventory Paper 189) as well as municipal planning documents where they are protected from incompatible development and land uses.

The Amendment would allow for the wise use of aggregate resources in the area, and has been carefully designed to minimize social, economic, and environmental impacts. The proposed pit would utilize existing haul routes (Highland Line towards County Road 12) currently used by other aggregate licenses in the area.

Technical studies have been prepared in support of the proposed pit including a Planning Justification Report and Aggregate Resources Act Summary Statement, Water Report, Maximum Predicted Water Table Report, Natural Environment Report, Noise Impact Assessment, Transportation Impact Assessment, Archaeological Assessment and Aggregate Resources Act Site Plan. The studies have demonstrated that the proposed pit can be operated in a manner in which potential impacts are minimized on surrounding land uses as well as natural features.

The following applications have also been submitted concurrently with this proposed Amendment:

1. Lanark County Sustainable Communities Official Plan Amendment to add the "Licensed Aggregate Extraction Operation" designation.
2. Township of Lanark Highlands Zoning By-law Amendment to rezone the lands to "Mineral Aggregate Resources Pit (MXP)".
3. Class A Licence under the Aggregate Resources Act (administered by the Ministry of Natural Resources and Forestry).

PART B – THE AMENDMENT

The Introductory Statement

All of this part of the document entitled Part B – The Amendment constitutes Amendment No.____ to the Lanark Highlands Official Plan.

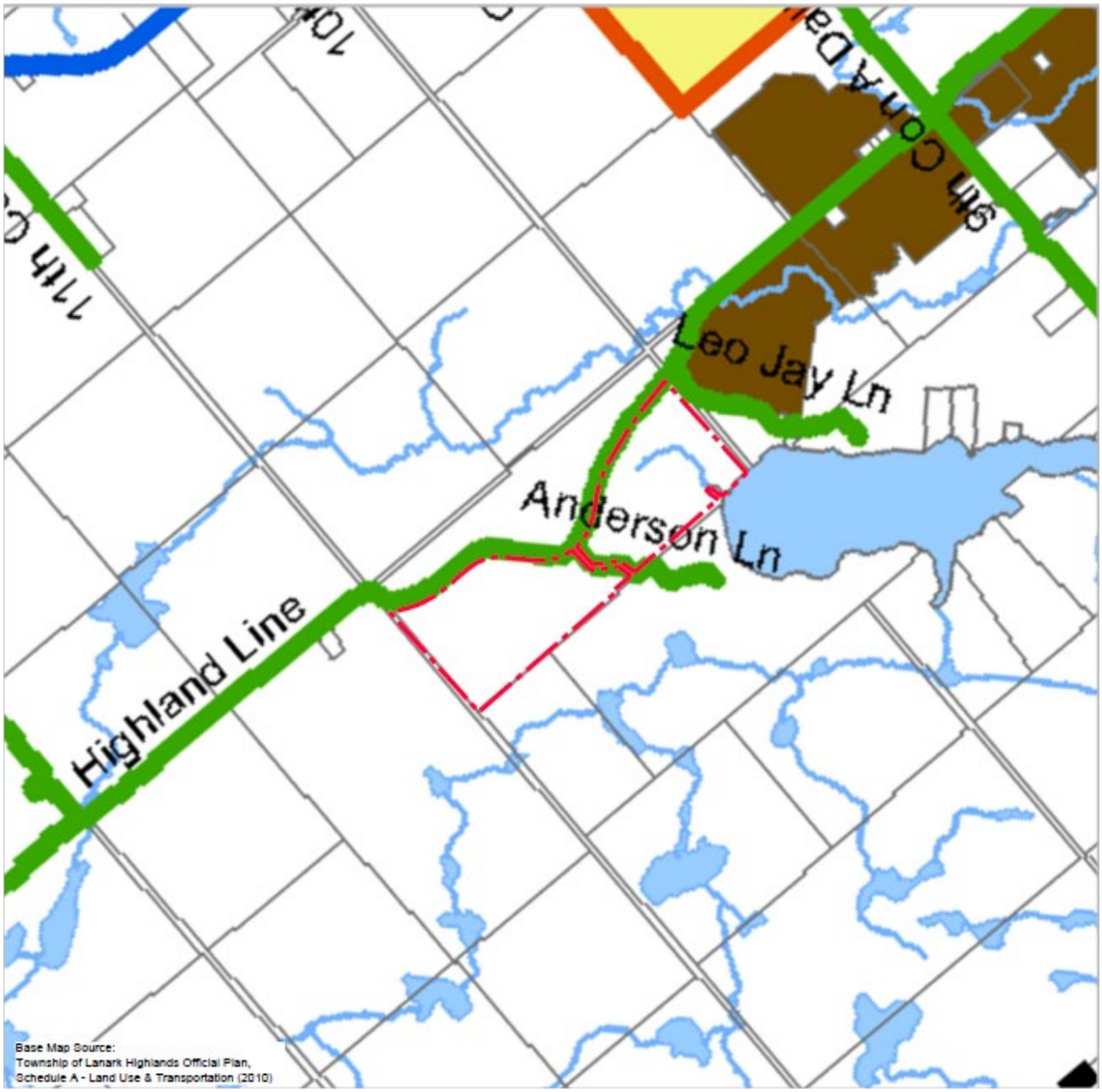
Details of the Amendment

The Lanark Highlands Official Plan is hereby amended by amending Schedule "A" to the Official Plan by changing the designation of land described as Part of Lot 5, Concession 10, Geographic Township of Dalhousie, now in the Township of Lanark Highlands as shown on Schedule "A" to this Amendment from "Rural Communities" to "Mineral Aggregate Resource Policy Area - Pit".

LANARK HIGHLANDS OFFICIAL PLAN AMENDMENT NO. _____

SCHEDULE “A”

Part of Lot 5, Concession 10, Geographic Township of Dalhousie, now in the Township of Lanark Highlands



Lands to be re-designated from "Rural Communities" to "Mineral Aggregate Resource Policy Area - Pit"

APPENDIX D: Draft Town of Lanark Zoning By-Law Amendment

THE CORPORATION OF THE
TOWNSHIP OF LANARK HIGHLANDS

BY-LAW NO._____-_____
A BY-LAW TO AMEND ZONING BY-LAW NO. 2003-451
(Highland Line Pit – File #ZA-__-__)

WHEREAS, the Planning Act, R.S.O. 1990, Chapter P. 13 Section 34 as amended, provides that the Councils of local municipalities may enact by-laws regulating the use of land and the erection, location and use of buildings and structures within the municipality;

AND WHEREAS, By-law No. 2003-451 regulates the use of land and the erection, location and use of buildings and structures within the Township of Lanark Highlands;

AND WHEREAS, the Council of the Corporation of the Township of Lanark Highlands deems it advisable to amend By-law No. 2003-451 as hereinafter set out;

AND WHEREAS, this By-law implements the policies and intentions of the Official Plan for the Township of Lanark Highlands;

NOW THEREFORE BE IT RESOLVED THAT, the Council of the Corporation of the Township of Lanark Highlands enacts as follows:

1. **GENERAL REGULATIONS**

   1.1 THAT By-Law No. 2003-451, as amended, is hereby further amended by amending the zoning on the lands legally described as Pt. Lot 5, Concession 10, former Township of Dalhousie, now in the Township of Lanark Highlands, from Mineral Aggregate Resources Reserve – Hold "MAR-h" and Rural "RU" to Mineral Aggregate Resources Pit -_____"MXP-__ " in accordance with Schedule "A" attached hereto and forming part of this By-law.

   1.2 AND THAT all applicable standards of By-law No. 2003-451 and the MXP zone shall apply to the subject property except as amended below:

      1.2.1 Minimum Yard Requirements
      Front Yard: 0 m

   1.3 AND FURTHER THAT this By-law shall come into force and effect with the passing thereof, in accordance with the Planning Act, R.S.O. 1990.

2. **EFFECTIVE DATE**

   ENACTED AND PASSED this____day of_____.

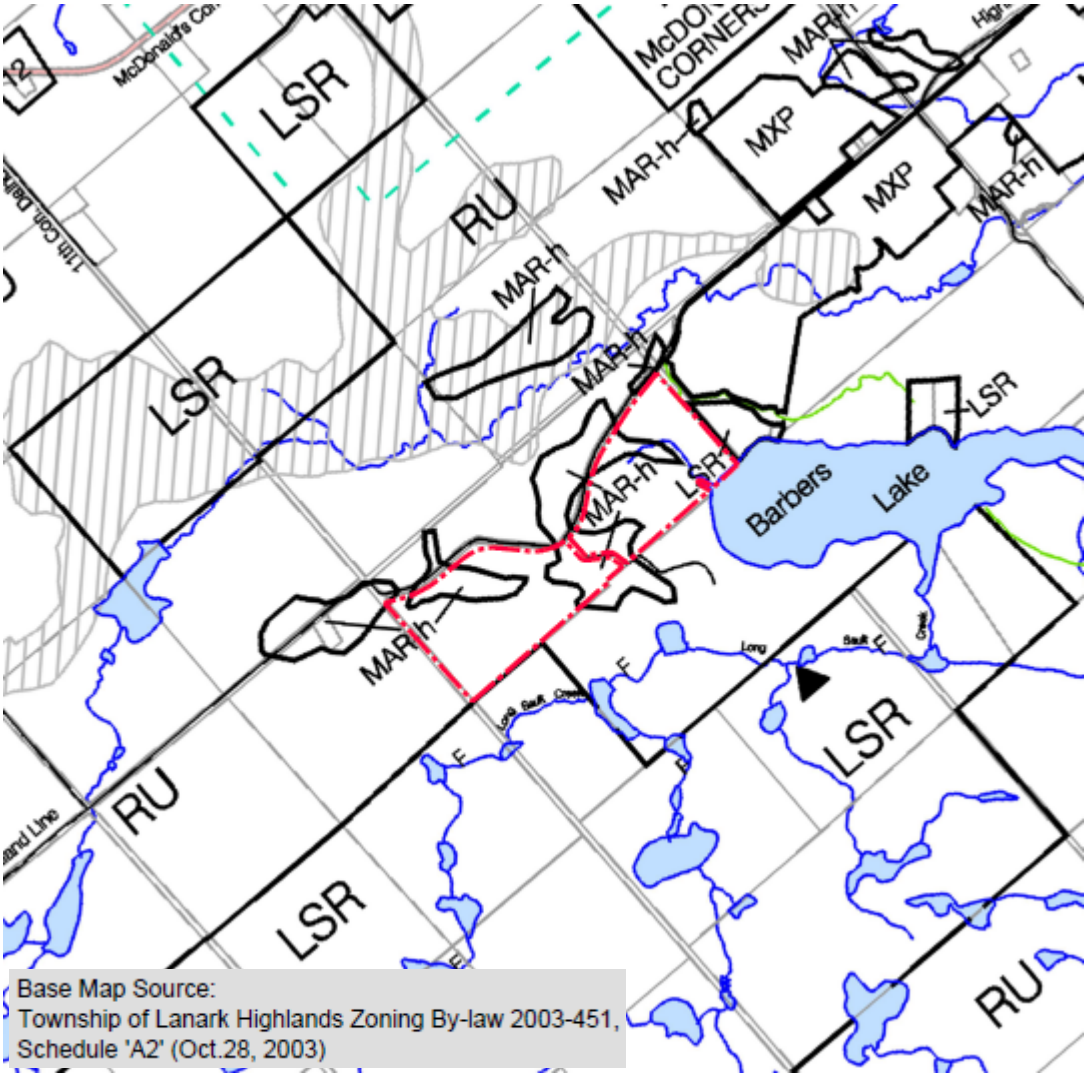
_____
Peter McLaren, Reeve

_____
Amanda Noel,
Planning Administrator, Deputy Clerk

THE CORPORATION OF THE TOWNSHIP OF LANARK HIGHLANDS
BY-LAW NO.____-_____

SCHEDULE "A"

Pt. Lot 5, Concession 10
Former Township of Dalhousie now in
the Township of Lanark Highlands



Base Map Source:
Township of Lanark Highlands Zoning By-law 2003-451,
Schedule 'A2' (Oct.28, 2003)

Lands to be re-zoned from Mineral Aggregate Resources Reserve – Hold "MAR-h" and Rural "RU" to Mineral Aggregate Resources Pit -_____"MXP-_"

To By-law No. ___-___
Geographic Township of Lanark
Township of Lanark Highlands

Area affected by this By-law
Mineral Aggregate Resources Reserve – Hold and Rural to Mineral Aggregate Resources Pit - ____

This is Schedule "A" to By-law____-____passed this____day of_____.

_____ _____

Reeve

Deputy Clerk

GOLDER
MEMBER OF WSP

ORIGINAL REPORT

Stage 4 Archaeological Mitigation

Turnbull Site (BfGd-8), Part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario

Licensee: Randy Hahn, Ph.D. (P1107)
PIF Number: P1107-0033-2020

Submitted to:

Phil White, Quality Control
Thomas Cavanagh Construction Limited
9094 Cavanagh Road
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Submitted by:

Golder Associates Ltd.
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19126620

May 14, 2021

Distribution List

1 e-copy - Thomas Cavanagh Construction Limited

1 e-copy - Ministry of Heritage, Sport, Tourism, and Culture Industries

1 e-copy - Golder Associates Ltd.

Executive Summary

The Executive Summary highlights key points from the report only; for complete information and findings, as well as the limitations, the reader should examine the complete report.

Golder Associates Ltd. (Golder) was retained by Thomas Cavanagh Construction Limited to complete a Stage 4 archaeological mitigation for the Turnbull Site (BfGd-8), located within part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario (Maps 1 and 2). The Turnbull Site was mitigated in support of an *Aggregate Resources Act* (ARA) license application for the for the proposed Highland Line Pit.

The objectives of this Stage 4 archaeological mitigation are to document the archaeological context, cultural features and artifacts for all parts of the archaeological site, to document the removal of the site, and to preserve the information about the site for future study.

The Turnbull Site (BfGd-8) was first identified during Golder's (2020) Stage 1 and 2 archaeological assessment. The site was determined to likely be the remains of the Turnbull homestead shown on the 1863 Map of Lanark County (Map 3). Golder's (2021a) Stage 3 archaeological assessment supported this interpretation, resulting in the collection of 1,534 historical artifacts dating to the mid-19th century and the identification of two cultural features.

The Stage 4 archaeological mitigation was conducted over 13 days between September 24 to November 20, 2020, under the field supervision of the licensee, Randy Hahn (P1107), with fieldwork consisting of a combination of hand excavation and mechanical topsoil removal. The hand excavation involved the excavation of 27 1-m^2 test units to expose two features identified during Golder's (2021a) Stage 3 archaeological excavation. An excavator equipped with a flat-edged bucket was then used to conduct mechanical topsoil removal for an area within a 10 m buffer around the extent of the Stage 3 excavation. This resulted in the discovery of an additional five features. The seven cultural features in total were recorded, cross sectioned and hand excavation with feature fill screened through 6 mm mesh. A total of 1,914 artifacts dating to the mid-19th century were recovered as a result of the Stage 4 excavation and topsoil removal.

Based on the results of Golder's previous assessments, the Turnbull Site (BfGd-8) was determined to have likely been occupied between 1859 until sometime before 1881. The results of the Stage 4 mitigation further support this interpretation both through the features that were identified and the recovered artifacts. All seven features appear to be remains of the homestead. This includes a pit feature (Feature 3) that may have been built under the Turnbull family's log house and the base of a chimney (Feature 1). Another feature (Feature 2) is interpreted as an additional outbuilding likely located to the west along Highland Line Road with a fire pit (Feature 7) located nearby. Finally, three features (Feature 4 to 6) likely represent post moulds from where a fence once existed.

Artifact and faunal analysis indicate that the Turnbull family were consuming and likely raising cattle, sheep, and pigs. The prevalence of sheep is characteristic of Scottish immigrants who typically consumed more sheep than other Immigrant groups in Canada (Ferris and Kenyon 1983). The Turnbull family also likely had a horse due to the presence of a small number of horse related artifacts.

The results of the Stage 4 mitigation of the Turnbull Site (BfGd-8) provide the basis for the following recommendation:

1) The Turnbull Site (BfGd-8) has been fully excavated and documented, and, as such, the site has no further cultural heritage value or interest and requires no additional archaeological assessment.

This report is submitted to the Ministry of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, R.S.O. 1990, c. 0.18. The report is reviewed to ensure that the licensed consultant archaeologist has met the terms and conditions of their archaeological license, and that the archaeological field work and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario.

Project Personnel

Project Manager	Brian Henderson, M.A.Sc., P.Eng.
Project Director	Kris Marentette, M. Sc., P.Geo., Principal
Senior Review	Michael Teal, M.A. (P364), Associate, Senior Archaeologist
Licensee/Field Supervisor	Randy Hahn, Ph.D. (P1107), Staff Archaeologist
Report Preparation	Rhiannon Fisher, M.A. (P468), Archaeologist
	Randy Hahn, Ph.D. (P1107), Staff Archaeologist
	Jamie Lemon, M.A. (P1056), Archaeologist
	Helen Moore, B.A. (R359), Material Culture Specialist
Faunal Analysis	Rhiannon Fisher, M.A. (P468), Archaeologist
Archaeobotanical Analysis	Jamie Lemon, M.A. (P1056), Archaeologist
Material Culture Analysis	Helen Moore, B.A. (R359), Material Culture Specialist
Field Crew:	Rebecca Bourgeois, M.A. (R1224)
	Shan Ling, M.A. (P340), Staff Archaeologist
	Helen Moore, B.A. (R359), Material Culture Specialist
GIS/Mapping	Bojan Radojevic, B.A.
Administration	Courtney Adey

Abbreviations

BP	Before Present, taken to mean before 1950 and used as an alternative to BC/AD.
CHVI	Cultural Heritage Value or Interest
Golder	Golder Associates Ltd.
m	Metre(s)
MHSTCI	Ministry of Heritage, Sport, Tourism and Culture Industries
PIF	Project Information Form

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1.0 PROJECT CONTEXT

1.1 Development Context

Golder Associates Ltd. (Golder) was retained by Thomas Cavanagh Construction Limited to complete a Stage 4 archaeological mitigation for the Turnbull Site (BfGd-8), located within part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario (Maps 1 and 2). The Turnbull Site was mitigated in support of an *Aggregate Resources Act* (ARA) license application for the for the proposed Highland Line Pit.

Permission to access the properties was provided by the client.

1.2 Objectives

As outlined in the Ministry of Heritage, Sport, Tourism and Culture Industries' *Standards and Guidelines for Consultant Archaeologists* (2011, p. 4), the objectives of this Stage 4 archaeological mitigation were:

- To document the archaeological context, cultural features and artifacts for all parts of the archaeological site
- To document the removal of the archaeological site
- To preserve the information about the archaeological site for future study

2.0 HISTORICAL CONTEXT

2.1 Regional Indigenous History

The Ottawa Valley was covered by the Laurentide ice sheet until approximately 11,000 years before present (BP). Following the period of deglaciation, the Ottawa Valley was inundated by the Champlain Sea which is interpreted to have extended from the Rideau Lakes in the south, along the Ottawa Valley and St. Lawrence areas and terminating in the vicinity of Petawawa in the west. The exact western boundary is unconfirmed as current elevation levels reflect the isostatic adjustment of the land following the melting of the glaciers which has obscured definitive traces of the Champlain Sea shoreline at the time of its existence. The eastern portion of the sea extended into the Atlantic Ocean.

During the much of the Paleo Period (11,000 BP –ca. 9,000 BP) Ottawa would have remained inundated by the Champlain Sea, although as the Champlain Sea receded towards the end of this period it is possible that people migrated along the changing waterfront landscape eventually moving into the Ottawa Valley (Watson 1999a).

The ridges and old shorelines of the Champlain Sea and early Ottawa River channels generally represent areas most likely to contain evidence of Paleo occupation in this region, however identifying the location and dates of these ancient shorelines has proved challenging. The boundaries of the Champlain Sea are not marked by a continuous identifiable shoreline, especially in its western shore where rocky conditions were not favorable to the formation of beaches (Chapman and Putnam 1973). Attempts to use deposits of marine mollusk shells as a source for radiocarbon dates to delineate the transgression of the shorelines have proved unreliable as shells absorb carbon at different rates according to their depth below the surface and geological location (Robinson 2012). Additionally, earlier interpretations showing discrete stages of regression (see Chapman 1937) have proven not to be supported by the geological record. Unlike the catastrophic flood events during the Younger Dryas climatic event that led to the rapid formation of the Champlain Sea, its regression was a slow process occurring as sea waters drained during isostatic rebound (Robinson 2012). The interpretation of the presence of shorelines is further complicated by the fact that isostatic rebound may have raised the Ottawa region above its current elevation before it receded to its current level (Fulton and Richards 1987). Flooding resulting from the overflow of glacial Lake Agassiz also eroded and manipulated topographic landforms within the evolving landscape (Fulton et al. 1987). As a consequence, only the margins of the Champlain Sea at its maximum extent, a time when the Ottawa region would have been fully submerged, have been reliably mapped due to the rapid inundation creating pronounced shoreline features (Loring 1980). Although recent studies using various dating techniques that do not rely upon deposits of mollusk shells have provided some favourable results (Tremblay 2008), considerable work remains in developing the chronology of the Champlain Sea's regression.

The earliest possible settlement in the Ottawa Valley would have occurred during the recession of the Champlain Sea when the vegetation and wildlife began to develop within the area, which enabled the sustainability of humans (Watson 1999a). The ridges and old shorelines of the Champlain Sea and early Ottawa River channels reflect areas most likely to contain evidence of Paleo Period occupation in the region. Archaeological and geological investigations in the Ottawa Valley have suggested these early sites may be identified within the 550 foot (167.6 metres) or higher contour topography, although additional research may be required to confidently assess this correlation (Kennedy 1976).

Evidence of human occupation within the Ottawa Valley during this period has been documented by a variety of archaeological discoveries including fluted points (laurel leaf shaped points with a channel flake scar extending from the base of the point) recorded in the Rideau Lakes area (Watson 1982; 1999b). In Ottawa, sites interpreted to have produced Paleo Period material have been recorded near Greenbank Road (Swayze 2003), Albion Road

and Rideau Road (Swayze 2004), although the lack of diagnostic material represented at these sites and the inferred climatic environment suggests these sites may rather be reflective of Archaic Period occupation following the recession of the Champlain Sea.

During the succeeding Archaic Period (ca. 9,000 BP to 2,800 BP), the environment of Eastern Ontario approached modern conditions (Ellis et al. 1990). Occupation within the Ottawa Valley developed as the environment became habitable, with an Early Archaic Dovetail projectile point recovered in Ottawa South sometime around 1918-1920 (Pilon and Fox 2015) potentially representing the earliest diagnostic evidence of human interaction within the local landscape.

Archaic Period inhabitants generally continued to employ a hunter-gatherer subsistence strategy focused on localized faunal and floral resources including deer, fish, berries and nuts. The McIntyre Site, located on the north shore of Rice Lake and south of Peterborough, contained the remains of a large variety of floral and faunal species (Ellis et al. 1990). Plant remains recovered from the site included butternut, acorn, hickory, plum, cherry, blueberry and hawthorn. Faunal remains included deer, canine, beaver, muskrat, bear, and a large variety of fish including bass, bullheads, and suckers. The inhabitants of the site may also have been gathering wild rice (McAndrews 1984). In the Ottawa Valley, a stone fish weir likely dating to the Archaic Period found upstream from Morrison Island and Allumette Island demonstrates the increasingly sophisticated technology that was being employed during the period (Allen 2010).

The Ottawa Valley was an important route for the movement of natural copper, either through direct trade between individual groups, or through trips to Lake Superior to exploit the surface deposits located there. Copper artifacts similar to those documented on Allumette Island in the Ottawa River have been discovered in Wisconsin, Michigan, New York State and Manitoba (Kennedy 1970). This commodity, as well as other tradable goods, was presumably transported by canoes and other vessels along the navigable waterways including the Ottawa River.

The earliest evidence of human burials within the Ottawa Valley are interpreted to date to the Archaic Period (Pilon & Young 2009). Excavations at Allumette and Morrison Islands have found burial sites containing the remains of dozens of individuals within deposits that appear to have been used continuously for millennia (Kennedy 1966). The inclusion of grave offerings such as natural/native copper pieces in burials found at the site of Coteau-du-Lac provides evidence for Archaic ritual practice (Pilon and Young 2009). Other sites with Archaic Period components within the Ottawa Valley region have been noted on Aylmer Island, Chaudière Falls, Wilber Lake, Leamy Lake, the Rideau Lakes (Watson 1982), Jessups Falls, and in Pendleton (Daechsel 1980). Archaic sites have been documented within the vicinity of the Rideau River (BhFw-19; BhFw-110, Golder 2017), and evidence from archaeological investigations around Honey Gables, Albion Road and Rideau Road may contain Early Archaic material (Swayze 2004). Evidence of Archaic Period occupation has also been recovered from isolated find spots within the City of Ottawa (Jamieson 1989), although the context of many of these have been poorly documented.

The Woodland Period (*ca*. 2,800 BP to 450 BP) is primarily distinguished from the Archaic Period by the introduction of ceramics (Wright 1972). Early Woodland Period inhabitants continued to live as hunters, gatherers and fishers in much the same way as earlier populations had done. They also shared an elaborate burial ceremonialism influenced by the inclusion of exotic artifacts within grave deposits (Spence et al. 1990, p. 129).

By the Middle Woodland Period (2,400 BP to 1,150 BP) regional cultural expressions or traditions have been distinguished by archaeologists. These traditions have been identified based on patterns of ceramic decorations, use of lithic materials, and are the primary basis to differentiate the Middle Period from the Early. A greater number of known sites from this period have allowed archaeologists to develop a better picture of the seasonal

round followed in order to exploit a variety of resources within a home territory. Through the late fall and winter, small groups would occupy an inland “family” hunting area. In the spring, these dispersed families would congregate at specific lakeshore sites to fish, hunt in the surrounding forest, and socialize. This gathering would last through to the late summer when large quantities of food would be stored for the approaching winter.

Along the Ottawa River, Middle Woodland sites have been identified in the northwest end of Ottawa at Marshall’s and Sawdust Bays (Daechsel 1980; Daechsel 1981), Rockcliffe Park (Pilon 2008; Pilon and Boswell 2015), as well as at Leamy Lake (Laliberte 1995), along the Rideau River (BhFw-6, BhFw-101, BhFw-110 and BhFw-118; Golder 2017; Patterson 2016) and within the City of Ottawa west of Bank Street (Golder 2014). Sawdust Bay 2 (BiGb-6), located approximately 750 m west of where the Mississippi River drains into the Ottawa, represents a camp site radiocarbon dated to 1560 BP (± 290 BP) and interpreted to reflect the Point Peninsula Tradition. The corresponding artifact assemblage shows that subsistence was focused on hunting fauna living in the adjacent lakes and swamps. The Leamy Lake and Rockcliffe Park Sites (BiFw-16 and BiFw-91), all located in the area around the mouth of the Gatineau River and the east shore of the Ottawa River, show evidence of seasonal warm weather settlement spanning a period from 4000 BP up to at least the Middle Woodland period (Pilon & Boswell 2015).

Another significant development of the Woodland Period was the introduction of agriculture and appearance of domesticated plants ca. 1,450 BP. Initially, only a minor addition to the diet, the cultivation of corn, beans, squash, sunflowers and tobacco gained economic importance during the Late Woodland Period. Unlike in southern Ontario, where the shift in subsistence resulted in the development of semi-permanent and permanent villages, evidence suggests that the Ottawa Valley remained occupied by mobile hunter-gatherers. In part, this was because the terrain was less than suitable for early agriculture. It was also a reflection of the increased pressure on hunting territories and conflict over trade routes at the end of the Woodland Period.

By the end of the Late Woodland Period, distinct regional populations occupied specific areas of southern Ontario separated by vast stretches of largely unoccupied land, including the Huron along the north shore of Lake Ontario, and the St. Lawrence Iroquois along the St. Lawrence River. Facing persistent hostilities with Iroquoian populations based in what is now New York State, the Huron moved from their traditional lands on the north shore of Lake Ontario to the Lake Simcoe and Georgian Bay region. The St. Lawrence Iroquois disappeared sometime in the late 16th century with refugees possibly dispersing among the Algonquin populations in the Ottawa Valley region (Pendergast 1999).

The Algonquins, who occupied the lands north of the Huron, had historical hunting territories that may have extended as far east as the St. Maurice River in Quebec. They also claimed the lowlands south of the St. Lawrence River after the disappearance of the St. Lawrence Iroquois in the late 16th century (Trigger & Day 1994). At the time of initial contact, the French documented several Algonquin groups residing in the vicinity of the present location of the City of Ottawa (Heidenreich & Wright 1987, Plate 18). These included the Kichesipirini of Morrison Island, the Matouweskarini along the Madawaska River to the west, the Onontchataronon in the Gananoque River basin to the southwest, and the Weskarini, the largest of the three, situated in the Petite Nation River basin to the northeast.

Late Woodland sites have been recorded throughout the Ottawa Valley. Two small Late Woodland sites were identified on a property near the Village of Cumberland (Ferris 2002). A significant Woodland Period occupation has also been identified at the Leamy Lake site and several burials dating to the Archaic Period have also been documented on the north side of the Ottawa River, just east of the Chaudière Falls. Many of these burials were observed during the mid-19th century, with upwards of twenty individuals documented along the northern shore of the Ottawa River between the Chaudière Falls and the Gatineau River. Many of these internments were associated with red ochre deposits, although there does not appear to be a consistent deposition positional pattern to those recorded (Pilon and Boswell 2015).

Though it is often difficult to link archaeological sites to specific historical Indigenous groups, the Highland Lake site (BiGh-1), located west of Ottawa, may be an Algonquin site associated with the Matouweskarini (von Gernet 1992). Ottawa Valley Algonquin sites typically consist of shallow deposits characteristic of seasonal occupation by small family groups within family or band territorial limits and are typically located on the headwaters of major tributaries (Pendergast 1999). Exceptions include a number of summer camps identified at Morrison Island and Leamy Lake where larger groups came together (Pilon and Boswell 2015).

The Algonquins' location along the same river networks used for transportation by early French traders positioned them to monopolize the early fur trade with the two communities becoming close allies following Champlain's expedition down the St. Lawrence River in 1603. Competition for furs increased existing tensions between the Algonquin communities and their neighbours including the Haudenosaunee Nations, such as the Mohawk, residing to the south in what is now Ontario and New York. The 17th century saw a long period of conflict known as the Beaver Wars between the Algonquin and the Haudenosaunee that resulted in the significant disruption of life. Mohawk raids against Algonquin villages in the Upper Ottawa and St. Lawrence Valleys resulted in the abandonment or destruction of many Algonquin settlements in these areas (Trigger and Day 1994). Some Algonquin's found refuge in French settlements such as Trois Riviére, Quebec City, Sillery, and Montreal while others may have retreated to interior locations along the Ottawa River's tributaries (Holmes 1993). At the end of the 17th century, the Haudenosaunee were driven out of much of southern Ontario by the Mississaugas though they continued to occupy parts of Eastern Ontario on a seasonal basis.

The French brokered a peace treaty in 1701 at Montreal where the Algonquin, the French, and the Haudenosaunee agreed to peacefully share the lands around the Great Lakes (INAC 2011). In exchange for peace, the Algonquin gave the Haudenosaunee secure access to furs which the Haudenosaunee used to secure their alliance with the British. Between 1712-1716, Algonquins were noted as living along the Gatineau River with the Haudenosaunee occupation located south of the St. Lawrence (Holmes 1993). By 1740, Algonquin communities were present in the vicinity of Trois-Rivieres, Riviere Lievre and Lake of Two Mountains and Mohawk community members were residing near Lake of Two Mountains (Holmes 1993).

Following the Seven Years' War in the mid-18th century, the defeat of the French, Algonquin, and their allies by the British and the Haudenosaunee resulted in the further loss of Algonquin hunting territories in southern Quebec and Eastern Ontario as the British seized France's colonies. The extension of Quebec's boundaries in 1774 through the Quebec Act and the use of the Ottawa River as the boundary of Upper and Lower Canada following the 1791 Constitution Act separated the Algonquins between two government administrations (AOP ND).

Britain's colonial policy differed from the French in that the Crown was much more interested in securing land surrenders from the Indigenous populations for settlement by Europeans. The Royal Proclamation of 1763 issued by King George III enabled the Crown to monopolize the purchase of Indigenous lands west of Quebec. Although the proclamation recognized Indigenous rights to their land and hunting grounds, it also provided a way through which these rights could be taken away (Surtees 1994). Land cession agreements between Indigenous groups and the Crown increased following the War of 1812 as a new wave of settlers arrived in Upper Canada primarily from Britain. The Crown implemented annuity systems in the purchase of lands from Indigenous peoples where the interest payments of settlers on the land would cover the cost of the annuity rather than pay a one-time lump sum. By the 1850s, Indigenous groups had become cautious of these agreements and had began to demand the retention of reserved land and preservation of hunting and fishing rights (Surtees 1994).

Between 1783 and 1784, Captain William Redford Crawford negotiated on behalf of the Crown with the Mississauga chiefs living in the Bay of Quinte region. In the so-called "Crawford Purchase," Crawford negotiated for the lands located east of the Bay of Quinte to the Trent River. This agreement was intended to provide land to the United Empire Loyalists and Indigenous allies following the American Revolution (Ontario 2020). The lands

covered by the Crawford Purchase now includes the communities of Kingston and Brockville. The Crown again negotiated with the Mississauga of the Bay of Quinte and Kingston areas during the Rideau Purchase (1819/1822) which included a portion of Algonquin territory in the Ottawa Valley (Surtees 1994). The Algonquin and Nipissing, who were left out of the talks, protested the purchase, but were largely ignored (Holmes 1993). The Rideau Canal was later built through the territory of the Rideau Purchase.

In 1839, the Crown denied the Algonquins and Nipissings the right to lease portions of their land, including islands in the Ottawa River, to settlers with whom they had previously been collecting rent payments (Holmes 1993). Furthermore, the Crown did little to prevent further additional encroachments by settlers on Indigenous lands.

A reserve was purchased for use by the Algonquins in Golden Lake in 1873 (Holmes 1993). The Golden Lake reserve, now known as the Algonquins of Pikwakanagan First Nation, has a registered population of around 2,000 people with over 400 living on the reserve (INAC 2013). Additional reserves and settlements for the Algonquins were established in Quebec during the mid-20th century.

The Indian Act of 1876 framed the relationship between the Canadian government and Canada's Indigenous peoples as a paternalistic one where the government served as their guardian until their cultures were able to integrate into Canadian society (INAC 2011). The Department of Indian Affairs was granted the authority to make policy decisions such as determine who was classified as Indigenous, manage their lands, resources and money, and promote "civilization". The consequence was the further erosion of Indigenous rights to autonomy and self-governance. The implementation of residential schools and adoption of Algonquin children by non-Indigenous families in the mid-20th century reflected further discrimination and the disregard of rights (AOP n.d.).

The Algonquins of Ontario today consist of ten communities: Antoine, Algonquins of Pikwakanagan First Nation, Bonnechere, Greater Golden Lake, Kijicho Manito Madaouskarini, Mattawa/North Bay, Ottawa, Shabot Obaadjiwan, Snimikobi, and Whitney and Area (AOO n.d.).

The Ottawa Valley is unceded Algonquin land and land claim negotiations with Canada and Ontario are in progress. The Algonquin and the Government of Canada signed an agreement in principle to transfer 117,500 acres of Crown lands in Eastern Ontario to the Algonquin (INAC 2016; Tasker 2016). While this represents an important step in the negotiations, the talks are ongoing.

2.2 Post-Contact Regional History

Samuel de Champlain was the first European to document his explorations of the Ottawa Valley, initially in 1613 and again in 1615. He was preceded by two of his emissaries, Etienne Brule around 1610 and Nicholas de Vigneau in 1611. It is likely that all three travelled at least the lower reaches of the Rideau River. In the wake of Champlain's voyages, the Ottawa River became the principal route for explorers, missionaries and fur traders travelling from the St. Lawrence to the interior, and throughout the seventeenth and eighteenth centuries this route remained an important link in the French fur trade.

The Rideau River, which continued to serve as a seasonal hunting, fishing, and gathering area for Indigenous peoples living in the area, was used as a travel corridor that connected the Ottawa Valley to the St. Lawrence River (Watson 2018). The construction of the Rideau Canal (1826–1832) brought increased European settlement along the shores of the Rideau River. Further development of the Rideau shorelines during the 19th and 20th centuries resulted in diminished opportunities for Indigenous hunting and gathering in the area as Euro-Canadian settlement increased.

2.2.1 Lanark County and Dalhousie Township

Settlement of Lanark County begin in 1815 following the British proclamation which offered free passage and land to emigrants to Upper Canada (Mika and Mika 1981, p. 490). The establishment of the military town of Perth in 1816 enabled the expansion of settlement into surrounding lands. Dalhousie Township was opened for settlement in 1820 (Mika and Mika 1977, pp. 517-518). Many of the first settlers of the township were families of impoverished Scottish weavers who immigrated to Canada following a decline in the weaving industry in Scotland. A second wave of immigration occurred during the 1830s and 1840s consisting primarily of immigrants from Ireland (Lanark Highlands ND).

Due to steep and rocky terrain, agriculture was restricted to floodplains beside rivers and lakes so many early settlers participated in lumbering. Beside lumbering, early industry included grist mills, flour mills, pork packing, tanning, and maple syrup operations (Lanark Highlands ND)

In 1857, flooding at Crotch Lake, located approximately 18 km west of Dalhousie Township caused the Mississippi River to overflow. All three of the township's bridges were destroyed in this disaster along with a grist mill located at Dalhousie Lake (Lanark Highlands ND).

In 1850, Dalhousie Township was united with North Sherbrooke and Lavant Townships. Subsequent amalgamation took place in 1975 with Dalhousie Township joining the Township of Lavant, Dalhousie and North Sherbrooke. Most recently, Lavant, Dalhousie and North Sherbrooke Township amalgamated with Lanark Township and Lanark Village to become the Lanark Highlands in 1997.

2.3 Study Area History

Land registry records for Dalhousie Township indicate that the east half of Lot 5, Concession 10 was first granted to John Camfield in 1857. Camfield sold all but eight and a half acres to Alexander Turnbull in 1859. William Forgue purchased the property in 1876. The property appears to have changed hands a couple additional times during the late 19th century, but this portion of the land registry was largely illegible. John Duncan purchased the east half of Lot 5, Concession 10 for $2,000 in 1928 and it has remained within the Duncan family throughout the 20th century.

The 1863 Walling Map of Lanark County (Map 3) shows the location of the Turnbull farmstead south of the road that passes through Lot 5 and lists the name A. Turnbull. Canada Census Records for 1861 list Alexander Turnbull as a 51-year-old farmer from Scotland. He is listed as living with his wife Margaret (33) and their children Ellen (8), Alex (7) and Elizabeth (5) in a one storey log house.

Turnbull's farmstead is not shown in the 1880-1881 Belden Map of Dalhousie Township (Map 3). As William Forgue had purchased the property by this time, the Turnbull Farmstead may no longer have been occupied. The 1881 Canada Census Records list Margaret Turnbull (54) as widowed so she may have moved elsewhere following her husband's death.

3.0 ARCHAEOLOGICAL CONTEXT

3.1 Study Area Environment

The study area is located within the Algonquin Highlands physiographic region, a region spanning over 40,000 square km and characterized by rough terrain underlain by Precambrian rocks (Chapman and Putnam 1984, p. 213). Low lying areas are commonly swamps and bogs. Common trees include sugar maple, yellow birch, white pine, hemlock and balsam fir (Chapman and Putnam 1984, p. 213). Black spruce and white cedar grow in the swamplands.

The Turnbull site is located within an agricultural field on a rise overlooking Highland Line road. Barbers Lake is located approximately 400 m to the east.

3.2 Previous Archaeology

The MHSTCI's Archaeological Report Database was searched on January 14, 2021 for previous archaeological assessments completed within 50 m of the study area. The only known archaeological assessments completed within 50 m of the study area those completed by Golder for the present project (Golder 2020; 2021a). Golder's (2020) Stage 1 and 2 archaeological assessment involved the pedestrian and test pit survey of an approximately 33 ha area located within Lot 5, Concession 10 of Dalhousie Township. The Stage 2 pedestrian survey resulted in the discovery of two archaeological sites, the Turnbull Site (BfGd-8) and the Duncan Site (BfGd-9). Both sites were deemed to have sufficient cultural heritage value or interest to warrant Stage 3 archaeological assessment.

The Stage 3 archaeological assessment of the Turnbull Site (BgGd-8) involved the hand excavation of 47 1-m^2 test units and the collection of 1,534 artifacts dating to the mid-19th century. Two cultural features were also identified. Due to the mid-19th century date of the site and the presence of two cultural features, the Turnbull site was recommended for Stage 4 mitigation prior to development impacts. The recommendations for the Stage 3 archaeological assessment are presented in Section 3.3.

3.3 Stage 3 Recommendations

Golder's (2021a) Stage 3 archaeological assessment of the Turnbull Site (BgGd-8) provided the following recommendations:

1) *The Turnbull Site (BfGd-8) possesses Cultural Heritage Value or Interest and should be subject to Stage 4 mitigation prior to any development impacts.*

2) *As the Turnbull Site (BfGd-8) is located within the area of the proposed Highland Line Pit and avoidance and protection is not a viable option, the Stage 4 mitigation would entail hand excavation of Features 1 and 2, and mechanical topsoil removal for the remainder of the site. The Turnbull Site meets all requirements for mechanical topsoil removal as outlined in Standard 1 of Section 4.2.3 of the Standards and Guidelines for Consultant Archaeologists (2011) and hand excavation of features as outlined in Section 4.2.1. Following consultation with an archaeology review officer (see supplementary documentation), hand excavation will extend only to the edge of the features.*

3) *Mechanical topsoil removal will employ an excavator with a flat-edged bucket and follow Standards 2 to 6 of Section 4.2.3 of the Standards and Guidelines for Consultant Archaeologists (2011).*

4) *As per Standard 1 of Section 4.3 of the Standards and Guidelines for Consultant Archaeologists (2011), mechanical excavation must extend a minimum of 10 m beyond uncovered cultural features, or to the edge of the project boundary (Map 4).*

4.0 METHODOLOGY

4.1 Field Methodology

The Stage 4 archaeological mitigation for the Turnbull Site (BfGd-8) was completed under PIF P1107-0033-2020 over 13 days between September 24 and November 20, 2020. Permission to access the study area was provided by the client. The licensee, Randy Hahn (P1107), was the field supervisor for all fieldwork. The dates of all Stage 4 fieldwork activities and the weather conditions observed during these activities are presented in Table 1. At no time were the conditions detrimental to the recognition and recovery of archaeological material; field visibility and lighting conditions were MHSTCI compliant.

Table 1: Dates of Stage 3 Field Work and Weather Conditions

Date	Weather	High Temperature (degrees Celsius)
September 24, 2020	Partly Cloudy	23
September 25, 2020	Mixed Sun and Clouds	25
September 28, 2020	Cloudy	27
October 1, 2020	Mixed Sun and Clouds	16
October 16, 2020	Cloudy	10
October 30, 2020	Mixed Sun and Clouds	1
November 2, 2020	Light Snow	1
November 5, 2020	Mostly Sunny	16
November 6, 2020	Mostly Sunny	18
November 12, 2020	Mixed Sun and Clouds	8
November 13, 2020	Mostly Cloudy	6
November 19, 2020	Mixed Sun and Clouds	8
November 20, 2020	Cloudy	13

The Stage 4 fieldwork began with the hand excavation of topsoil in 27 1 m^2 test units over the two features discovered during the Stage 3 archaeological assessment (Golder 2021a). All excavated topsoil was screened through 6mm wire mesh and the artifacts collected. The features were then drawn and photographed. Images 1 and 2 (p. 49) show the field crew conducting the hand excavation of topsoil over Feature 1.

After the two features were exposed, the study area was mechanically topsoil stripped by an excavator with a smooth-edged bucket following the methods outlined in Standards 1 to 6 of Section 4.2.3 of the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011). Mechanical topsoil stripping was implemented to uncover additional features that were not identified during the previous Stage 3 excavation. As the Turnbull Site (BfGd-8) is a large historic archaeological site located in an agricultural field that has been subject to ploughing for many years and no cultural strata had been identified beneath the ploughzone, it met conditions for excavation by mechanical topsoil removal as identified in Section 4.2.3 of the *Standards and Guidelines for Consultant Archaeologists* (MHSTCI 2011). Furthermore, the Stage 2 and 3 archaeological assessments have provided a representative sample of ploughzone artifacts and their distribution so the collection of additional ploughzone artifacts was determined to be unnecessary.

The mechanical topsoil removal stopped at the topsoil/subsoil interface and the subsoil surface was cleaned by shovel to help in the identification of features. The exposed subsoil surface was not allowed to dry out before being examined for cultural features. The extent of the topsoil removal extended 10 m to the north, south, east, and west of the Stage 3 excavations. Images 3 and 4 (p. 50) show a representative sample of field conditions and the methods and equipment employed during the mechanical soil stripping of the site.

After the topsoil was stripped, the two previously identified features, as well as an additional five features, discovered during the mechanical topsoil removal were excavated by hand, as per Standard 7 of Section 4.2.1 (MHSTCI 2011). Each feature was cross sectioned with excavation proceeding in 5 cm increments to record horizontal context. The three largest features, Features 1, 2, and 3, were excavated in quadrants to enable better recording of artifact context. All excavated soils from the features were screened through 6 mm wire mesh as per Standard 5 of Section 4.2.2 of the *Standards and Guidelines* (MHSTCI 2011). Images 5 and 6 (p. 51) show representative examples of the feature excavations.

The locations of features were recorded with a Garmin GPSMAP62 handheld GPS, which is a 12 channel SiRFstar III high-sensitivity GPS receiver (WAAS-enabled) that continuously tracks and uses up to 12 satellites to compute and update plotted positions. The accuracy of the unit is <10 meters 95% typical. The positions recorded for this Stage 4 excavation were typically accurate to 3 meters or less. The projection used was the Universal Transverse Mercator (UTM), Grid Zone 18, and referenced to the North American Datum (NAD) 1983.

A field logbook was maintained for the duration of the investigation detailing pertinent information and digital photographs were taken of the tested areas, topography, and methods employed. A total of 12 pages of field notes were generated by this work supported by 179 digital photos. These notes and photos, as well as the GPS data, are stored digitally on the Golder server.

4.2 Artifact Analysis and Curation Methods

This report and the following artifact inventories (Appendices A to C) provide a record of the artifacts and other archaeological materials (samples) recovered from the Stage 4 excavation of the Turnbull Site (BfGd-8). This information provides the basis for the interpretation of the site. The intent of this report is to offer enough artifact information that a future researcher may determine whether the site is of relevance to their investigation.

4.2.1 The Inventory System

The artifact inventory was compiled in a Microsoft Office Access 2007 database system.

Each entry in the database contains the following information:

- an individual inventory number

- spatial location (provenience) within the study area/site (operation, sub-operation, stratum)
- artifact analysis (see below)
- the quantity of any given entry

4.2.2 Artifact Analysis

The artifact analysis was based upon the MHSTCI standard requirements, as set out in Tables 6.1 and 6.2 of the Standards and Guidelines (MHSTCI 2011). Every artifact entry in the database includes material composition, artifact type (object), and the function which it served and if any alterations had been made to the original artifact (e.g., burning). Additional artifact descriptions were based upon the type of artifact (see below).

4.2.3 Historical Artifacts

Only historical period artifacts were found during this investigation, including: ceramic objects, glass items, and other inorganic and organic cultural objects (metal, stone, flora, fauna). Ceramic ware and glaze types were provided, as well as their decoration and colours. When a maker's mark was visible it was recorded.

Date ranges were provided where possible with references cited. Glass artifact colours and decorative patterns were recorded, in addition to technique of manufacture when identifiable. As with ceramic material, when a marker's mark was visible it was recorded. Date ranges were provided where possible, and the reference cited.
All other artifacts were described in as much detail as possible including surface treatment, decorative pattern, and technique of manufacture when identifiable.

4.2.4 Archaeobotanical

A total of four soil samples for specialist analyses were taken from Feature 2 and Feature 3. Soil samples were taken using a shovel and a bucket, as per Section 4.4, Standard 1 of the *Standards and Guidelines for Consultant Archaeologists* (MTCS 2011). Soil samples ranged from 3.9 litres to 5.1 litres, depending on the size of feature.

Soil flotation and separation of soils into heavy and light fractions was conducted using a Flote-Tech A flotation system at the Golder archaeology lab in Mississauga, Ontario. Heavy fraction materials were caught in a tank insert fitted with fine fabric mesh of approximately 1 mm. Heavy fraction materials were transferred from the tank insert to fine fabric bundles, given flotation tag labels and allowed to dry. Once dry, these samples were transferred to bags with their flotation tag labels. Light fraction materials carried by water falling over the flotation tank weir were caught in either 0.285 mm fine woven polyester fabric mesh or in 0.3 mm fine heat set nylon monofilament mesh. Light fraction materials were tied into bundles within their fine fabric mesh, given flotation tag labels and allowed to dry. Once dry, these samples were transferred to bags with their flotation tag labels.

After transfer to the analyst, both heavy fraction and light fraction bags were opened and split by nested brass sieves of the following mesh sizes: 4 mm, 2 mm and 0.25 mm as well as the nested bottom/receiving pan, creating up to four sieve size cohorts per sample: >4 mm, >2 mm (but <4 mm), >0.25 mm (but <2 mm) and <0.25 mm. Splitting samples by sieve size allows more rapid and reliable observation of materials and disallows large items from obscuring small items beneath.

Soil sample materials of both the heavy and light fractions were analysed under a AmScope SE305R-PZ Stereo Microscope at 10-60x magnification. Identifications were made with the aid of standard botanical identification texts (e.g., Martin and Barkley 1973) as well as online databases (CFIA 2019, NHMU 2021, USDA 2020). Identifications of charcoal that was captured in the 4 mm sieve were made with the aid of Hoadley (1990). Identifications of charred and attempted only for the >4 mm sieve size cohort, as those smaller than that size are considered too small for consistent positive identification (Fecteau 1978:5-6; cf. Fecteau 2008:40).

Material from each sieve was inspected macroscopically before transfer to one or several Petri dishes and placed under magnification. If present, non-archaeobotanical artifacts and faunal remains were also picked out by sieve size cohort. In some cases, sieves size cohorts produced no material or no botanical, faunal or artifactual material (i.e., only stones etc.). Artifactual remains were tagged and set aside for other analysts.

Identifications to the lowest possible taxon were attempted for charred and uncharred plant remains (seeds, nuts and other plant parts) of all sieve size cohorts from both the heavy and light fractions. Charred bark and vitrified (of melted or glassy appearance) wood are not usually identifiable to taxon and fragments were counted by sieve size cohort. Given the extremely minute nature of materials in the <0.6mm sieve size cohort (bottom/receiving pan materials) made up mainly of dust-like particles, an estimate of charcoal flecks was not attempted. Few whole seeds are of the size to enter the <0.6 mm bottom/receiving pan.

Archaeobotanical remains are not given artifact catalogue numbers, but are referred to and curated by Float Log Form No.

4.2.5 Faunal

The largest inhibitor towards confident identification was the degree of fragmentation caused by biotic degradation, carnivore ravaging, human butchery action, and additional taphonomic traces from human agency such as burning of bones. Due to the level of disturbance, analysis was conducted with the metric of Number of Individual Specimens (NISP), see Lyman 1994 for definition. The use of NISP is often criticized as a potentially inaccurate measure of the relative abundances of taxa because it does not account for intertaxonomic variation in the fragmentation of skeletal elements. However, due to the nature of this site and the high degree of refuse that would be burnt or otherwise processed the NISP count provides a healthy overestimation and is only calculated for specimens that can be identified to a Skeletal Element.

Skeletal Elements were identified following Shipman's 1981 definition of a Defined Skeletal Element which can be identified on a firm morphological or metrical basis even when fragmentary due to the distinctive texture, markings, or shape of specific skeletal elements. Furthermore, elements susceptible to high degrees of fragmentation such as the crania and long bone midshafts were only included if an identifiable landmark was present (Marean et al. 2001). Most dental and skeletal elements were used to estimate values, excluding ribs and vertebrae as they are difficult to number and side accurately when fragmented and comingled within the assemblage (Snow and Folk 1970).

Taphonomic traces such as tooth marks from carnivore feeding, cut marks from butchery action, and biotic traces such as bio-erosion were identified and catalogued following Blumenschine et al. 1996.

4.2.6 Storage and Curation

The collection was packed for storage by spatial location (provenience). When inventoried, artifacts were bagged in transparent, re-sealable (zippered) polyethylene bags which are inert and moisture resistant.
The contents of each artifact bag were identified on archival quality labels (acid-free, non-yellowing, acrylic adhesive), with an archival ink which is permanent and fade resistant. The artifact bags were then placed in a banker's box (12" W x 15" D x 10" H).

Artifact collections are stored in the archaeology lab, until the report has been submitted to the MHSTCI, after which they will be moved to a storage room. The Golder Ottawa office is located at 1931 Robertson Road. This collection contains 4,516 artifacts (197 from the Stage 2, 1,535 from the Stage 3, 2784 from the Stage 4) and is packed in three banker's boxes.

5.0 RECORD OF FINDS

The Stage 4 archaeological fieldwork was conducted employing methods described in Section 4.0 of this report. A total of 27 1 m^2 test units were hand excavated over Features 1 and 2 followed by mechanical topsoil removal which resulted in the discovery of an additional five features. An inventory of the documentary record generated from the fieldwork is provided in Table 2, and the results of the Stage 3 archaeological fieldwork are described below.

Table 2: Inventory of Documentary Record

Document Type	Current Location of Document	Additional Comments
Field Notes	Golder Associates Ltd. Ottawa Office	Original field notebook with digital copies in project file. 12 pages.
Maps provided by Client	Golder Associates Ltd. Ottawa Office	Stored in the project file.
Digital Photographs	Golder Associates Ltd. Ottawa Office	Stored electronically in the project file. 179 photos.
GPS Data	Golder Associates Ltd. Ottawa Office	Stored electronically in the project file.
Artifact Assemblage	Golder Associates Ltd. Ottawa Office	Stored in 3 banker's boxes.

5.1 Stratigraphy and Artifact Analysis

The soil stratigraphy at the Turnbull Site (BfGd-8) consists of 17 lots. Lot 1, the plough zone, is a dark grey-brown sand with loose compaction and gravel inclusions. Two subsoils were identified within the study area. Lot 2 is orange-brown sterile sand with loose compaction and gravel inclusions. Lot 3 is a light grey coarse sand with loose compaction and gravel inclusions. Lot 4 to 17 are associated with the seven features.

Table 3: Lot Descriptions

Lot	Description	Soil	Colour	Compaction	Inclusions
1	Topsoil	Sand	Dark Grey Brown	Loose	Roots
2	Subsoil	Sand	Orange Brown	Loose	Gravel
3	Subsoil	Sand	Light Grey	Loose	-
4	Feature Fill (Feature 1)	Sand	Dark Brown	Loose	Ash and Mortar
5	Feature Fill (Feature 2)	Sand	Mottled Dark Grey and Orange	Loose	Ash and Wood
6	Feature Fill (Feature 3)	Sand	Mottled Grey Brown	Loose	-
7	Feature Fill (Feature 4)	Sand	Dark Grey Brown	Loose	Wood
8	Feature Fill (Feature 5)	Sand	Dark Grey Brown	Loose	Wood
9	Feature Fill (Feature 6)	Sand	Dark Grey Brown	Loose	Wood
10	Feature Fill (Feature 7)	Sand	Mottled Dark Grey and Orange	Loose	-
11	Feature Fill (Feature 1)	Mortar	Light Grey	Moderate	-

Lot	Description	Soil	Colour	Compaction	Inclusions
12	Feature Fill (Feature 1)	Sand	Mottled Dark Grey and Orange	Loose	-
13	Feature Fill (Feature 1)	Sandy Clay	Grey	Moderate	-
14	Wooden Frame (Feature 1)	Wood	Brown	-	-
15	Feature Fill (Feature 7)	Sandy Clay	Tan	Moderate	Ash
16	Wood Board (Feature 3)	Wood	Brown	-	-
17	Displaced Lot 3 (Feature 2)	Sand	Grey	Loose	Cobbles and boulders

5.1.1 Lot 1

Lot 1 represents the ploughzone/topsoil layer that was hand excavated to expose Features 1 and 2, both identified during the Stage 3 archaeological assessment. The number of artifacts recovered from each 1 m^2 excavation unit and the depths of subsoil (Lots 2 and 3) are presented in Tables 4 and 5 and shown on Map 4.

Table 4: Depths and Artifact Counts by Test Unit Excavated Above Feature 1

Unit	Depth (cm)	# of Artifacts
E114 N111	25	32
E115 N109	39	47
E115 N111	22	119
E115 N112	20	67
E116 N109	32	60
E116 N110	20	184
E116 N112	30	92
E117 N109	30	96
E117 N110	33	60
E117 N111	32	65
E117 N112	24	55

Table 5: Depths and Artifact Counts by Test Unit Excavated Above Feature 2

Unit	Depth (cm)	# of Artifacts
E88 N135	25	6
E88 N136	20	11
E89 N134	32	12
E89 N135	31	15
E89 N136	36	6
E89 N137	33	3
E90 N134	32	26

Unit	Depth (cm)	# of Artifacts
E90 N136	32	28
E90 N137	31	4
E91 N135	32	21
E91 N136	35	24
E91 N137	34	6
E92 N134	29	11
E92 N135	34	21
E92 N136	32	6
E92 N137	28	4

A total of 1,081 artifacts were found in Lot 1. Twelve of these artifacts were mortar samples, with an additional 70 discarded. The number of artifacts per 1 m^2 excavation unit is provided on Map 4. The artifacts are summarized by function in Table 6. The 72 indeterminate fauna fragments are examined in detail in Appendix B.

Table 6: Stage 4 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	72
food/beverage	639
furnishing	1
geological	1
indeterminate	116
personal/societal	28
structural	215
tools/equipment	9
Total	**1081**

5.1.1.1 Food/Beverage Artifacts

The majority (59%) of the artifacts in Lot 1 had a food/beverage related function. Food/beverage function artifacts can be further divided into the more specific categories of beverage containers, food preparation, storage containers, indeterminate and tableware. Beverage containers included: wine bottle, case/gin bottle, and two sherds that could only be identified as alcohol bottle. Food preparation artifacts recovered included a possible cast iron cauldron or cooking pot fragment and coarse red earthenware sherds from a milk pan. Milk pans were used to separate cream from fresh milk, the former of which was then used to make butter. The presence of a milk pan for processing fresh milk indicates that the Turnbull's likely had a cow on their farmstead. Two ceramic sherds were identified as sherds from storage containers, both of them coarse stoneware with a salt glazed exterior and Albany slipped interior (Image 7, p. 52). Albany Slip was primarily in use from 1805 to 1920 (Miller 2000, p. 10). Artifacts determined to be food/beverage function related, but unidentifiable beyond that were 32 sherds of coarse earthenware holloware, these sherds could belong to either food preparation or storage vessels.

Tableware artifacts accounted for 88% of the food/beverage artifacts. Tableware objects were mainly ceramic, including sherds from: bowls, plates, saucers, teabowls/cups, pitchers, a teapot and a platter. A fork, two sherds of glassware and a glass stopper were also recovered (Image 8, p. 52). Tableware ceramics often provide the

best evidence for dating artifact assemblages as they change more often than other artifacts according to popularity trends. Basic ceramic tableware decoration types are summarized in Table 7 and representative examples of the decoration types found are shown in Image 9 (p. 53). Relevant date information is stated where available. Decoration types with an asterisk have further detail below.

Table 7: Lot 1 Ceramic Tableware Decoration Types

Decoration Type	# of Artifacts	Date	Reference
edged*	18	Commonly used between 1790 and 1860	(Hunter and Miller 1994, p. 443)
Jackfield-type glazed	4	Most popular in the late 18th century, versions continue into the 19th century	(MACL 2002)
Rockingham glazed	3	Peak of Canadian manufacturing was in the 1890s	(Burke 1991, p. 35)
hand painted: late palette	95	1830s to 1870s	(Samford and Miller 2002a)
indeterminate	2	n/a	
industrial slip*	5	Introduced in the 18th century, used to 20th century	(Sussman 1997, p. 1)
Majolica	1	Introduced 1851	(Miller 2000, p. 13)
moulded*	6	n/a	
plain	287	n/a	
sponged (closely spaced, dabbed colour)	39	common from the 1820s to the 1860s, most popular in the 1830s	(Samford 2013, p. 500)
Sponged: cut	58	1840s to 1870s	(Samford 2013, p. 501)
Transfer printed*	37	1820 to 1840 was the period of peak production	(Little 1969, p. 15)
TOTAL	555		

Edge Decorated Ceramics

Edge decorated ceramics were one of the most common decorative types used on tablewares in North America between 1790 and 1860. The earliest documented occurrence of the decorative type was in the mid-1770s (Miller 2013, p. 487). Edged wares were produced into the 1890s. Different types and colours of edged wares have distinct date ranges. All of the sherds found in Lot 1 were blue, which becomes rare by around 1860 but is produced up to 1890s (Miller 1991, p. 6). There were two types of edged decoration identified (Image 9, p. 53); *unscalloped rim with impressed repetitive patterns* which dates from the 1840s to 1860s and *embossed rim,* in particular *chicken foot* which dates from the 1820s to 1830s (Miller 2013, p. 488).

Industrial Slip Ceramics

A total of five sherds of industrial slip decorated ceramic was identified. One sherd was banded, one sherd could not be identified beyond industrial slip and three sherds were further identified as cable or finger-trailed. This type of decoration was produced with a multi-chambered slip pot, which was patented in 1811 (Rickard 2006, p. 13).

Moulded/Child's Plate

Five sherds were recovered with moulded designs that indicated that they were likely from "child's plates" (Image 9, p. 53). Two sherds of black transfer printed decorated flatware were also identified as possibly from a child's plate (see Transfer Printed Ceramics section). These plates, which were produced for children and often exhibited educational stories, proverbs or riddles, were most popular between 1820 and 1860 (Wooten 2013, p. 508).

Transfer Printed Ceramics

Forty-six sherds of transfer printed ceramics were recovered (2 black, 33 blue, and 2 brown; Image 9, p. 53). Transfer print as a ceramic decoration began in 1750s and was developed by John Sadler and Guy Green of Liverpool. It was then adopted by Josiah Wedgwood who used it on his Creamware. Transfer printing is a process by which a pattern or design is etched onto a copper (or other metal) plate. The plate is then inked and the pattern is "transferred" to a special tissue. The inked tissue is then laid onto a bisque fired ceramic item, glazed, and fired again. Key dates in the history of transfer print are noted in Table.

Three sherds were identified as likely being the Willow pattern. The Willow pattern originated in England and was designed by Thomas Minton in the 1780 (Little 1969, p. 15). The pattern has remained in production ever since. A single sherd was found with a partial blue transfer printed maker's mark "..NPO..". The mark is possibly that of the Davenport Pottery which was operational from circa 1793 to 1887. Uppercase letters were used for the name DAVENPORT post 1805 (Birks 2016).

A total of 17 sherds of blue transfer printed soup plate were identified belonging to the same vessel in Lot 1. Some of these sherds mended with those in Feature 1, Lot 4A and 4C (Image 10, p. 53). The plate has a blue transfer printed maker's mark, a Garter mark, which notes the pattern name of "..OCKET" and the pottery "J R & Co" (Image). The Garter mark is widely used on ceramics from circa 1840 (Godden 1988, p. 33). "J R & Co" is thought to identify the John Ridgway & Co pottery in Stoke-on-Trent, England, which operated from circa 1830 to 1855. As the mark includes "& Co", the date range for the mark reduces to circa 1841 to 1855 (Birks 2016).

Table 8: Key Dates of Transfer Printed Ceramics

Date	Reference
technique invented c. 1753 (over-glaze)	(Kybalova 1989, p. 212)
1783 first overglaze printed patterns	(Shaw 1829)
1820 to 1840 was the period of peak production	(Little 1969, p. 15)
declined in popularity in 1850s	(Miller 1991, p. 9)
revival in the 1870s	(Samford and Miller 2002a)
produced into the early 20th century	(Samford 1997, p. 18)
black, peak production 1825 to 1838	(Samford and Miller 2002a)
blue, peak production 1817 to 1848	(Samford and Miller 2002a)
brown, peak production 1829 to 1843	(Samford and Miller 2002a)

5.1.1.2 Structural Artifacts

The next most common type of artifacts were structural in function and included nails, windowpane sherds, a fragment of iron drainpipe, a spike and mortar samples. A total of 108 nails were recovered; 79 were machine cut and 29 were wrought by a blacksmith (Image 11, p. 54). There were three methods of nail manufacture that developed over time as the industry grew and became more mechanized. The first nails were hand wrought individually by a blacksmith. Machine cut nails became available after 1800, when a nail cutting machine became

of practical use (Vincent 1993, p. 159). By the 1830s machine cut nails had mostly replaced wrought nails in common use (Vincent 1993, p. 163). Wire nails replaced the machine cut nail and became of common use in the 1860s (Miller 2000, p. 14). The single spike was machine cut.

5.1.1.3 Indeterminate Artifacts

A total of 116 artifacts were inventoried whose function could not be concluded. Artifacts included: glass and metal vessels/containers, iron sheet, strap and a fragment of pipe, a square nut and a wood sample.

5.1.1.4 Personal/Societal Artifacts

Personal/societal artifacts totalled 28. The majority of these were sherds of clay smoking pipes (14). Two pipe bowl fragments were decorated, one fluted, one with an embossed “TD”. Three stem fragments were marked with their manufacturer. The most complete mark was “MURRA[y]/[g]LASGOW” and the other two have the potential to be the same (Image 12, p. 54). The Murray factory was operational from 1830 to 1861 (Bradley 2000:117). Other personal/societal artifacts included seven sherds of bottle glass with embossed lettering, all of them with a few letters only whose meaning could not be deciphered. Embossed lettering was the most common form of commercial marking on containers and tableware in 19th century (Jones & Sullivan 1989, p. 16). The technique becomes nearly non-existent by the 1920s when paper labels takeover (Fike 1987, p. 5).

Five completely different buttons were recovered: bone, copper alloy, iron, shell and Prosser-made (Image 13, p. 55). Prosser buttons generally date post 1840 (Sprague 2002, p. 111). One sherd of porcelain miniature tableware was identified, likely a doll’s teacup. A copper token was also found and although worn, a bouquet was visible on the obverse, and a wreath on the reverse (Image 14, p. 55). From the details observed the token appears to be one issued by the Bank of Montreal from 1835 to 1837 (Haxby and Willey 1991, p. 177).

5.1.1.5 Tools/Equipment Artifacts

Tools/equipment artifacts included agricultural and writing implements, as well as some more general artifacts, such as a bucket handle, a fragment of whetstone, a possible chaining pin and a possible tool blade fragment. Agricultural implements included a wrought iron staple, likely used for fencing and a large cast iron fragment, possibly a piece of plough blade. Writing implements included two fragments of slate pencil and an ink bottle base (Image 15, p. 55).

5.1.1.6 Furnishing

The single furnishing artifact was a possible sheet iron candleholder (Image 16, p. 56).

5.1.2 Feature 1 (Lots 4, 11, 12, 13, and 14)

Feature 1 is a rectangular shaped feature (Image 17, p. 56) measuring approximately 3.1 m in length and 2.1 m in width and was first identified during the Stage 3 archaeological assessment (Golder 2021a). The soil stratigraphy consisted of five lots (Images 18 and 19, p. 57). Lot 4 is a layer of feature fill consisting of dark brown sand with mortar inclusions. The majority of artifacts came from this lot. Lot 11 is a layer of mortar that was likely deposited from a structure that once stood above the feature. Lot 12 is the builder’s trench and contained mottled dark grey and orange fill. Lot 13 is a layer of grey sandy clay and represents the base of the feature. As clay is not typical of the site, Lot 13 was likely poured in this location. This interpretation is supported by the presence of what appears to be a wood frame (Lot 14) placed around Lot 13 (Image 20, p. 57).

A total of 807 artifacts were found in Feature 1. The distribution of artifacts by lot is described below.

5.1.2.1 Lot 4

A total of 665 artifacts were found in Lot 4. The artifacts are summarized by function in Table 9. The 86 indeterminate fauna fragments are examined in detail in Appendix B.

Table 9: Lot 4 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	86
food/beverage	344
furnishing	1
indeterminate	96
personal/societal	7
structural	126
tools/equipment	5
Total	**665**

Food/Beverage Artifacts

The majority (52%) of the artifacts in Lot 4 had a food/beverage related function. Food/beverage function artifacts can be further divided into the more specific categories of beverage containers, storage containers, and tableware. Beverage containers included sherds from wine bottle and case/gin bottle, likely just two vessels. A single artifact was identified as from a storage container, a sherd of Albany slipped stoneware. Albany Slip was primarily in use from 1805 to 1920 (Miller 2000, p. 10).

Tableware artifacts accounted for 91% of the food/beverage artifacts. Tableware objects were mainly ceramic, including sherds from: bowls, plates, saucers, teabowls/cups, a pitcher, a teapot and a platter. An iron spoon handle and a sherd of glass tableware were also recovered. Basic ceramic tableware decoration types are summarized in Table 10 and representative examples of the decoration types found are shown in Image 21 (p. 58). Relevant date information is stated where available. Decoration types that are starred have further detail below.

Table 10: Feature 1, Lot 4 – Ceramic Decoration Types

Decoration Type	# of Artifacts	Date	Reference
edged*	38	Commonly used between 1790 and 1860	(Hunter and Miller 1994, p. 443)
Rockingham glazed	1	Peak of Canadian manufacturing was in the 1890s	(Burke 1991:35)
hand painted: late palette	99	1830s to 1870s	(Samford & Miller 2002)
indeterminate	3	n/a	
industrial slip: banded	5	Introduced in the 18th century, used to 20th century	(Sussman 1997, p. 1)
industrial slip: blue banded	3	Common after the 1840s into the 20th century	(Miller 1991, p. 6)
moulded*	6	n/a	
plain	66	n/a	

Decoration Type	# of Artifacts	Date	Reference
sponged (closely spaced, dabbed colour)	43	common from the 1820s to the 1860s, most popular in the 1830s	(Samford 2013, p. 500)
Sponged: cut	40	1840s to 1870s	(Samford 2013, p. 501)
Transfer printed: blue*	10	peak production 1817 to 1848	(Samford and Miller 2002a)
TOTAL	314		

Edge Decorated Ceramics

Edge decorated ceramics were one of the most common decorative types used on tablewares in North America between 1790 and 1860. The earliest documented occurrence of the decorative type was in the mid-1770s (Miller 2013, p. 487). Edged wares were produced into the 1890s. Different types and colours of edged wares have distinct date ranges. All of the sherds found in Lot 4 were blue, which becomes rare by around 1860 but was produced up to 1890s (Miller 1991, p. 6).

There were four types of edged decoration identified, types and dates are identified in Table 11 (Image 21, p. 58).

Table 11: Feature 1, Lot 4 - Edge Decorated Ceramics

Type	# of Artifacts	Date	Reference
symmetrical scalloped, impressed lines	13	1800 to 1830	(Miller 2013:489)
Embossed motifs (chicken foot)	15	1820s to 1830s	(Miller 2013:489)
unscalloped, impressed repetitive patterns	7	1840s to 1860s	(Miller 2013:489)
unscalloped, unmoulded, painted lines	1	1860s to 1890s	(Miller 2013:489)

Moulded

Six sherds of moulded ceramic were identified in Lot 4. One sherd was a plate rim with the classic Wheat pattern (Image 21, p. 58). Wheat patterns generally date from the 1860s to the 1900 (Samford and Miller 2002b). Another sherd had a checkered moulded pattern as well as a pink painted rim line, this sherd could possibly be from a Child's plate (see Lot 1). The other two sherds had very simple moulding.

Transfer Printed

Transfer printed ceramics were first available in the 1750s and continue to this day. Further information and key dates in the history of transfer print are noted in Lot 1. Ten sherds of blue transfer printed soup plate were recovered. Blue transfer print peaked in production from 1817 to 1848 (Samford and Miller 2002a). These sherds mended with sherds from Lot 1. See Lot 1 for further information.

Structural Artifacts

The next most common type of artifacts were structural in function and included nails, windowpane sherds, hinges, mortar sample and a spike. A total of 89 nails were recovered; 54 were machine cut, 30 were wrought by a blacksmith, and four could not be determined. The single spike was machine cut. See Lot 1 for further information regarding nail manufacture.

Personal/societal Artifacts

Personal/societal artifacts included two sherds of panel bottle, one of them with embossed lettering (Image 22, p. 58). Embossed markings on bottles were most common in the 19th century, becoming extinct around the 1920s when paper labels became more popular (Jones and Sullivan 1989, p.16, Fike 1987, p. 5). A fragment of Vulcanite comb and a fragment of terracotta smoking pipe were also noted. The first synthetic invented was Vulcanite, or vulcanized rubber in 1839 by Charles Goodyear (Hillman 1986, p. 20). Two buttons and a terracotta smoking pipe stem (Image 23, p. 59) were also found. One button was bone, and one button was Prosser made.

Other Artifacts

A total of 96 artifacts were inventoried whose function could not be concluded. Artifacts included: glass holloware vessels, iron sheet, strap, a fragment of iron bar, an iron ring, a slot screw and a wood sample. The five Tools/Equipment artifacts were fragments of a wire bucket handle and a sickle blade. The single Furnishing artifact was possibly a fragment of cast iron stove plate.

5.1.2.2 Lot 11

A total of 91 artifacts were found in Lot 11. The artifacts are summarized by function in Table 12. The 4 indeterminate fauna fragments are examined in detail in Appendix B.

Table 12: Lot 4 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	4
food/beverage	66
indeterminate	13
structural	7
tools/equipment	1
Total	**91**

Food/Beverage Artifacts

The majority (73%) of the artifacts in Lot 11 had a food/beverage related function. Food/beverage function artifacts can be further divided into the more specific categories of beverage containers, storage containers, and tableware. Beverage containers included one sherd from a wine bottle. A single artifact was identified as from a storage container, a sherd of stoneware. The sherd was painted, and salt glazed on the exterior and Albany slipped on the interior. Albany Slip was primarily in use from 1805 to 1920 (Miller 2000, p. 10).

Tableware artifacts accounted for 97% of the food/beverage artifacts. Tableware objects were mainly ceramic, including sherds from: bowls, plates, saucers, teabowls/cups, and a platter. An iron tablespoon and a two-tine fork were also recovered. Basic ceramic tableware decoration types are summarized in Table 13 and representative examples of the decoration types found are shown in Image 24 (p. 59). Relevant date information is stated where available. Decoration types that are starred have further detail below.

Table 13: Feature 1, Lot 11 – Ceramic Decoration Types

Decoration Type	# of Artifacts	Date	Reference
edged*	15	Commonly used between 1790 and 1860	(Hunter and Miller 1994, p. 443)
hand painted: late palette	19	1830s to 1870s	(Samford and Miller 2002a)
indeterminate	1	n/a	
industrial slip*	6	Introduced in the 18th century, used to 20th century	(Sussman 1997, p. 1)
plain	17	n/a	
sponged (closely spaced, dabbed colour)	1	common from the 1820s to the 1860s, most popular in the 1830s	(Samford 2013, p. 500)
Sponged: cut	1	1840s to 1870s	(Samford 2013, p. 501)
Transfer printed: blue (with moulded border)	2	peak production 1817 to 1848	(Samford and Miller 2002a)
TOTAL	62		

Edge Decorated Ceramics

All of the sherds found in Lot 11 were blue, which becomes rare by around 1860 but was produced up to 1890s (Miller 1991, p. 6). There were three types of edged decoration identified, types and dates are identified in Table 14. For further general Edge Decorated ceramic information, see Lot 1.

Table 14: Feature 1, Lot 4 - Edge Decorated Ceramics

Type	# of Artifacts	Date	Reference
symmetrical scalloped, impressed lines	4	1800 to 1830	(Miller 2013, p. 489)
Embossed motifs (chicken foot)	3	1820s to 1830s	(Miller 2013, p. 489)
unscalloped, impressed repetitive patterns	8	1840s to 1860s	(Miller 2013, p. 489)

Industrial Slip Ceramics

A total of six sherds, representing two bowls of industrial slip decorated ceramic were identified. One bowl was banded in blue and brown and was of the London Shape (Image 24, p. 59). Blue banded industrial slip is common after the 1840s and into the 20th century (Miller 1991, p. 6). The London Shape is the dominant shape used from circa 1825 to the 1840s (Miller 2011, p. 11). The second bowl was decorated with black mocha on a grey-blue band. It was also the London Shape (Image 24, p. 59). Mocha decoration was first manufactured in the late 18th century and continued in use into the early 19th century (Samford and Miller 2002a).

Other Artifacts

A total of 13 artifacts were inventoried whose function could not be concluded. Artifacts included: glass holloware vessels, iron sheet, strap, and possible fragment of iron container. Structural artifacts included nails, window pan and a mortar sample. The single Tools/Equipment artifact was an axe head.

5.1.2.3 Lot 12

A total of 3 artifacts were found in Lot 12. The artifacts included two ceramic tableware sherds and a fragment of bone. The ceramic tableware sherds represented a banded industrial slipped bowl and a blue edge decorated plate (Image 25, p. 60). Blue banded industrial slip is common after the 1840s and into the 20th century (Miller 1991, p. 6). Edge decorated; unscalloped, impressed repetitive patterns date from the 1840s to 1860s (Miller 2013, p. 489).

5.1.2.4 Lot 13

A total of 47 artifacts were found in Lot 4. The artifacts are summarized by function in Table 15. The 4 indeterminate fauna fragments are examined in detail in Appendix B.

Table 15: Lot 13 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	4
food/beverage	31
indeterminate	5
structural	6
tools/equipment	1
Total	**47**

Food/Beverage Artifacts

The majority (66%) of the artifacts in Lot 13 had a food/beverage related function. All of them were ceramic tableware, except a sherd of panelled glass tumbler. Ceramic tableware shapes included: plates, saucers and teabowls/cups. Basic ceramic tableware decoration types are summarized in Table 16 and representative examples of the decoration types found are shown in Image 26 (p. 60). Relevant date information is stated where available.

Table 16: Feature 1, Lot 13 Ceramic Decorations Types

Decoration Type	# of Artifacts	Date	Reference
edged: unscalloped, impressed repetitive patterns	3	1840s to 1860s	(Miller 2013, p. 489)
hand painted: late palette	8	1830s to 1870s	(Samford and Miller 2002a)
industrial slip: banded	6	Introduced in the 18th century, used to 20th century	(Sussman 1997, p. 1)
moulded	3	n/a	
plain	9	n/a	
sponged (closely spaced, dabbed colour)	1	common from the 1820s to the 1860s, most popular in the 1830s	(Samford 2013, p. 500)
TOTAL	30		

Other Artifacts

A total of five artifacts were inventoried whose function could not be concluded. Artifacts included: a glass bottle sherd and iron rod, sheet and strap. Structural artifacts included nails (wrought and cut) and windowpane glass. The single Tools/Equipment artifact was a possible slate pencil holder.

5.1.2.5 Lot 14

A single wood sample was recovered from Lot 14. This was taken from a wooden frame that made up this lot.

5.1.3 Feature 2 (Lots 5 and 17)

Feature 2 is an irregularly shaped pit feature (Image 27, p. 61) located along the western edge of the study area near the present-day fence line. It measured approximately 3.8 m in length and 3.6 m in width. Similar to Feature 1, Feature 2 was first identified during the Stage 3 archaeological assessment (Golder 2021a).

Feature 2 contained two lots (Images 28 and 29, p. 62). Lot 5, which made up the majority of the feature fill, is a mottled dark grey and orange sand with ash and wood inclusions. Lot 17 is a grey sand with cobbles and boulders. It appears to be displaced subsoil that was likely placed in the feature as it was backfilled.

A total of 380 artifacts were found in Feature 2. All artifacts came from within Lot 5. The artifacts are summarized by function in Table 17. The 92 indeterminate fauna fragments are examined in detail in Appendix B.

Table 17: Feature 2, Lot 5 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	92
food/beverage	160
furnishings	1
indeterminate	43
Personal/societal	35
structural	40
tools/equipment	9
Total	**380**

5.1.3.1 Food/Beverage Artifacts

The majority (42%) of the artifacts in Lot 1 had a food/beverage related function. Food/beverage function artifacts can be further divided into the more specific categories of beverage containers, food preparation, storage containers, indeterminate and tableware. The single beverage container identified was a sherd of wine bottle finish. The finish was noted as being of the “applied” variety, meaning it likely dates to pre-1870 (Lindsey 2020) (Image 30, p. 62). Food preparation artifacts recovered included a possible cast iron cauldron or cooking pot fragment and coarse red earthenware sherds from a milk pan. Six ceramic sherds were identified as sherds from storage containers. Three vessels were represented: two coarse red earthenware and one stoneware. Artifacts determined to be food/beverage function related, but unidentifiable beyond that were 10 sherds of coarse red earthenware holloware, these sherds could belong to either food preparation or storage vessels.

Tableware artifacts accounted for 76% of the food/beverage artifacts. Tableware objects were mainly ceramic, including sherds from: bowls, plates, saucers, teabowls/cups, and a pitcher. A bone leaf from a fork handle and a copper alloy teaspoon were also recovered (Image 30, p. 62). The teaspoon was impressed with four small symbols/letters that could not be deciphered. Only three tableware ceramic decoration types were identified in

Feature 2, Lot 5: Jackfield, late palette hand painted, and transfer printed (Image 31, p. 63). Late palette hand painted became common around 1830 and remained into the 1870s (Samford and Miller 2002a). Transfer printed ceramics were first available in the 1750s and continue to this day. Further information and key dates in the history of transfer print are noted in Lot 1. Two different colours of transfer print were identified in Feature 2, Lot 5: blue and pink. Blue transfer printed ceramics peaked in production from 1817 to 1848 (Samford and Miller 2002a). Four plate sherds were recognized as the Willow pattern. The Willow pattern originated in England and was designed by Thomas Minton in the 1780 (Little 1969, p. 15). The pattern has remained in production ever since. The pink transfer print was unusual, as it was overglaze printed on porcelain. The two sherds had worn decoration and represented a saucer and a teacup.

5.1.3.2 Indeterminate Artifacts

A total of 43 artifacts were inventoried whose function could not be concluded. Artifacts included: glass and metal vessels/containers, iron strap and wire, two handle-like fragments, and multiple samples of wood and charcoal.

5.1.3.3 Structural Artifacts

The next most common type of artifacts were structural in function and included nails, windowpane sherds, and a copper alloy lock escutcheon. A total of 35 nails were recovered; 25 were machine cut and 10 were wrought by a blacksmith. See Lot 1 for further information regarding nail manufacture.

5.1.3.4 Personal/Societal Artifacts

Personal/societal artifacts totalled 35. The majority of these were sherds of clay smoking pipes (24). One pipe bowl fragment was decorated in an effigy style. Two stem fragments were marked with their manufacturer. The most complete mark was “[mu]RRAY/GLAS[gow]” and the other fragment had the potential to be the same (Image 32, p. 63). The Murray factory was operational from 1830 to 1861 (Bradley 2000, p. 117).

Other personal/societal artifacts included a possible brooch pin, a footwear heel plate, a lice comb fragment, an eyeglasses lens, an indecipherable coin with a hole made through it, two straight pins and four buttons (Image 33, p. 63). One straight pin had a wound head, and one had a cast head. Wound head pins date prior to 1832, when a cast head pins take over the market (URS Poster). Four buttons were recovered: two bone, one copper alloy and one shell (Image 33, p. 63). The shell button was decorated with incised radiating lines.

5.1.3.5 Tools/Equipment Artifacts

Tools/equipment artifacts included sewing implements, as well as some more general artifacts, such as a hammer head, a possible blade (perhaps a screwdriver or punch bit), a possible wedge-like tool, and a possible lead weight. A total of five thimbles were found in this soil context, which is a very high number (Image 34, p. 64). Five thimbles would be unusual for an entire historical site, let alone a single feature. One other thimble was found in Feature 7, Lot 15.

5.1.3.6 Furnishing Artifacts

The single furnishing artifact was a hasp, possibly from a trunk.

5.1.4 Feature 3 (Lots 6 and 16)

Feature 3 is a rectangular pit feature (Image 35, p. 64) located immediately west of Feature 1. It measured approximately 3.2 m in length and 2.05 m wide. The feature fill (Lot 6) is a mottled dark grey-brown sand (Images 36 and 37, p. 65). Wood boards (Lot 16) were partially preserved along the edge of the feature (Image 38, p. 65) suggesting that it was originally wood lined.

5.1.4.1 Lot 6

A total of 336 artifacts were found in Lot 6 during the Turnbull Site Stage 4 AA. Two of these artifacts were mortar samples, with an additional 62 discarded. The artifacts are summarized by function in Table 18. The 25 indeterminate fauna fragments are examined in detail in Appendix B.

Table 18: Feature 3, Lot 6 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	25
food/beverage	75
indeterminate	26
personal/societal	31
structural	173
tools/equipment	6
Total	**336**

Structural

The majority (51%) of the artifacts in Lot 6 had a structural related function and included nails, windowpane sherds, a key, and mortar samples. A total of 134 nails were recovered; 120 were machine cut and 14 were wrought by a blacksmith. See Lot 1 for further information regarding nail manufacture.

Food/Beverage

The next most common type of artifacts were food and beverage in function and included storage containers and tableware ceramic vessels. Two ceramic storage vessels were identified: a stoneware jug and a coarse red earthenware holloware vessel. Tableware ceramic vessel shapes included: plates, saucers, teacups, a possible pitcher (handle fragment) and various flatware and holloware sherds that could not be identified further. Basic ceramic tableware decoration types are summarized in Table 19 and representative examples of the decoration types found are shown in Image 39 (p. 66). Relevant date information is stated where available. Decoration types that are starred have further detail below.

Table 19: Feature 3, Lot 6 – Ceramic Decoration Types

Decoration Type	# of Artifacts	Date	Reference
edged*	4	Commonly used between 1790 and 1860	(Hunter and Miller 1994, p. 443)
Rockingham glazed	1	Peak of Canadian manufacturing was in the 1890s	(Burke 1991, p. 35)
hand painted: late palette	18	1830s to 1870s	(Samford and Miller 2002a)
moulded*	4	n/a	
plain	26	n/a	
sponged (closely spaced, dabbed colour)	12	common from the 1820s to the 1860s, most popular in the 1830s	(Samford 2013, p. 500)
Sponged: cut	6	1840s to 1870s	(Samford 2013, p. 501)
Transfer printed: blue	2	peak production 1817 to 1848	(Samford and Miller 2002a)
TOTAL	73		

Edge Decorated Ceramics

Edge decorated ceramics were one of the most common decorative types used on tablewares in North America between 1790 and 1860. The earliest documented occurrence of the decorative type was in the mid-1770s (Miller 2013, p. 487). Edged wares were produced into the 1890s. Different types and colours of edged wares have distinct date ranges. All of the sherds found at the Turnbull Site were blue, which becomes rare by around 1860 but is produced up to 1890s (Miller 1991, p. 6). Four sherds were found in Lot 6; two were of the *embossed rim* variety, in particular *chicken foot* which dates from the 1820s to 1830s (Miller 2013, p. 488), and two were spalled so their decoration was not fully identifiable.

Moulded

Four sherds of moulded ceramic were noted: one with a gold rim line, two with moulded foliage/flowers and one in the Wheat Pattern. Ceramics with moulded foliage generally date to the 1860s, while harvest/wheat patterns generally date from the 1860s to the 1900 (Samford and Miller 2002b).

Personal/Societal

Personal/societal artifacts totalled 31. The majority of these were sherds of clay smoking pipes (23). Two stem fragments were marked with their manufacturer “Henderson/Montreal” (Image 40, p. 66). The Henderson company was operational from 1847 to 1876 (Bradley 2000, p. 117). Another two bowl fragments were decorated with impressed “TD”s.

Other personal/societal artifacts included five buttons: one shell, two bone and two Prosser-made (Image 41, p. 67). One of the Prosser buttons is transfer printed with a green pattern. Prosser buttons generally date post 1840 (Sprague 2002, p. 111). One sherd of miniature tableware was identified, possibly a doll’s plate (Image 42, p. 67). The sherd is decorated with a moulded border and brown transfer printed central design. A copper coin was also found and although worn, was identified as "BANK OF UPPER CANADA 1852//BANK TOKEN ONE HALF PENNY" (Image 42, p. 67). A possible copper alloy umbrella rib tip or ferrule was also noted.

Tools/Equipment

Tools/equipment artifacts included writing, sewing and horse related artifacts. The writing artifact was a slate pencil, the sewing artifact was a pair of small scissors (Image 43, p. 68) and the horse related artifacts included a fragment of harness bell and three machine cut horseshoe nails (Image 44, p. 68). These artifacts represent the only horse related artifacts recovered from the Stage 4 mitigation at the Turnbull site.

5.1.4.2 Lot 16

A single artifact was retrieved from Lot 16, a fragment of clay smoking pipe stem marked “Henderson/Montreal” (Image 45, p. 69). The Henderson company was operational from 1847 to 1876 (Bradley 2000, p. 117).

5.1.5 Feature 4 (Lot 7)

Feature 4 is a circular feature measuring approximately 30 cm in diameter (Images 46 and 47, pp. 70-71). This feature is likely associated with Features 5 and 6 (described in Sections 5.1.6 and 5.1.7), which all contained upright fragments of wood and formed a rough line suggesting that these features are likely post moulds associated with a fence.

Despite its small size, Feature 4 contained a large number of artifacts. A total of 72 artifacts were found in Feature 4, Lot 7. The artifacts are summarized by function in Table 20. The 7 indeterminate fauna fragments are examined in detail in Appendix B.

Table 20: Feature 4, Lot 7 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	7
food/beverage	58
indeterminate	3
personal/societal	1
structural	3
Total	**72**

5.1.5.1 Food/Beverage Artifacts

The majority (81%) of the artifacts had a food/beverage related function. All of the artifacts were sherds of ceramic tableware except for a sherd of coarse red earthenware holloware, which could have been from a food preparation or food storage vessel. Tableware vessels included sherds from: plates, saucers, tea bowls/cups, and various holloware and flatware vessels that could not be further identified. Basic ceramic tableware decoration types are summarized in Table 21 and representative examples of the decoration types found are shown in Image 48 (p. 71). Relevant date information is stated where available. Six of the late palette hand painted sherds belonged to a teacup with a pink double rim line in the “tulip” shape, which dates from the mid 1850s to early 20th century (Miller 2011, p. 13). Four of the sponged sherds belonged to a teacup in the “double-curve” shape, which dates from the 1830s into the 1850s (Miller 2011, p. 12).

Table 21: Feature 4, Lot 7 – Ceramic Decoration Types

Decoration Type	# of Artifacts	Date	Reference
Edged: unscalloped, impressed repetitive patterns	8	1840s to 1860s	(Miller 2013, p. 488)
hand painted: late palette	25	1830s to 1870s	(Samford and Miller 2002a)
plain	18	n/a	
sponged (closely spaced, dabbed colour)	5	common from the 1820s to the 1860s, most popular in the 1830s	(Samford 2013, p. 500)
sponged: cut	1	1840s to 1870s	(Samford 2013, p. 501)
TOTAL	57		

5.1.5.2 Structural Artifacts

Three structural artifacts were recovered: two sherds of windowpane and a machine cut nail. Machine cut nails become available after 1800 and are the dominant nail type by 1830s (Vincent 1993, p. 159, 163). Machine cut nails decline in use by the 1860s (Miller 2000, p. 14). See Lot 1 for further information regarding nail manufacture.

5.1.5.3 Other Artifacts

The three indeterminate function artifacts were fragments of iron sheet. The single personal/societal artifact was a fragment of clay smoking pit mouthpiece, with an amber glaze.

5.1.6 Feature 5 (Lot 8)

Feature 5 is a circular feature measuring approximately 37 cm in diameter (Images 46 and 49, pp. 70 and 72). Along with Features 4 and 6, it is likely a post mould associated with a fence. The interpretation of this feature as a post mould was supported by the presence of wood fragments within the feature which likely are the remains of a wood fence post. Unlike Feature 4, no artifacts were recovered.

5.1.7 Feature 6 (Lot 9)

Feature 6 is the third post mould feature and measures approximately 25 cm in diameter (Images 46 and 50, pp. 70 and 72). Like Feature 5, no artifacts were recovered from the feature fill (Lot 9).

5.1.8 Feature 7 (Lots 10 and 15)

Feature 7 is an irregularly shaped feature (Images 51 and 52, p. 73) measuring 2.65 m in length and 1.8 m wide. It is located immediately southeast of Feature 2. Feature 7 consisted of two lots. Lot 10 is a mottled dark grey-orange sand situated on top of Lot 15 which is a tan-grey sandy clay with ash. Much of the subsoil around Feature 7 was also reddened suggesting exposer to heat. The presence of ash in Lot 15 and fire reddened subsoil suggests that Feature 7 was a fire pit with Lot 10 representing fill placed into the pit after its use. A total of 107 artifacts were found in Feature 7.

5.1.8.1 Lot 10

A total of 36 artifacts were found in Lot 10. The artifacts are summarized by function in Table 18. The 9 indeterminate fauna fragments are examined in detail in Appendix B.

Table 22: Feature 7, Lot 10 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	9
food/beverage	21
indeterminate	2
personal/societal	3
structural	1
Total	**36**

Food/Beverage Artifacts

The majority (58%) of the artifacts had a food/beverage related function. Food/beverage function artifacts can be further divided into the more specific categories of food preparation, storage containers, indeterminate and tableware. The single food preparation artifact was a large, cast iron, holloware rim fragment, possibly from a cauldron or cooking pot type vessel. Two storage containers were identified, a black glazed stoneware vessel and a possible whiteware jar, identified by its unusual footring.

Tableware artifacts accounted for 76% of the food/beverage artifacts. Tableware objects were mainly ceramic, including sherds from: bowls, saucers, and a teacup. A sherd of glassware was also recovered (Image 53, p. 74). Unusual for the site was a sherd of porcelain teacup (Image 53, p. 74). This sherd had no decoration, but was noted to be the London Shape, which was the dominant style used from circa 1825 into the 1840s (Miller 2011, pp. 11-12). The only ceramic decoration identified in Lot 10 was late palette hand painted. This type of decoration became common around 1830 and remained into the 1870s (Samford and Miller 2002a).

Other Artifacts

Other artifacts found in Lot 10 included three fragments of clay smoking pipe, a machine cut nail (Image 53, p. 74) and an iron strap handle for a vessel.

5.1.8.2 Lot 15

A total of 71 artifacts were found in Lot 15. The artifacts are summarized by function in Table 23. The 17 indeterminate fauna fragments are examined in detail in Appendix B.

Table 23: Feature 7, Lot 10 Artifact Function Totals

Function	# of Artifacts
fauna: indeterminate	17
food/beverage	33
personal/societal	3
structural	5
indeterminate	11
tools/equipment	2
Total	**71**

Food/Beverage Artifacts

The majority (46%) of the artifacts had a food/beverage related function. Food/beverage function artifacts can be further divided into the more specific categories of food preparation, storage containers and tableware. The food preparation artifacts were likely sherds of course red earthenware milk pan. The storage container was a sherd of whiteware jar rim, likely belonging with the sherd identified in the previous Lot 10.

Tableware artifacts accounted for 76% of the food/beverage artifacts. Tableware objects were mainly ceramic, including sherds from: plates, saucers, and a teapot. The teapot was a Jackfield-type vessel and it's shape was identified by it's lid. A fragment of knife blade and a sherd of a heavy stemware foot was also recovered, perhaps belonging to a vessel such as a creamer (Image 54, p. 74). Basic ceramic tableware decoration types are summarized in Table 24 and representative examples of the decoration types found are shown in Image 55 (p. 75). Relevant date information is stated where available.

Table 24: Feature 7, Lot 15 – Ceramic Decoration Types

Decoration Type	# of Artifacts	Date	Reference
Jackfield-type glazed	1	Most popular in the late 18th century, versions continue into the 19th century	(MACL 2002)
hand painted: late palette	5	1830s to 1870s	(Samford and Miller 2002a)
lustre	5	Peaked around 1860	(Samford 2013:493)
plain	11	n/a	
Transfer printed: blue	1	peak production 1817 to 1848	(Samford and Miller 2002a)
TOTAL	23		

Other Artifacts

Structural artifacts included two sherds of windowpane, two machine cut nails and a key (Image 56, p. 75). Indeterminate function artifacts included typical metal objects such as bar, rod, screen, sheet, wire and a hook, as well as samples of wood and charcoal. Personal/Societal artifacts included a fragment of clay smoking pipe, a large shell button and a straight pin with a wound head (Image 57, p. 76). Tools/Equipment artifacts included a thimble (sewing), and a piece of animal trap (hunting/fishing) (Image 58, p. 76).

5.2 Faunal Analysis

This section will provide the results and interpretations gathered from the zooarchaeological analysis of the Turnbull Site (BfGd-8) faunal assemblage. A total of 317 faunal remains were recovered during the Stage 4 excavations. All 317 skeletal elements were distinctive enough to be able to be identified to the minimum taxonomic distinction of Class for the faunal assemblage (Table 25). A complete catalogue of all faunal remains identified to the highest degree of taxonomic distinction possible can be seen in Table 26.

Table 25: Number of Identified Specimens for each taxonomic class. Number of Individual Specimens (NISP) and percent representation within the assemblage

Taxon Class	Common Name	NISP	% Represented (NISP)
Mammalia	Mammal	306	96.5%
Aves	Bird	7	2.2%
Actinopterygii	Fish	1	0.3%
Reptilia	Reptile	1	0.3%
Bivalvia	Mollusk	2	0.6%
Total Count		**317**	

Table 26: Summary results for all identifiable faunal remains

Class	Order	Family	Genus	Species	Common Name	NISP
Mammalia						306
	Artiodactyla					
		Bovidae				
			Bos	*B. taurus*	Cattle	42
			Ovis	*O. aries*	Sheep	21
		Suidae	Sus	*S. scrofa*	Pig	21
	Rodentia				Rodents	2
Aves						
	Galliformes				Ground Birds	7
Actinoterygii						
	Perciformes	Percidae			Ray-Finned Fish	1
Reptilia						
	Chelonia	Cryptodira (Sub-Order)			Turtles	1
Bivalvia						
	Anomalodesmata	Cardiidae			Cockle	2

Species with the highest representation from the collection are cattle (n=42), sheep (n=21), and domestic pig (n=21). Much of the assemblage is fragmented leading to a low degree of identification to the species level (n=84; 26%).

Most of the mammalian bone of which species could be identified consist of long bones of the hindlimbs, specifically the tibiae (n=6) and femur (n=3); long and short bones of the forelimbs, specifically the radii (n=5), ulnae (n=2), metacarpals (n=4) and calcanea (n=4); and long bones belonging to both the forelimbs and hindlimbs, specifically the phalanges (n=12). The higher abundance of these bones is due to these body portions being near to or the most meat rich in terms of the femur and tibia but having minimal flesh and little to no in-bone nutrients such as marrow themselves, leading to their abundant refuse without fragmentation through butchery practices. Furthermore, the lower limb bones are quite dense and able to withstand taphonomic traces such as burning and breakage through feeding and processing that would otherwise fragment other bones beyond identification.

Intrusive elements exist within the assemblage. Burrowing rodents have likely disturbed the stratigraphy, placing themselves temporally and spatially incongruent with their associated archaeological timeframe. While not identified to the highest degree of taxonomic distinction and only listed as Mammalia in the catalogue it is possible some of the fragmented mammalian elements belong to Order Rodentia. It is possible that some of the rodent remains are temporally correct, as is evidenced by the moderate degree of gnaw marks present on faunal remains.

Assessing overall diet of inhabitants of this site was done conservatively, due to the fragmented assemblage. Focus on species that had evidence of human agency by either the presence of cut marks from butchery action, burn damage, or calcification from cooking or refuse action confirmed a meat diet reliant on cattle, sheep, and domestic pig. Evidence of hunting and processing of smaller game is likely lost to taphonomic actions such as cooking smaller animals whole, and scavenging carnivore agents that would either consume the bones whole or transport them away from the site.

The Stage 4 mitigation of the Turnbull Site have interpreted it as the remains of the Turnbull homestead depicted the 1863 map (Map 3) occupied by the Turnbull family. Alexander Turnbull is listed in the 1861 Canada Census Records as a 51-year-old farmer who immigrated to Dalhousie Township from Scotland.

Current understanding of 19th century Upper Canada production and consumption of foods is primarily based on published historical accounts interpreted alongside 18th and 19th century British and American customs (Tourigny 2020). Various studies suggest that meals consumed in the 19th century in Upper Canada differed from those in English customs at the time. Upper Canadian meals were often described as containing noticeably more meat than typical English menus in both fresh and preserved forms with salted pork as a staple (Tourigny 2020). As noted in Section 2.2.1 of this report, pork packing was an early industry in Lanark County. Rural areas were thought to be reliant on pork, especially amongst newly settled immigrant families. As farmers became better established and more land was cleared for pastures the ability to rear cattle and sheep would have improved. The faunal assemblage from the Turnbull Site suggests Alexander Turnbull may have reared cattle, pigs, and sheep and at the very least consumed all three based on butchery marks identified on the faunal remains of all three species.

While published historical accounts have aided in understanding 19th century Upper Canada foodways Archaeological research through investigations of human skeletal, palaeobotanical and zooarchaeological remains has further increased the understanding. Ferris and Kenyon (1983) noted that Scottish immigrants consumed more mutton than other immigrant groups based on observations of five different assemblages from

19th century Upper Canada sites (Tourigny 2020). Immigrants to the province may have wanted to create a sense of normalcy in their everyday routines by incorporating the foods they were accustomed to prior to their arrival in the region which likely attributes to a higher frequency of sheep remains being found in areas settled by Scottish immigrants. Analysis of seven assemblages from 19th century sites in southwestern and eastern Ontario by Tourigny (2020) concluded that faunal assemblages from this time are primarily dominated by three mammalian species: cattle (*B. taurus*), pigs (*S. scrofa*), and sheep (*O. aries*). Results from Tourigny's study were variable in which species was most commonly identified at each site but it was concluded that most sites are dominated by cattle or pigs. Cattle is the most commonly identified species at Turnbull Site which is consistent with Tourigny's study. Sheep and pig were identified at the same frequency. While pig is usually found at a higher frequency than sheep the equal rate in which they were recovered may be related to Turnbull immigrating to Upper Canada from Scotland.

5.3 Archaeobotanical Analysis

Sediment samples were collected from Features 2 and 3 for flotation. Table 27 provides a summary of recovered artifacts and flora remains from the light and heavy fractions. Appendix C provides a comprehensive summary of the processed floats, includes fraction weights.

Small frequencies of artifacts and microfaunal remains were recovered from the heavy and light fractions.

Table 27: Turnbull Stage 4 Archaeobotanical Summary

Fraction	Artifacts/Flora	Common Name	Freq.
Heavy	Charred Nut Shells		21
	Microfaunal		6
	Artifacts		4
	Uncharred *Prunus pensylvanica*	Pin cherry	1
Light	Uncharred *Amaranthus sp.*	Pigweed	22
	Charred Nut Shells		21
	Uncharred *Chenopodium sp.*	Goosefoot	17
	Uncharred *Rubus sp.*	Brambles (raspberries, blackberries, dewberries)	6
	Charred *Rubus sp.* flesh	Brambles (raspberries, blackberries, dewberries)	4
	Uncharred *Panicum capillare*	Witchgrass	3
	Microfaunal		2
	Uncharred *Sambucus canadensis*	Elderberry	1
	Charred *Carduus sp.*	Thistle	1
	Unidentified		2

The presence of numerous uncharred seeds likely represents modern 'seed rain', where seeds have moved or washed into the feature soil. On the whole, these modern seeds appear to derive from field or forest-edge or mixed field-forest species and likely reflect the habitat of the very recent past. Unless carbonised or recovered from waterlogged or organic-rich deposits these uncharred seeds are not believed to represent the archaeological past.

Nutshell fragments (n=42), bramble flesh (*Rubus sp.*) (n=4) and thistle (*Carduus sp.*) (n=1) represent recovered charred seeds or flesh. When considered in terms of the size of the site, the recovered frequencies make it difficult to determine the archaeological significance of these recoveries (if any).

A summary of heavy and light fraction recoveries by feature is provided in Table 28. Feature 2 yielded a relatively high number of charred nutshell fragments, but very little uncharred or charred seeds. Feature 2 did yield the highest number of identifiable charcoal fragments (see Table 3).

Table 28: Turnbull Stage 4 Float Summary by Feature

Feature	Artifacts	Micro-fauna	Uncarbonized Seeds	Carbonized Seeds/Flesh	Carbonized Nut Shells
3 (6C)	0	0	Amaranthus sp. (n=16), Panicum capillare (n=1), Rubus sp. (n=3)		18
2 (5C)	1	1	Amaranthus sp. (n=4), Chenopodium sp. (n=2), Rubus sp. (n=3), Unidentified (n=2)	Rubus sp. flesh (n=3)	0
2 (5A)	1	0	Amaranthus sp. (n=2)	Rubus sp. flesh (n=1)	17
3 (6A)	2	7	Chenopodium sp. (n=15), Panicum capillare (n=2), Prunus pensylvanica (n=1), Sambucus canadensis (n=1)	Carduus sp. (n=1)	7
Total	**4**	**8**	**52**	**5**	**42**

Charcoal collected in the 4 mm sieve were analyzed, with the results of identifiable pieces presented in Table 29. Feature 3 yielded a relatively high number of Northern White Cedar charcoal fragments (*Thuja occidentalis*) (n=33).

Table 29: Charcoal Recovered from 4 mm Sieve

Log Form	Feature	Fraction	Identifier	Common Name	Freq.
1	3 (6C)	Light	N/A	Unidentified Hardwood	2
3	2 (5C)	Light	N/A	Unidentified Hardwood	1
5	2 (5A)	Light	*Thuja occidentalis*	Northern White Cedar	33
6	2	Heavy	N/A	Unidentified Hardwood	1
7	3 (6A)	Light	*Ulmus sp.*	Elm	1

5.4 General Site Distribution

The distribution of features identified during the Stage 4 mitigation reveals some patterns. Features 1 and 3 are located in close proximity and may be the subsurface remains of a single building, likely the Turnbull family log house depicted on 1863 map (Map 3). The interpretation of these features as associated with a building is supported by both features being rectangular and the fact Feature 3 is associated with a large number of structural artifacts.

A second cluster of features is located in the northwestern area of the site close to Highland Line Road. In contrast to Features 1 and 3, Features 2 and 7 are irregular in shape. Nonetheless, structural artifacts make up the second largest category of artifacts for Feature 2 indicating that it may also represent the subsurface remains of a structure.

The third pattern is the row of post moulds (Features 4 to 6) located along the southwestern boundary of the site. These features most likely represents a fence line that once passed beside the Turnbull house.

6.0 ANALYSIS AND CONCLUSIONS

The seven features excavated during the Stage 4 archaeological mitigation provide a window into the spatial organization of a mid-19th century farmstead in Dalhousie Township. Features 1 and 3 are likely the subsurface remains of the Turnbull family log house and the association of the two features is supported by their proximity and orientation. Feature 3 is interpreted as a storage space or root cellar that was likely built underneath the log house. The construction of sub-floor pits is associated with early house forms in Ontario (MacDonald 1997, p. 58). Such pits were excavated under the kitchen or living room area, typically near the fireplace (Strickland 1971). The pits were used to store root crops and salted pork where they could be protected from the harsh Canadian winters.

Feature 1 is interpreted to be the remains of the chimney and this interpretation is supported by the presence of cut stone in the vicinity of this feature in the topsoil (Lot 1) above the feature, the presence of ash and mortar, and a large number of cattle, pig, and sheep bones recovered from within this feature. Chimneys typically measured 4 to 6 feet wide and could be built from stone, brick or, in the case of early chimneys, wattle and daub (MacDonald 1997, p. 58). Measuring 3.1 m in length and 2.1 m wide, is larger than described as typical by MacDonald (1997). Feature 1 contains a clay base which may indicate the chimney was primarily wattle and daub with the cut stones resting on top to form the hearth. An example of such a chimney can be seen in Image 59 (p. 77). Partial remains of fireplaces at other Ontario archaeological sites have been noted to include rectangular concentrations of stones at ash such as at the Pickard Site (AhGx-24) in Ancaster (Welsh and MacDonald 1996). Much of the stone would have likely been removed when the log house was torn down, and the location of the homestead converted to agricultural field sometime in the late 19th or early 20th century.

Significantly, the orientation of Features 1 and 3 provides some evidence for the layout of the log house. The chimney was built along the northern wall of the house. Feature 3 shows the location of the kitchen or living area beside the chimney with the house facing the historic road which largely followed the path of the present Highland Line Road.

A fence was located to the east of the house as suggested by Features 4 to 6. Given the space between post moulds, this fence was likely wire and would have resembled the wire fence currently located along Highland Line Road on the west side of the property.

Feature 2 may represent an outbuilding or pit used for the disposal of domestic waste. The interpretation of Feature 2 as an outbuilding is better supported by its proximity to the road, the presence of structural remains, and the number of personal artifacts including combs, eye glass lenses, and sewing equipment (Images 34 and 35, p. 64). Feature 7 is likely a fire pit given the presence of ash and fire reddened soil. It is tempting to interpret Feature 2 and 7 as the initial occupation of the property by the Turnbull family, perhaps representing the initial shanty built by the family and an outdoor fire pit as they cleared the land and built their log house. The log house, built once the family was more established on the property and represented by Features 1 and 3, was likely built further away from the road to provide privacy. If this interpretation is correct, the initial log shanty may have been converted to a different purpose such as converted to a cellar or stable.

Though not identified during the Stage 4 mitigation, the Turnbull homestead likely also would have contained an outhouse and well. These may have been located outside of the Stage 4 study area and were thus not identified following the mechanical topsoil removal.

Information on food and access to animals is provided by the artifact and faunal analysis. The Turnbull family likely kept pigs, cattle, and sheep. The cattle were both consumed and used as a source for milk. The consumption of sheep may reflect the Scottish origins of Alexander Turnbull as sheep were typically more commonly kept among Scottish immigrants than immigrants of other groups (Ferris and Kenyon 1983). The archaeobotanical analysis produced more limited results but suggests the consumption of brambles such as raspberries, blackberries, dewberries.

A small number of horse related artifacts were recovered from Feature 3. Their presence suggests the Turnbull's had a horse. It is unusual that the horse related artifacts are from Feature 3, interpreted to be a pit built under the log house, but their presence may also indicate the log house was converted to a stable after the Turnbull family no longer lived on the property.

The artifact analysis supports the mid 19th century occupation of the site suggested during the Stage 2 and 3 archaeological assessments of the site (Golder 2020; 2021a). The land registry records indicate Turnbull purchased the property in 1859 and the family may have already moved elsewhere by 1881 when the house is no longer shown on the historic maps (Map 3).

Comparison of the Turnbull Site to similar sites within Dalhousie Township is limited by the small number of other archaeological assessments conducted in the area. The closest site that dates to the same time period is the Duncan Site (BfGd-9), located approximately 1 km southwest of the Turnbull site. The Duncan Site was interpreted to be a domestic refuse scatter located approximately 100 m south of the likely location of the Duncan homestead based on historic maps (Golder 2021b; 2021c). Though the two sites are very different, the Duncan Site shows the practice of disposing of domestic waste in a "back-forty" away from the house. This provides some additional support to the interpretation of Feature 2 as being the remains of the outbuilding rather than primarily a refuse pit as its location would have put the feature along the road passing in front of the house and would have been visible in front of the log house located up the slope. While not unknown as demonstrated by the number of refuse piles or rusting vehicles visible on modern farm properties while driving along country roads, the digging of a refuse pit so close to the house would have likely been unattractive to the Turnbull family and they have been also disposing of waste in an area of the property not covered by the present project.

7.0 RECOMMENDATIONS

The results of the Stage 4 mitigation of the Turnbull Site (BfGd-8) provide the basis for the following recommendation:

1) The Turnbull Site (BfGd-8) has been fully excavated and documented, and, as such, the site has no further cultural heritage value or interest and requires no additional archaeological assessment.

8.0 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the Minister of Tourism, Culture and Sport, as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Heritage, Sport, Tourism and Culture Industries, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest , and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33, requires that any person discovering or having knowledge of a burial site shall immediately notify the police or coroner. It is recommended that the Registrar of Cemeteries at the Ontario Ministry of Consumer Services is also immediately notified.

Archaeological sites recommended for further archaeological fieldwork or protection remain subject to Section 48(1) of the Ontario Heritage Act and may not be altered, or have artifacts removed from them, except by a person holding an archaeological licence.

9.0 IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the archaeological profession currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

This report has been prepared for the specific site, design objective, developments and purpose described to Golder by Thomas Cavanagh Construction Limited (the Client). The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges the electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client cannot rely upon the electronic media versions of Golder's report or other work products.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project.

Special risks occur whenever archaeological investigations are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain archaeological resources. The sampling strategies incorporated in this study comply with those identified in the Ministry of Heritage, Sport, Tourism and Culture Industries' *Standards and Guidelines for Consultant Archaeologists* (2011).

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11.0 IMAGES

Image 1: Field crew conducting test unit excavation to expose Feature 1, view southeast.

Image 2: Field crew conducting test unit excavation to expose Feature 1, view southeast.

Image 3: Excavator conducting mechanical topsoil removal along the property fenceline, view southwest.

Image 4: Excavator conducting mechanical topsoil removal view northeast.

Image 5: Field crew excavating Feature 3, view northwest.

Image 6: Field crew conducting hand excavation of Feature 2, view southwest.

Image 7: Coarse stoneware sherds with Albany slipped interior (left) and salt glazed exterior (right) from units E116 N110 and E116 N112.

Image 8: Tableware artifacts: Iron fork tines (E117 N109) and glass stopper (E116 N110).

Image 9: Representative examples of ceramic tableware decoration: (1st row, left to right) edged: embossed motifs (E117 N111), edged: unscalloped, impressed repetitive patterns (curved lines), Rockingham glazed (E115 N112), Jackfield-type (E92 N137), hand painted: late palette (E88 N135). (2nd row, left to right) industrial slip: cable (E117 N110), Majolica (E115 N109), moulded/child's plate (E115 N109). (3rd row, left to right) Sponged (E115 N111), cut sponged (E116 N109). (4th row, left to right) partial blue transfer printed mark, possibly Davenport (E116 N112), transfer printed black (E117 N109), transfer printed brown (E115 N111), transfer printed blue (E89 N134).

Image 10: Plate containing JR & Co maker's mark thought to belong to John Ridgway & Co pottery in Stoke-on-Trent, England and dating to between 1841 t0 1855.

Image 11: (Top) machine cut nail (E115 N111) and (bottom) wrought nail (E115 N111).

Image 12: Representative examples of clay smoking pipe fragments (E92 N135). The bottom pipe stem contains the words “MURRA[y]/[g]LASGOW”.

Image 13: Representative examples of button types (left to right): shell (E92 N135), bone (E116 N109), Prosser (E116 N109), iron (N116 E112, and copper alloy (E117 N110).

Image 14: Bank of Montreal token issued 1835 to 1837 (E116 N110).

Image 15: Representative examples of writing implements: two slate pencils (E115 N111 and E116 N109) and sherd from an ink bottle (E116 N110).

Image 16: Possible candleholder from unit E115 N111.

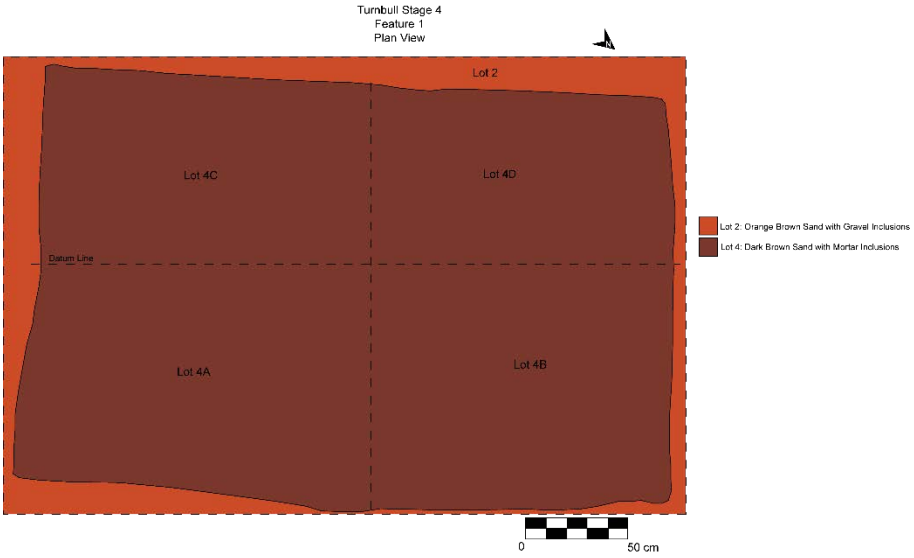


Image 17: Plan drawing of Feature 1.

Image 18: Photo showing the cross section of Feature 1, view west.

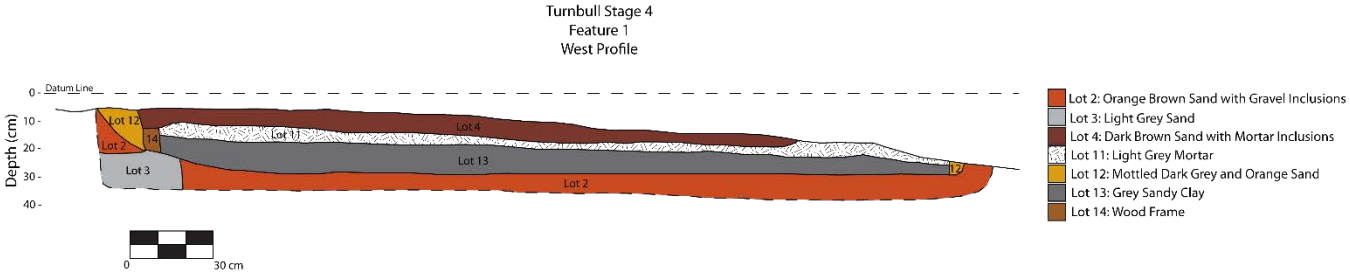


Image 19: Drawing of west profile of Feature 1.

Image 20: Closeup of the remains of a wood frame used in the construction of Feature 1, view southwest.

Image 21: Ceramic tableware decoration types from Feature 1, Lot 4 (top row, left to right): symmetrical scalloped, impressed lines, embossed motifs (chicken foot), unscalloped, impressed repetitive patterns, unscalloped, unmoulded, painted lines, (bottom row, left to right) hand painted: late palette, industrial slip: banded, moulded: Wheat, sponged, cut sponged, and transfer printed blue.

Image 22: Personal/societal artifacts from Feature 1, Lot 4 (left to right): embossed panel bottle, Vulcanite comb, terracotta smoking pipe.

Image 23: Representative personal/societal artifacts from Feature 1, Lot 4 (left to right): bone button, Prosser button and terracotta smoking pipe stem.

Image 24: Representative ceramic tableware decoration types from Feature 1, Lot 11 (top row, left to right): symmetrical scalloped, impressed lines, Embossed motifs (chicken foot), unscalloped, impressed repetitive patterns, hand painted: late palette, (bottom row, left to right) industrial slip: banded and London Shape, industrial slip: Mocha, sponged, and cut sponged.

Image 25: Decorated ceramic tableware types from Feature 1, Lot 12: blue edge decorated plate (left) and banded industrial slipped bowl sherd (right).

Image 26: Representative ceramic tableware decoration types from Feature 1, Lot 13 (top row, left to right): edged: unscalloped, impressed repetitive patterns, hand painted: late palette, (bottom row, left to right) industrial slip: banded, moulded, and sponged.

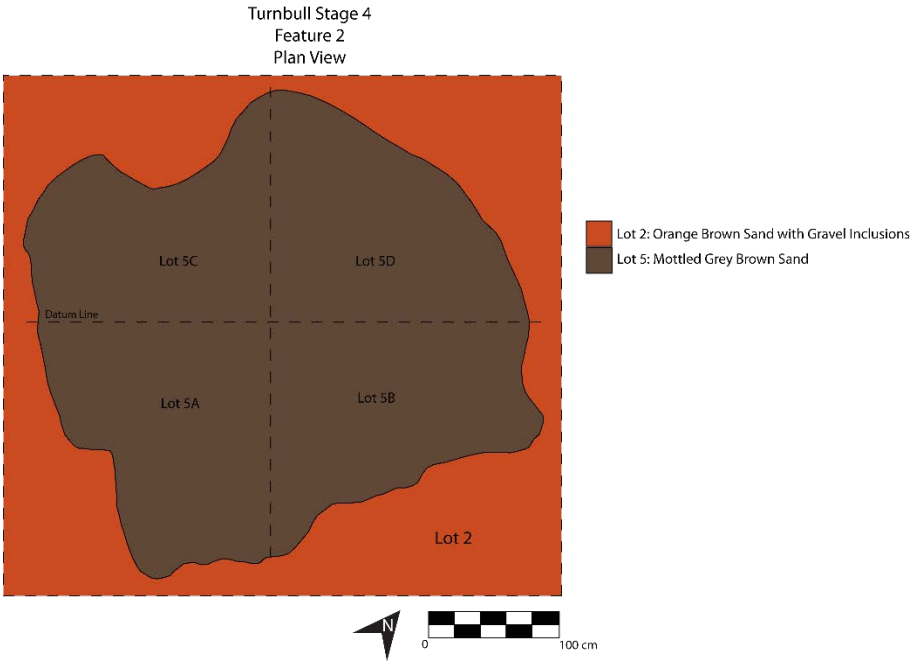


Image 27: Plan view of Feature 2.

Image 28: Photo of north profile of Feature 2, view northwest.

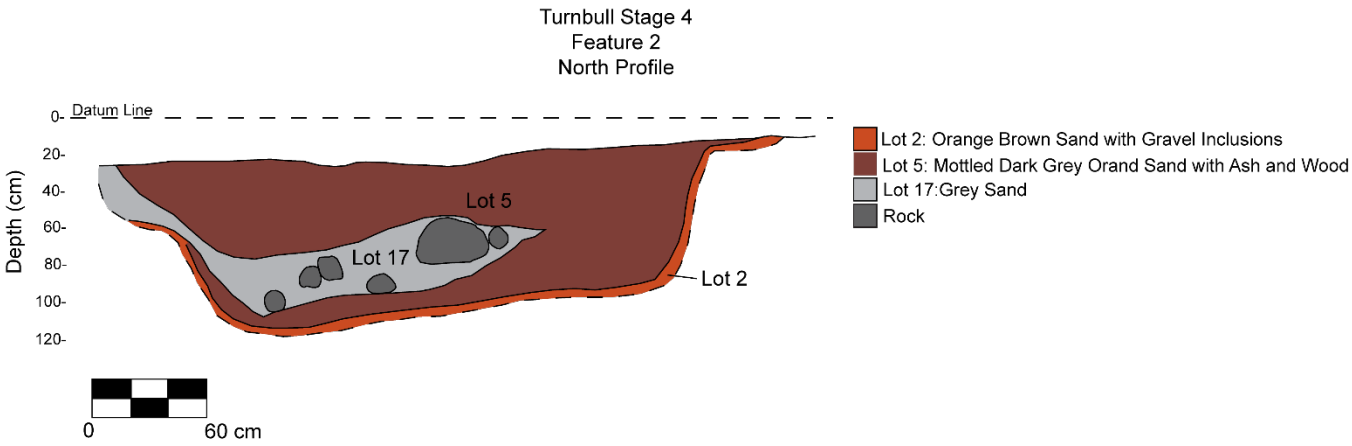


Image 29: North profile of Feature 2.

Image 30: Wine bottle with applied finish, bone fork handle and teaspoon from Feature 2, Lot 5.

Image 31: Representative ceramic tableware decoration types from Feature 2, Lot 5 (Left to right): Jackfield-type, hand painted: late palette, blue transfer print (willow), and pink transfer print on porcelain.

Image 32: Pipestem labelled Murray/Glasgow from Feature 2, Lot 5.

Image 33: Representative personal/societal artifacts from Feature 2, Lot 5 (left to right): footwear heel plate, a lice comb fragment, an eyeglass lense, an indecipherable coin with a hole through it, two straight pins, and four buttons.

Image 34: Representative thimbles from Feature 2, Lot 5.

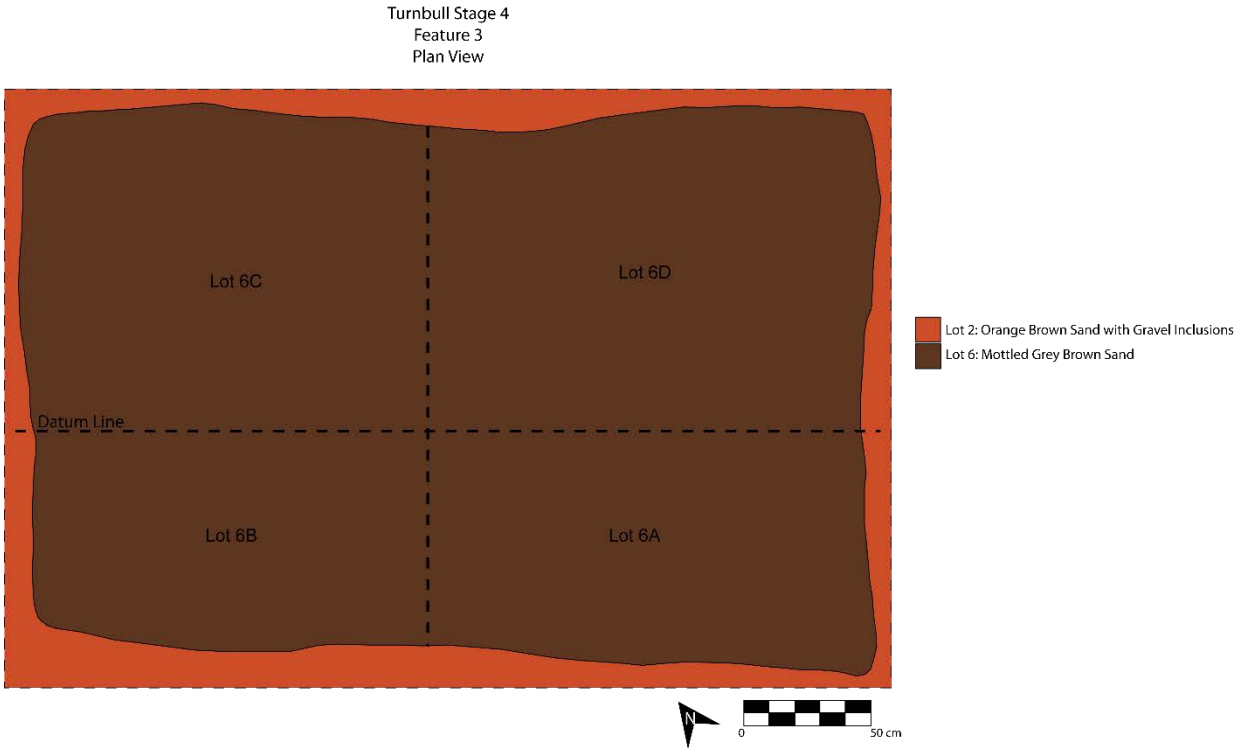


Image 35: Plan drawing of Feature 3.

Image 36: East Profile of Feature 3, view northeast.

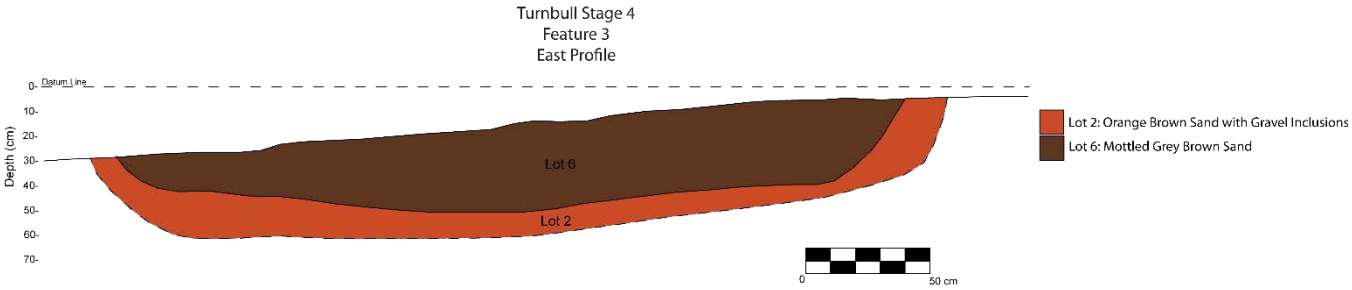


Image 37: East profile of Feature 3.

Image 38: Location of a fragmentary wooden board (Lot 16) along the wall of Feature 3. The location of the board is highlighted by the red rectangle.

Image 39: Representative ceramic tableware decoration types from Feature 3, Lot 6: (Top row, left to right) edged: embossed motif, Rockingham glazed, hand painted: late palette, moulded/gold rim line, (bottom row, left to tight) moulded flowers, moulded wheat pattern, sponged, cut sponged, and blue transfer printed.

Image 40: Clay smoking pipe stem marked “Henderson/Montreal”.

Image 41: Buttons from Feature 3, Lot 6 (Left to right): shell, two bone buttons, Prosser-made and Prosser-made with transfer print.

Image 42: Doll's plate, 1852 coin, and umbrella tip from Feature 3, Lot 6.

Image 43: Slate pencil and scissors from Feature 3, Lot 6.

Image 44: Harness bell and horseshoe nails from Feature 3, Lot 6.

Image 45: Clay smoking pipe stem marked “Henderson/Montreal” from Feature 3, Lot 16.

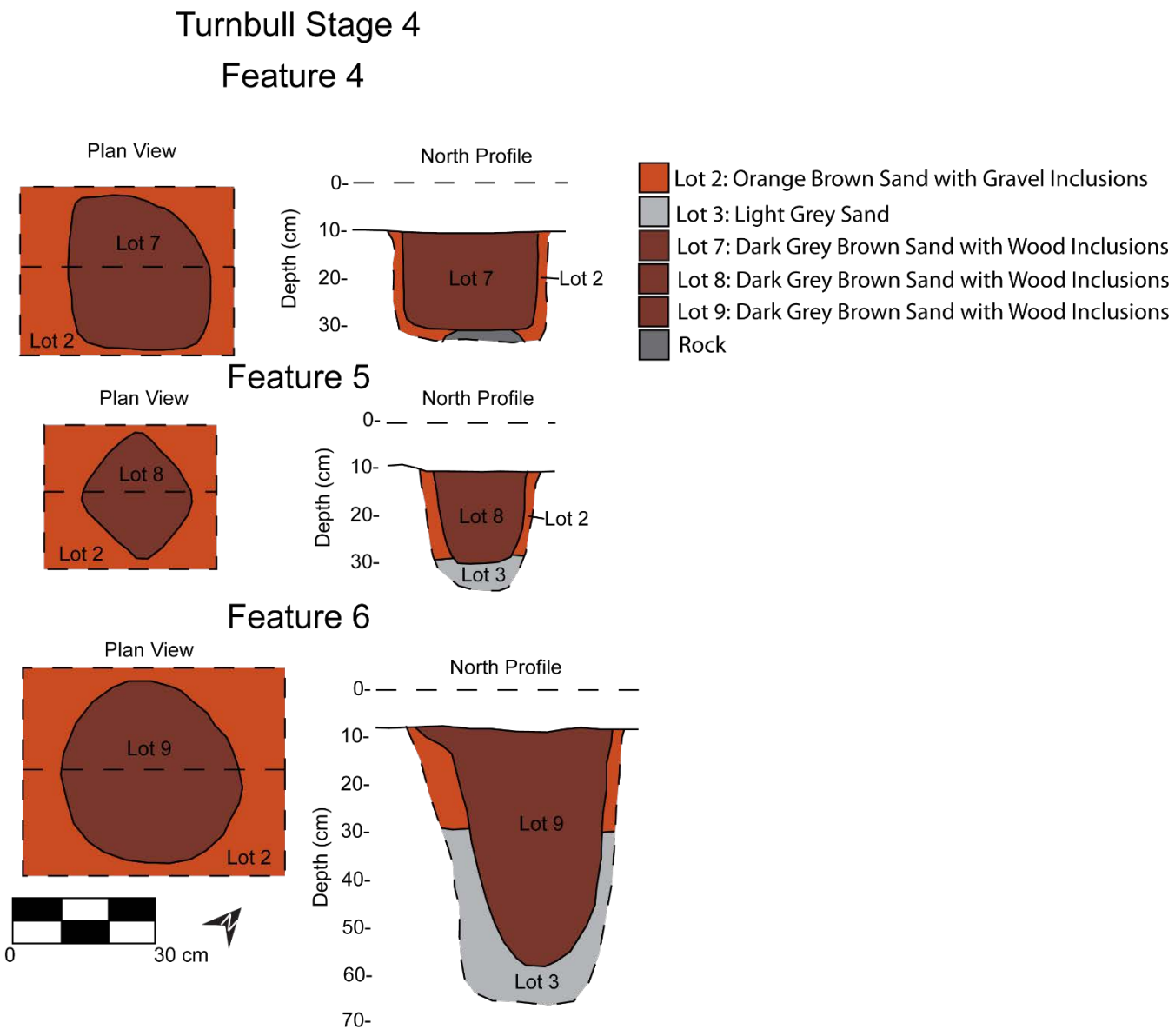


Image 46: Plan and profile drawing of Features 4 to 6.

Image 47: Feature 4, view northwest.

Image 48: Representative ceramic tableware decoration types from Feature 4, Lot 7 (left to right): edged: unscalloped with impressed repetitive patterns hand painted: late palette, sponged and cut sponged.

Image 49: Feature 5, view northwest.

Image 50: Feature 6, view northwest.

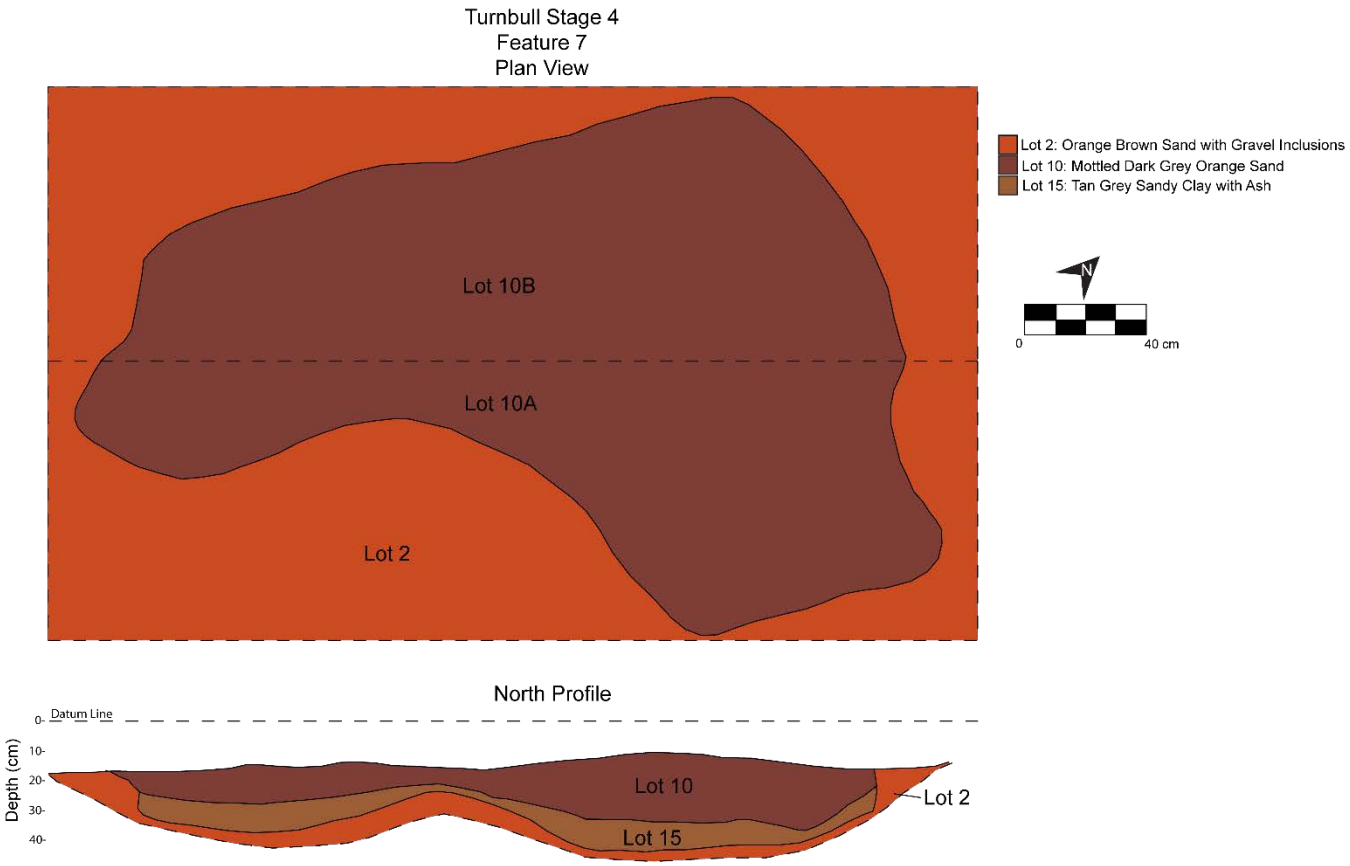


Image 51: Plan and profile drawing of Feature 7.

Image 52: North profile of Feature 7, view north.

Image 53: Representative artifacts from Feature 7, Lot 10 (left to right): glass tableware, Porcelain teacup (London shape), hand painted: late palette, machine cut nail.

Image 54: Iron knife blade fragment and glass stemware foot from Feature 7, Lot 15.

Image 55: Representative ceramic tableware decoration types from Feature 7, Lot 15 (left to right): Jackfield-type, hand painted: late palette, lustre, and blue transfer printed.

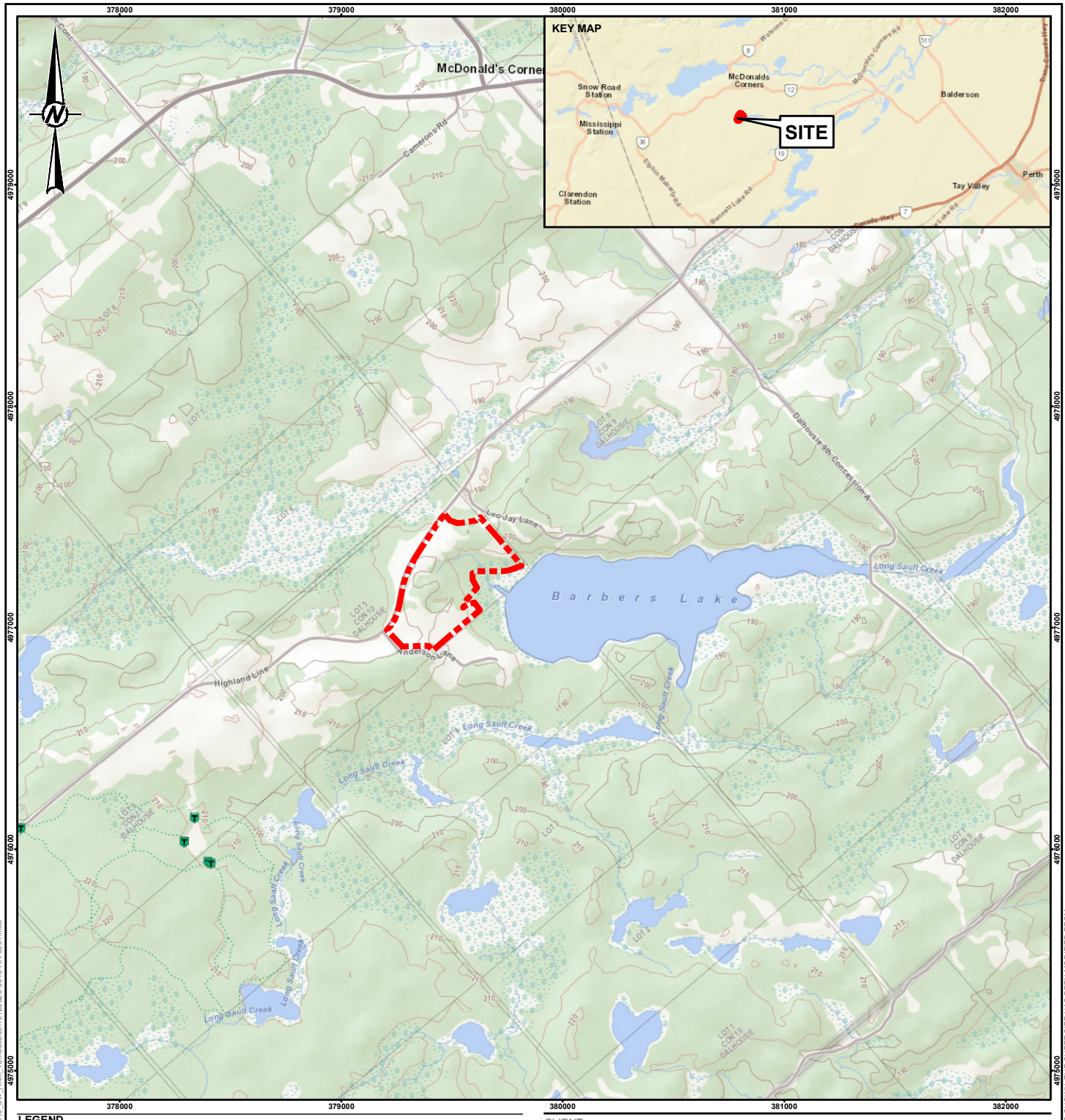
Image 56: Key from Feature 7, Lot 15.

Image 57: Shell button and straight pin with wound head from Feature 7, Lot 15.

Image 58: Thimble (top) and animal trap jaw (bottom) from Feature 7, Lot 15.

Image 59: Photo of a stick and mud chimney from a historic log house (Caddo Heritage Productions 2013). Note the field stones used in the construction of the base.

12.0 MAPS



LEGEND

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NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

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2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 18 VERTICAL DATUM: CGVD28

CLIENT

THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT

STAGE 4 ARCHAEOLOGICAL MITIGATION TURNBULL SITE (BfGd-8), PART OF LOT 5, CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY

TITLE

KEY PLAN

CONSULTANT

GOLDER

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REVIEWED	RH
APPROVED	MT

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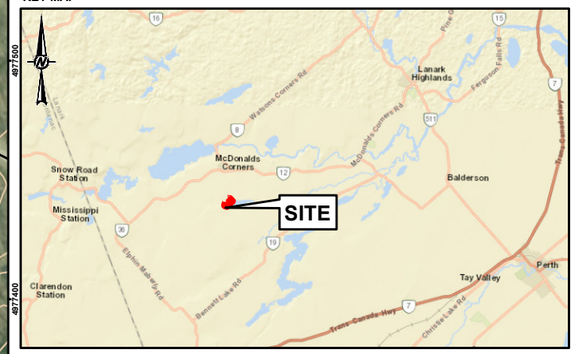

SCALE 1:425,000

LEGEND

- TURNBULL SITE (BfGd-8) BOUNDARY
- STUDY AREA
- ROADWAY
- TOPOGRAPHIC CONTOUR, METRES
- WATERCOURSE
- WATERBODY
- WETLAND
- LOT /CONCESSION FABRIC

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

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CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
STAGE 4 ARCHAEOLOGICAL MITIGATION TURNBULL SITE (BfGd-8), PART OF LOT 5, CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY

TITLE
SITE PLAN

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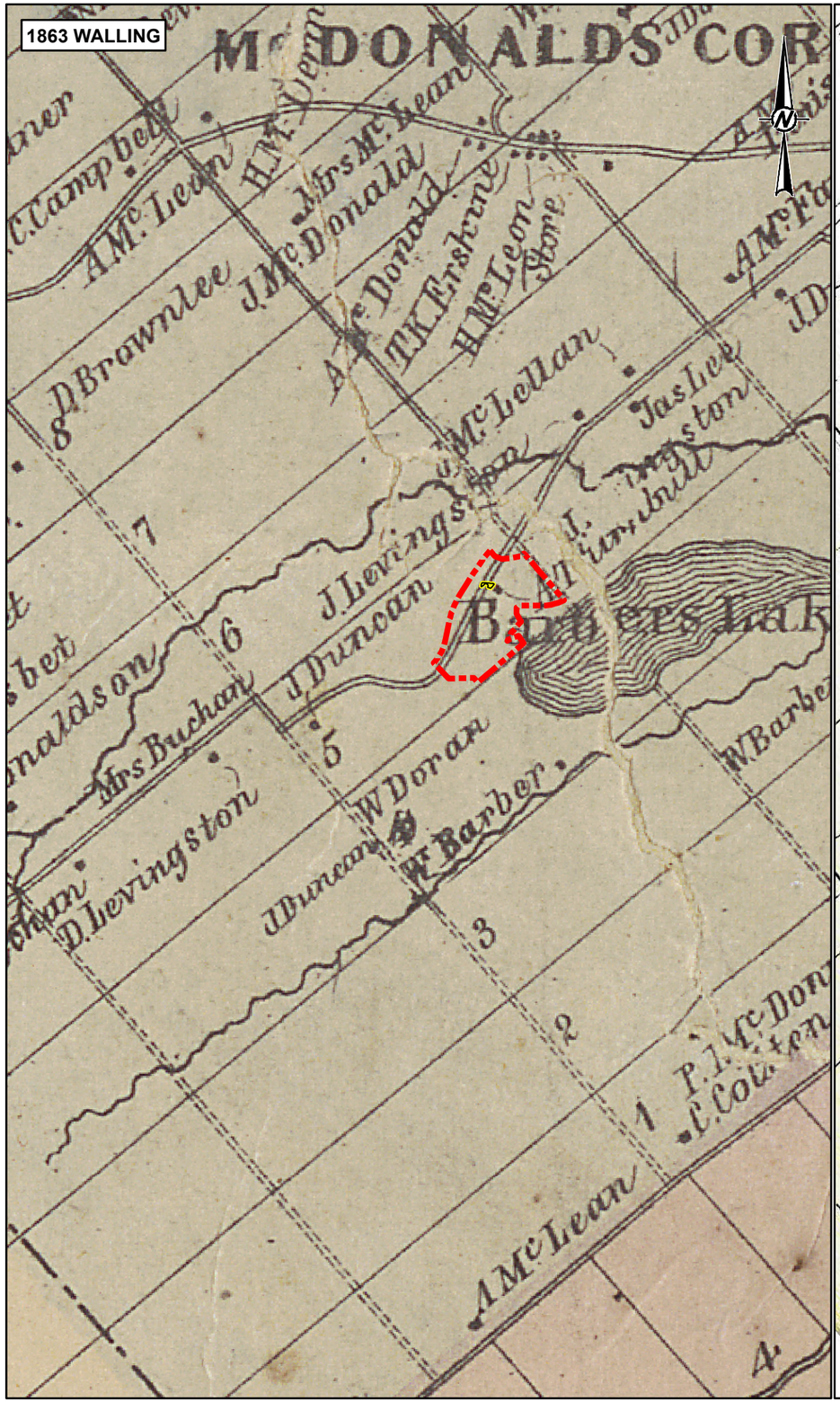

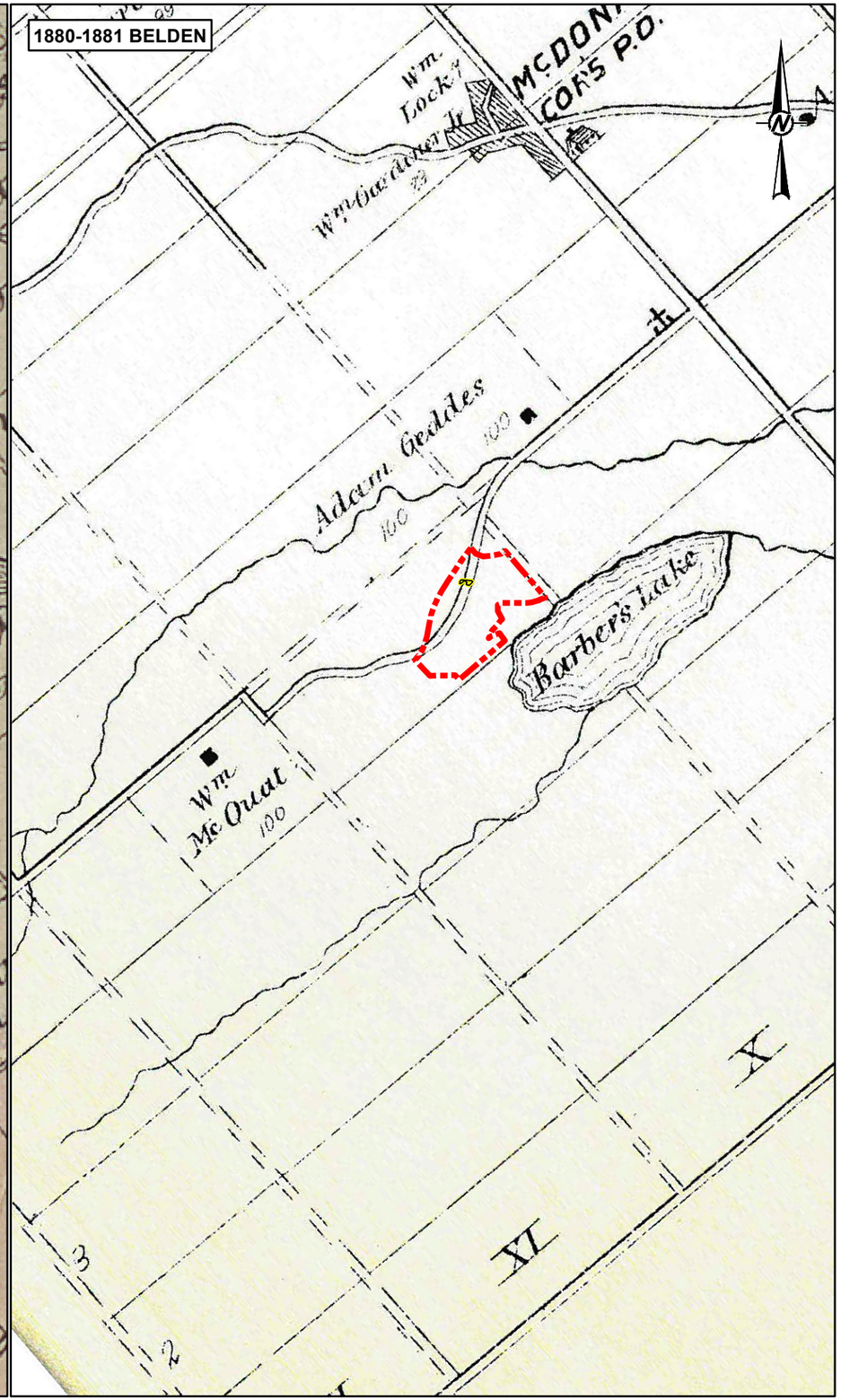

KEY MAP

SCALE 1:425,000

LEGEND

- TURNBULL SITE (BfGd-8) BOUNDARY
- STUDY AREA

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

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2. H. BELDEN & CO. 1880-1881 ILLUSTRATED HISTORICAL ATLAS OF LANARK & RENFREW COUNTIES
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THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
STAGE 4 ARCHAEOLOGICAL MITIGATION TURNBULL SITE (BfGd-8), PART OF LOT 5, CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY

TITLE
HISTORIC MAPS

CONSULTANT
GOLDER

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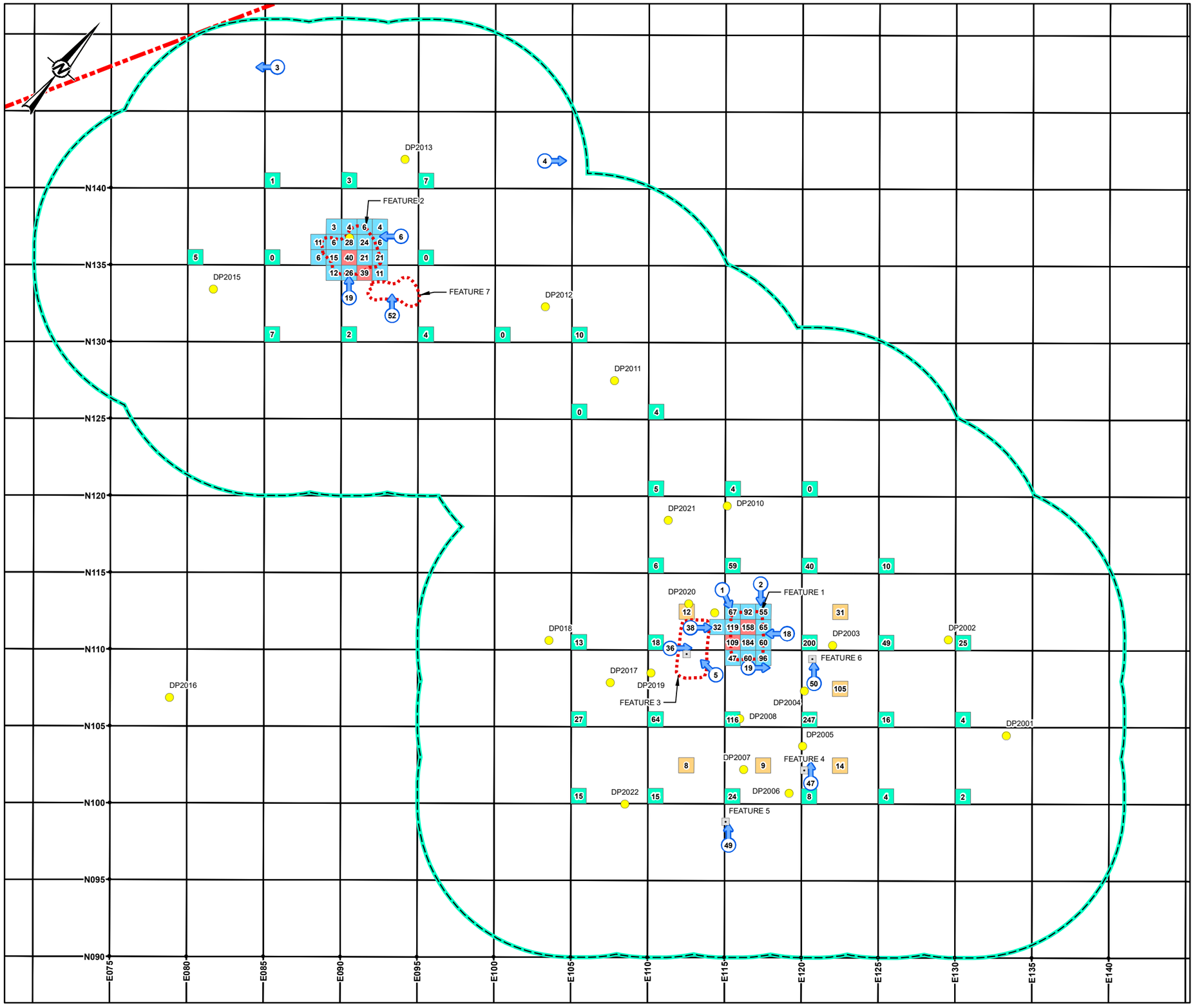

LEGEND

- PHOTO LOCATION AND DIRECTION
- CSP LOCATIONS (STAGE 2)
- POST MOULD LOCATION
- FEATURE LOCATION
- STAGE 4 TEST UNIT
- STAGE 3 TEST UNIT
- STAGE 3 INFILL UNIT
- FEATURE IDENTIFIED DURING STAGE 3 ARCHAEOLOGICAL ASSESSMENT
- EXTENT OF STAGE 4 MECHANICAL TOPSOIL REMOVAL - NO FURTHER ARCHAEOLOGY
- 5 METRE GRID

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

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THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT

STAGE 4 ARCHAEOLOGICAL MITIGATION TURNBULL SITE (BfGd-8), PART OF LOT 5, CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY

TITLE

STAGE 4 RESULTS, RECOMMENDATIONS AND PHOTO LOCATIONS

CONSULTANT

GOLDER

YYYY-MM-DD	2021-05-14
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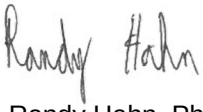
Signature Page

We trust that this report meets your current needs. If you have any questions, or if we may be of further assistance, please contact the undersigned.

Golder Associates Ltd.



Randy Hahn, Ph.D.
Archaeologist

Michael Teal, M.A.
Associate, Senior Archaeologist

RH/MT/ca

https://golderassociates.sharepoint.com/sites/112126/project files/6 deliverables/archaeology/archaeology stage 4/turnbull stage 4/02 final report/p1107-0033-2020_may2021_re.docx

APPENDIX A

Artifact Inventory

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6408			088	135	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	footring/footrim	plain	clear/colourless			1	
6409			088	135	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			2	
6406			088	135	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			1	
6407			088	135	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim/body	hand painted	polychrome: late palette			2	
6196			088	136	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				1	
6197			088	136	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	brown			1	
6198			088	136	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			6	
6199			088	136	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	transfer printed	blue		spalled	2	
6195			088	136	01	fauna		fauna: indeterminate								1	
6239			089	134	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				1	
6240			089	134	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	rim	glaze: lead	brown: light			1	
6242			089	134	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	hand painted	polychrome: late palette			1	
6243			089	134	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			4	
6241			089	134	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	footring/footrim	transfer printed	blue		spalled	1	fence - Willow?
6236			089	134	01	fauna		fauna: indeterminate								2	
6237			089	134	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: olive	moulded: contact		1	
6238			089	134	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		1	
6251			089	135	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	rim/body	glaze: lead	brown: light			5	
6253			089	135	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	body	transfer printed	blue		spalled	1	Willow border?
6252			089	135	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			4	
6254			089	135	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			3	
6249			089	135	01	glass	indeterminate	food/beverage	beverage container	bottle: alcohol	body	plain	green: dark olive	moulded: contact		1	
6250			089	135	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		1	
6255			089	136	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: none			spalled	2	
6257			089	136	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	rim/body	plain	clear/colourless			3	
6256			089	136	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	indeterminate			heat altered: burnt	1	
6678			089	137	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			3	
6670			090	134	01	ceramic	coarse earthenware: red	food/beverage	food preparation	milk pan	rim/body	glaze: lead	brown			5	
6671			090	134	01	ceramic	coarse earthenware: red	food/beverage	tableware	holloware: cylindrical	rim/body	glaze: jackfield	black		spalled	3	
6674			090	134	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	body	transfer printed	blue		heat altered: burnt	1	
6673			090	134	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	base	hand painted	polychrome: late palette			1	
6675			090	134	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			13	
6672			090	134	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	sponged	blue			1	
6676			090	134	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		1	
6677			090	134	01	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		1	
6232			090	136	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	black			1	
6233			090	136	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	rim/body	glaze: lead	brown: light			9	
6230			090	136	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	body	transfer printed	blue		spalled	2	geometric border
6234			090	136	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	rim/footrim	plain	clear/colourless			3	
6231			090	136	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	hand painted	polychrome: late palette			2	
6235			090	136	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			9	
6228			090	136	01	fauna		fauna: indeterminate								1	
6229			090	136	01	metal	iron	tools/equipment	indeterminate	bucket	handle					1	handle attachment
6194			090	137	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			2	
6192			090	137	01	fauna		fauna: indeterminate								1	
6193			090	137	01	metal	iron	indeterminate		strap	incomplete					1	
6202			091	135	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	rim/body	glaze: lead	brown			2	
6204			091	135	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	footrim/body	plain	clear/colourless			4	
6203			091	135	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	plain	clear/colourless		heat altered: burnt	2	London shape
6205			091	135	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			8	
6201			091	135	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	hand painted	polychrome: late palette			2	
6200			091	135	01	fauna		fauna: indeterminate								3	
6191			091	136	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				1	
6190			091	136	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	brown			8	
6188			091	136	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			14	
6189			091	136	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			1	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6680			091	137	01	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim	hand painted	polychrome: late palette			1	
6262			091	137	01	fauna		fauna: indeterminate								4	
6679			091	137	01	glass	indeterminate	food/beverage	tableware	tumbler	base	plain	clear/colourless	indeterminate		1	
6045			092	134	01	ceramic	coarse earthenware: buff	food/beverage	indeterminate	holloware: cylindrical	body	glaze: none				2	
6047			092	134	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	rim/body	plain	clear/colourless			6	
6046			092	134	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			1	
6044			092	134	01	fauna		fauna: indeterminate								1	
6043			092	134	01	glass	indeterminate	food/beverage	beverage container	bottle: wine	base	plain	green: dark olive	indeterminate		1	
6056			092	135	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				1	
6057			092	135	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	Glasgow: Murray				1	'MURRA../..LASGOW'
6055			092	135	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				1	
6051			092	135	01	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	brown			1	
6052			092	135	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	rim	transfer printed	blue		spalled	2	1 sherd likely Willow border
6054			092	135	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			8	
6053			092	135	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			6	
6058			092	135	01	fauna	shell	personal/societal	clothing	button: 4 hole	incomplete	plain			worn	1	
6258			092	136	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	fluted				1	
6259			092	136	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	base/body	plain	clear/colourless			5	
6049			092	137	01	ceramic	fine earthenware: red	food/beverage	tableware	holloware: cylindrical	body	glaze: jackfield	black			1	
6050			092	137	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			2	
6048			092	137	01	metal	iron	indeterminate		sheet	incomplete					1	
5987			114	111	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	sponged: cut	blue			1	
5989			114	111	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	rim/body	sponged: cut	brown			2	
5990			114	111	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			7	
5988			114	111	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged: cut	purple			2	
5986			114	111	01	fauna		fauna: indeterminate								4	
5984			114	111	01	glass	indeterminate	food/beverage	beverage container	bottle: wine	body	plain	green: olive	indeterminate		1	
5985			114	111	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		4	
5981			114	111	01	metal	iron	indeterminate		container: indeterminate	rim					1	wire rim?
5982			114	111	01	metal	iron	indeterminate		sheet	incomplete					1	
5977			114	111	01	metal	iron	structural	building component	pipe: drain	incomplete			cast		1	
5978			114	111	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		wrought		2	
5980			114	111	01	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		1	
5979			114	111	01	metal	iron	structural	hardware	nail: lath	incomplete	indeterminate		cut		4	
5983			114	111	01	mortar		structural	building component	sample						1	
6212			115	109	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				2	
6216			115	109	01	ceramic	porcelain: hard paste	personal/societal	recreation	toy: miniature tableware	rim	plain	clear/colourless			1	doll teacup?, unglazed int
6226			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	footring/footrim	transfer printed	black		spalled	1	child's plate?
6219			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	industrial slip	banded			1	grey-blue
6222			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	majolica	green			1	majolica?, moulded, dark green foliage?
6221			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	sponged: cut	blue			2	
6223			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	rim	hand painted	polychrome: late palette			1	blue flowers, blk stem
6227			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			11	
6224			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	plate: child's	rim	moulded	clear/colourless			3	checkered pattern, scalloped rim
6220			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines
6218			115	109	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	hand painted	polychrome: late palette			4	
6217			115	109	01	ceramic	vitrified white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	plain	clear/colourless			1	
6225			115	109	01	ceramic	vitrified white earthenware	food/beverage	tableware	plate: soup	rim	transfer printed	blue			2	matches Feat. 01 4A, 16C, E116 N110-1
6206			115	109	01	fauna		fauna: indeterminate								1	
6208			115	109	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive	moulded: contact		2	
6210			115	109	01	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	aqua: light			2	
6209			115	109	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		4	
6215			115	109	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		2	
6213			115	109	01	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		2	
6214			115	109	01	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		1	
6207			115	109	01	mortar		structural	building component	sample						1	
6211			115	109	01	stone	quartz	geological		sample						1	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6598			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	base	transfer printed	brown		spalled	1	
6599			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	body	plain	clear/colourless			11	
6594			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			3	imp curved lines
6597			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged	blue			3	
6595			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged: cut	purple			1	
6593			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	footring/footrim	sponged: cut	brown			2	
6592			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			7	
6596			115	111	01	ceramic	refined white earthenware	food/beverage	tableware	teacup	body	sponged: cut	brown			3	
6076			115	111	01	fauna		fauna: indeterminate								6	
6588			115	111	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	base/body	plain	green: dark olive	moulded: contact		4	
6583			115	111	01	glass	indeterminate	food/beverage	beverage container	bottle: wine	neck	plain	green: dark olive	indeterminate		4	
6585			115	111	01	glass	indeterminate	food/beverage	tableware	holloware: cylindrical	rim	plain	clear/colourless	indeterminate		1	
6586			115	111	01	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		4	
6589			115	111	01	glass	indeterminate	indeterminate		plate (pane)	incomplete	plain	clear/colourless	indeterminate		1	
6584			115	111	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		22	
6611			115	111	01	metal	iron	furnishing	lighting	candleholder	incomplete					1	candleholder?
6610			115	111	01	metal	iron	indeterminate		sheet	incomplete					11	
6601			115	111	01	metal	iron	indeterminate		strap	incomplete					1	w=1.5cm
6609			115	111	01	metal	iron	indeterminate		strap	incomplete					1	w=3.5cm
6603			115	111	01	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		1	
6602			115	111	01	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		1	
6606			115	111	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		7	
6605			115	111	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		7	
6607			115	111	01	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		6	
6608			115	111	01	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		5	
6604			115	111	01	metal	iron	structural	hardware	spike	incomplete	rectangular head		cut		1	
6600			115	111	01	metal	iron	tools/equipment	agricultural	staple	complete			wrought		1	
6587			115	111	01	mortar		structural	building component	sample						1	
6591			115	111	01	stone	indeterminate	structural	building component	sample	incomplete					1	polygonal stone with mortar adhering?, calcium/lime?
6590			115	111	01	stone	slate	tools/equipment	writing	pencil	incomplete	plain				1	
5960			115	112	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	footrim/base	plain	clear/colourless			8	
5961			115	112	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			6	
5957			115	112	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	sponged	blue			1	sm
5956			115	112	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines, tiny
5955			115	112	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	footring/footrim	sponged: cut	brown			1	floral
5959			115	112	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	hand painted	polychrome: late palette			3	
5958			115	112	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim/body	hand painted	polychrome: late palette			5	
5954			115	112	01	ceramic	yelloware	food/beverage	tableware	holloware: cylindrical	body	glaze: Rockingham	brown			2	
5949			115	112	01	fauna		fauna: indeterminate								4	
5952			115	112	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive	moulded: contact		1	
5953			115	112	01	glass	indeterminate	food/beverage	beverage container	bottle: wine	body	plain	green: dark olive	indeterminate		1	
5951			115	112	01	glass	indeterminate	indeterminate		holloware: indeterminate	body	plain	clear/colourless	indeterminate		2	
5950			115	112	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		10	
5967			115	112	01	metal	iron	indeterminate		container: cylindrical	incomplete					8	some folded edges, seams
5962			115	112	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		3	
5964			115	112	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		3	
5963			115	112	01	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		3	
5965			115	112	01	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		3	
5966			115	112	01	metal	iron	tools/equipment	indeterminate	tool: indeterminate	blade					1	dbl edged blade with eye? Letter opener?
5948			115	112	01	mortar		structural	building component	sample						1	
5888			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	industrial slip	indeterminate			1	grey-blue, is?
5886			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	sponged	blue			2	
5885			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	sponged: cut	blue			4	
5889			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			9	
5887			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	transfer printed	blue			1	tp?
5882			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged: cut	black			1	
5883			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			4	3 diff rim lines

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
5881			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	sponged: cut	purple			4	
5884			116	109	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	hand painted	polychrome: late palette			3	
5872			116	109	01	fauna		fauna: indeterminate								6	
5875			116	109	01	fauna	bone	personal/societal	clothing	button: 3 hole	complete	plain				1	
5879			116	109	01	glass	indeterminate	food/beverage	beverage container	bottle: alcohol	body	plain	green: dark olive	indeterminate	patinated	1	
5878			116	109	01	glass	indeterminate	indeterminate		holloware: indeterminate	body	plain	green: light	indeterminate	heat altered: melted	1	
5880			116	109	01	glass	indeterminate	indeterminate		plate (pane)	incomplete	plain	aqua: light	indeterminate		3	
5876			116	109	01	glass	indeterminate	personal/societal	clothing	button: 4 hole	complete	plain	white	Prosser		1	
5877			116	109	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		2	
5897			116	109	01	metal	iron	indeterminate		holloware: cylindrical	body	plain		cast		1	pot/cauldron?
5898			116	109	01	metal	iron	indeterminate		indeterminate	incomplete	plain		cast		1	
5896			116	109	01	metal	iron	indeterminate		rod	incomplete					1	bent into a chain link?, one end threaded
5891			116	109	01	metal	iron	indeterminate		sheet	incomplete					1	
5890			116	109	01	metal	iron	indeterminate		strap	incomplete					1	
5894			116	109	01	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		2	
5892			116	109	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		3	
5893			116	109	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		3	
5895			116	109	01	metal	iron	structural	hardware	nail: common	incomplete	rosehead		wrought		1	
5873			116	109	01	mortar		structural	building component	sample						1	
5874			116	109	01	stone	slate	tools/equipment	writing	pencil	incomplete	plain				1	
6305			116	110	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain	clear/colourless			2	
6306			116	110	01	ceramic	coarse stoneware: grey	food/beverage	storage container	holloware: cylindrical	body	slipped/glaze: salt	Albany (interior)/clear (exterior)			1	
6288			116	110	01	ceramic	coarse stoneware: grey	tools/equipment	writing	bottle: ink	base	glaze: derbyshire	brown			1	
6303			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	footring/footrim	plain	clear/colourless			4	
6295			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	hand painted	polychrome: late palette			4	
6290			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	sponged: cut	purple			1	
6297			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	transfer printed	blue		spalled	1	sm delicate design
6294			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	rim/body	sponged: cut	brown			4	
6304			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			35	
6298			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	plate: child's	rim	moulded	clear/colourless		spalled	1	checkered pattern, scalloped rim
6299			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			3	imp curved lines, 2+ vessels
6296			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			1	blue, green
6291			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged: cut	black		spalled	2	
6293			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	sponged: cut	brown			3	
6292			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	sponged: cut	purple			7	
6300			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			12	pink rim lines
6301			116	110	01	ceramic	refined white earthenware	food/beverage	tableware	teapot	rim/body	sponged	blue			5	teapot?
6302			116	110	01	ceramic	vitrified white earthenware	food/beverage	tableware	plate: soup	vessel portion	transfer printed	blue			14	partial bl tp mark, mends with Feat. 01 4A, 16C
6289			116	110	01	ceramic	yelloware	food/beverage	tableware	holloware: cylindrical	body	glaze: Rockingham	brown			1	
6126			116	110	01	fauna		fauna: indeterminate								22	
6319			116	110	01	flora	wood	indeterminate		sample						1	
6322			116	110	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive	moulded: contact		5	
6320			116	110	01	glass	indeterminate	food/beverage	tableware	closure: stopper	incomplete	indeterminate	clear/colourless	indeterminate		1	
6323			116	110	01	glass	indeterminate	food/beverage	tableware	holloware: cylindrical	base	plain	clear/colourless	indeterminate		1	
6325			116	110	01	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		1	
6324			116	110	01	glass	indeterminate	indeterminate		plate (pane)	incomplete	plain	clear/colourless	indeterminate		1	
6326			116	110	01	glass	indeterminate	personal/societal	health/hygiene	bottle: panel	finish: 1 part	plain	blue: light	moulded: contact	patinated	3	applied finish
6321			116	110	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		8	
6318			116	110	01	metal	copper alloy	personal/societal	commerce	coin: token	complete				worn	1	bouquet visible
6314			116	110	01	metal	iron	indeterminate		closure: indeterminate	complete					1	closure?, ring with circle
6315			116	110	01	metal	iron	indeterminate		indeterminate	complete					1	tool/machinery part, one end threaded, l=14cm
6313			116	110	01	metal	iron	indeterminate		rod	incomplete					1	l=6.5cm
6317			116	110	01	metal	iron	indeterminate		sheet	rim					14	
6316			116	110	01	metal	iron	indeterminate		strap	incomplete					1	
6307			116	110	01	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		2	
6308			116	110	01	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		8	
6310			116	110	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		2	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6309			116	110	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		1	
6311			116	110	01	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		3	
6312			116	110	01	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		3	
6127			116	110	01	mortar		structural	building component	sample						1	
6694			116	112	01	ceramic	coarse stoneware: grey	food/beverage	storage container	holloware: cylindrical	body	slipped/glaze: salt	Albany (interior)/clear (exterior)			1	blue painted
6696			116	112	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	base	transfer printed	blue			1	partial bl tp maker's mark '..NPO..' Davenport?, sm design
6702			116	112	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			27	
6701			116	112	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	moulded	pink		heat altered: burnt	1	checkered pattern, pink rim line
6700			116	112	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette		spalled	2	
6698			116	112	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged	blue		spalled	7	
6697			116	112	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged: cut	brown			1	
6699			116	112	01	ceramic	refined white earthenware	food/beverage	tableware	teacup	body	hand painted	polychrome: late palette		heat altered: burnt	3	
6075			116	112	01	fauna		fauna: indeterminate								2	
6685			116	112	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	base	plain	green: dark olive	moulded: contact		1	
6686			116	112	01	glass	indeterminate	food/beverage	beverage container	bottle: wine	body	plain	green: dark olive	indeterminate		5	
6688			116	112	01	glass	indeterminate	indeterminate		holloware: indeterminate	body	plain	clear/colourless	indeterminate		2	
6689			116	112	01	glass	indeterminate	indeterminate		indeterminate	body	indeterminate	aqua: light	indeterminate	heat altered: melted	2	
6687			116	112	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		16	
6681			116	112	01	metal	iron	indeterminate		sheet	incomplete					11	
6682			116	112	01	metal	iron	indeterminate		strap	incomplete					1	
6690			116	112	01	metal	iron	indeterminate	hardware	nut: square	complete					1	
6695			116	112	01	metal	iron	personal/societal	clothing	button: 4 hole	complete	plain				1	
6691			116	112	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		2	
6692			116	112	01	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		1	
6693			116	112	01	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		2	
6683			116	112	01	metal	iron	tools/equipment	agricultural	plough	blade			cast		1	plough blade?, large/heavy
6684			116	112	01	mortar		structural	building component	sample						1	
6164			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	base	transfer printed	black			1	child's plate?
6165			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	base	transfer printed	brown			1	
6171			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	transfer printed	blue		spalled	1	
6181			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			35	
6174			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	sponged	blue			7	
6173			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	transfer printed	blue			2	sm design
6169			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	rim/bdy	sponged: cut	brown			5	
6170			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: indeterminate	blue		spalled	1	
6168			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: embossed motifs	blue		spalled	1	chicken foot
6167			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	hand painted	polychrome: late palette			4	1 sherd with 3 pink rim lines
6166			117	109	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	hand painted	polychrome: late palette			2	blue/pink
6172			117	109	01	ceramic	vitrified white earthenware	food/beverage	tableware	plate: soup	base	transfer printed	blue			1	likely matches Feat. 01 4A, 16C, E116 N110-1
6082			117	109	01	fauna		fauna: indeterminate								6	
6177			117	109	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive	moulded: contact		2	
6176			117	109	01	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		4	
6178			117	109	01	glass	indeterminate	indeterminate		holloware: indeterminate	body	plain	blue: light	indeterminate		1	
6179			117	109	01	glass	indeterminate	indeterminate		holloware: indeterminate	body	ribbed	clear/colourless	moulded: contact		1	
6180			117	109	01	glass	indeterminate	personal/societal	health/hygiene	bottle: polygonal	body	embossed: lettering	aqua: light	moulded: contact		1	'..D T..'
6175			117	109	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		5	
6186			117	109	01	metal	iron	food/beverage	tableware	fork	tine: three					1	
6187			117	109	01	metal	iron	indeterminate		container: indeterminate	rim/body					7	
6182			117	109	01	metal	iron	indeterminate		strap	incomplete					1	
6185			117	109	01	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		2	
6183			117	109	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		2	
6184			117	109	01	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		1	
6083			117	109	01	mortar		structural	building component	sample						1	
6152			117	110	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	mark: indeterminate				1	'G[lasgow]/..'
6151			117	110	01	ceramic	coarse stoneware: buff	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	clear/colourless			1	
6145			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	bowl	rim/body	industrial slip	cable/finger trail			3	blue rim line, blue/brown/white cable?
6148			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	sponged	blue			5	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6144			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	base	transfer printed	blue		spalled	1	lgr vessel? Partial mark?
6150			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			12	
6139			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	sponged: cut	purple			1	
6149			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	body	edged: indeterminate	blue			1	
6142			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: embossed motifs	blue			1	chicken foot
6143			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines
6140			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged: cut	brown			1	
6146			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette		spalled	1	pink rim line
6141			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged: cut	black			1	
6147			117	110	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim/body	hand painted	polychrome: late palette			3	
6078			117	110	01	fauna		fauna: indeterminate								3	
6129			117	110	01	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive	moulded: contact		1	
6131			117	110	01	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		1	
6132			117	110	01	glass	indeterminate	personal/societal	health/hygiene	bottle: polygonal	body	embossed: lettering	aqua: light	moulded: contact		2	'..TO..', '../..DW..'
6130			117	110	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		7	
6133			117	110	01	metal	copper alloy	personal/societal	clothing	button: 4 hole	complete	plain				1	
6138			117	110	01	metal	iron	food/beverage	food preparation	holloware: cylindrical	body	plain		cast		1	cauldron/cooking pot?
6137			117	110	01	metal	iron	indeterminate		sheet	incomplete					3	
6136			117	110	01	metal	iron	indeterminate		strap	incomplete					2	
6134			117	110	01	metal	iron	structural	hardware	nail: common	complete	clasp head		wrought		1	
6135			117	110	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		1	
6079			117	110	01	mortar		structural	building component	sample						3	some with finer plaster surface
6128			117	110	01	stone	indeterminate	tools/equipment	indeterminate	whetstone	incomplete					1	whetstone?
6033			117	111	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	TD: embossed				1	"..D"
6040			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	flatware	footring/footrim	plain	clear/colourless			3	
6041			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	footring/footrim	plain	clear/colourless			1	
6042			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			10	
6037			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	sponged: cut	brown		heat altered: burnt	2	
6036			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	plate: child's	rim	moulded	clear/colourless			1	checkered pattern, scalloped rim
6035			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			3	imp curved lines
6038			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			7	1 burnt
6034			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	sponged	blue			6	
6039			117	111	01	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	hand painted	polychrome: late palette			3	
6022			117	111	01	fauna		fauna: indeterminate								2	
6031			117	111	01	glass	indeterminate	food/beverage	beverage container	bottle: wine	body	plain	green: dark olive	indeterminate		4	
6029			117	111	01	glass	indeterminate	indeterminate		holloware: polygonal	body	plain	aqua: light	moulded: contact		1	
6030			117	111	01	glass	indeterminate	indeterminate		holloware: polygonal	body	plain	clear/colourless	moulded: contact		1	
6032			117	111	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		6	
6024			117	111	01	metal	iron	indeterminate		sheet	incomplete					5	
6025			117	111	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		2	
6026			117	111	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		1	
6028			117	111	01	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		3	
6027			117	111	01	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		1	
6023			117	111	01	metal	iron	tools/equipment	indeterminate	chaining pin	complete					1	
6021			117	111	01	mortar		structural	building component	sample						1	
6277			117	112	01	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	mark: indeterminate				1	'M..'?
6286			117	112	01	ceramic	earthenware: ind. white	food/beverage	tableware	indeterminate	body	indeterminate			heat altered: burnt	1	
6280			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	hand painted	blue			2	tiny
6287			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			7	
6285			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	sponged	blue			1	
6281			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	rim/body	hand painted	polychrome: late palette			3	sm
6284			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	pitcher	handle	sponged	blue			1	
6279			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			2	imp curved lines
6282			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged: cut	brown			4	
6283			117	112	01	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim/body	sponged: cut	brown			3	
6278			117	112	01	ceramic	yelloware	food/beverage	tableware	holloware: cylindrical	body	plain	clear/colourless			1	
6085			117	112	01	fauna		fauna: indeterminate								3	

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6271			117	112	01	glass	indeterminate	food/beverage	beverage container	bottle: wine	body	plain	green: dark olive	indeterminate		3	
6275			117	112	01	glass	indeterminate	indeterminate		bottle: indeterminate	finish: 1 part	plain	blue: light	indeterminate	patinated	1	
6273			117	112	01	glass	indeterminate	indeterminate		hollowware: indeterminate	body	plain	clear/colourless	indeterminate		1	
6276			117	112	01	glass	indeterminate	indeterminate		indeterminate	indeterminate	indeterminate	aqua: light	indeterminate	heat altered: melted	1	
6274			117	112	01	glass	indeterminate	personal/societal	health/hygiene	bottle: panel	body	embossed: lettering	aqua: light	moulded: contact		1	'..SP..'
6272			117	112	01	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		6	
6263			117	112	01	metal	iron	indeterminate		pipe: indeterminate	incomplete					1	d=2cm
6265			117	112	01	metal	iron	indeterminate		sheet	incomplete					2	
6264			117	112	01	metal	iron	indeterminate		strap	incomplete					1	
6266			117	112	01	metal	iron	indeterminate	hardware	spike	incomplete	rectangular head		cut		1	long, thin, l=14.5cm
6270			117	112	01	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		2	
6267			117	112	01	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		2	
6268			117	112	01	metal	iron	structural	hardware	nail: common	incomplete	rosehead		wrought		2	
6269			117	112	01	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		1	
6086			117	112	01	mortar		structural	building component	sample						1	
6767	Feat. 01				04A	ceramic	clay: terracotta	personal/societal	smoking	smoking pipe	bowl	impressed			spalled	1	vertical lines
6769	Feat. 01				04A	ceramic	coarse stoneware: buff	food/beverage	storage container	hollowware: cylindrical	lid	slipped	Albany (interior)			1	
6783	Feat. 01				04A	ceramic	porcelain: hard paste	food/beverage	tableware	flatware	rim	moulded	rim line: gold			1	
6778	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	bowl	rim/footring	hand painted	polychrome: late palette			4	
6785	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	hollowware: cylindrical	footring/footrim	plain	clear/colourless			2	
6786	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			13	
6776	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	pitcher	spout	industrial slip	banded			5	blue/aqua
6781	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: embossed motifs	blue			5	chicken foot
6782	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: symmetrical scalloped/imp. lines	blue			3	
6784	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	base	plain	clear/colourless			7	
6780	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	platter	vessel portion	edged: symmetrical scalloped/imp. lines	blue			2	platter?, no footrim
6771	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	saucer	footring/footrim	sponged: cut	brown			2	
6773	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged: cut	purple			3	
6779	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			27	
6774	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	sponged: cut	black			3	
6777	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	hand painted	polychrome: late palette			1	tulip shape
6772	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim	sponged: cut	brown			1	
6775	Feat. 01				04A	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim/bdy	sponged: cut	black			6	
6770	Feat. 01				04A	ceramic	vitrified white earthenware	food/beverage	tableware	plate: soup	vessel portion	transfer printed	blue			4	partial bl tp Garter maker's mark '..OCKET J..', two marks/vessels?, mends with Feat. 01 16C
6787	Feat. 01				04A	ceramic	vitrified white earthenware	food/beverage	tableware	teapot	vessel portion	sponged	blue			21	polygonal base, partial handle, rim with lid ledge
6768	Feat. 01				04A	ceramic	yelloware	food/beverage	tableware	hollowware: cylindrical	body	glaze: Rockingham	brown			1	tiny
6070	Feat. 01				04A	fauna		fauna: indeterminate								22	
6759	Feat. 01				04A	flora	wood	indeterminate		sample						1	
6762	Feat. 01				04A	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive	moulded: contact		3	
6765	Feat. 01				04A	glass	indeterminate	food/beverage	tableware	hollowware: cylindrical	body	plain	clear/colourless	indeterminate		1	
6766	Feat. 01				04A	glass	indeterminate	indeterminate		hollowware: cylindrical	body	plain	aqua: light			2	
6763	Feat. 01				04A	glass	indeterminate	indeterminate		plate (pane)	incomplete	plain	aqua: light	indeterminate		1	
6764	Feat. 01				04A	glass	indeterminate	personal/societal	health/hygiene	bottle: panel	body	plain	aqua: light	moulded: contact		1	
6761	Feat. 01				04A	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		13	
6750	Feat. 01				04A	metal	iron	food/beverage	tableware	spoon: table	handle: fiddle					1	likely a spoon
6748	Feat. 01				04A	metal	iron	indeterminate		bar						3	1 hooked
6751	Feat. 01				04A	metal	iron	indeterminate		sheet	incomplete					14	
6749	Feat. 01				04A	metal	iron	indeterminate		strap	incomplete					4	w=3.4, 1.6, 1.4cm
6752	Feat. 01				04A	metal	iron	indeterminate	hardware	screw: slot	complete	countersunk head				1	
6754	Feat. 01				04A	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		2	
6757	Feat. 01				04A	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		8	
6755	Feat. 01				04A	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		7	
6756	Feat. 01				04A	metal	iron	structural	hardware	nail: common	incomplete	rosehead		wrought		2	
6758	Feat. 01				04A	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		2	
6753	Feat. 01				04A	metal	iron	structural	hardware	spike	incomplete	rectangular head		cut		1	
6760	Feat. 01				04A	synthetic	vulcanite	personal/societal	health/hygiene	comb	incomplete	plain	black	moulded: contact		1	
6722	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	bowl	body	sponged: cut	blue			2	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6727	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	flatware	footring/footrim	plain	clear/colourless			5	
6730	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			12	
6724	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: embossed motifs	blue			4	chicken foot
6719	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	moulded	clear/colourless		spalled	2	only moulded rim line visible
6725	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	plate: lunch (8")	rim	edged: unscalloped, imp. repetitive patterns	blue			5	imp curved lines
6721	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	plate: lunch (8")	rim	edged: unscalloped, unmoulded, painted lines	blue			1	
6720	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	saucer	base	sponged	blue			1	
6731	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged: cut	purple			4	
6723	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	hand painted	polychrome: late palette			5	
6728	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	sponged	blue			2	
6732	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	sponged: cut	brown			1	
6726	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	footring/footrim	plain	clear/colourless			3	
6733	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim	sponged: cut	black			1	leaves around rim
6729	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	vessel portion	hand painted	polychrome: late palette			8	shape
6734	Feat. 01				04B	ceramic	refined white earthenware	food/beverage	tableware	teapot	vessel portion	sponged	blue			9	lid, handle, body, polygonal
6071	Feat. 01				04B	fauna		fauna: indeterminate								19	
6736	Feat. 01				04B	glass	indeterminate	personal/societal	health/hygiene	bottle: panel	body	embossed: lettering	aqua: light	moulded: contact		1	'PA../NE..'
6735	Feat. 01				04B	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		8	
6738	Feat. 01				04B	metal	iron	furnishing	heating/temperature control	stove: plate	incomplete			cast		1	stove?
6745	Feat. 01				04B	metal	iron	indeterminate		sheet	incomplete					1	long edges folded, w=10cm
6746	Feat. 01				04B	metal	iron	indeterminate		strap	incomplete					1	w=2.6cm
6737	Feat. 01				04B	metal	iron	indeterminate		strap	incomplete					2	fine
6742	Feat. 01				04B	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		5	
6741	Feat. 01				04B	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		9	
6739	Feat. 01				04B	metal	iron	structural	hardware	nail: common	incomplete	rosehead		wrought		4	
6743	Feat. 01				04B	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		1	
6740	Feat. 01				04B	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		7	
6747	Feat. 01				04B	metal	iron	tools/equipment	indeterminate	bucket	handle			wire		1	bucket handle?
6514	Feat. 01				04C	ceramic	clay: terracotta	personal/societal	smoking	smoking pipe	stem	plain				1	
6516	Feat. 01				04C	ceramic	coarse stoneware: grey	food/beverage	storage container	hollowware: cylindrical	body	slipped/glaze: salt	Albany (interior)/clear (exterior)			4	blue painted
6517	Feat. 01				04C	ceramic	porcelain: hard paste	food/beverage	tableware	plate: dinner (9-12")	rim	indeterminate			worn	2	hand painted? Decal?, polychrome
6530	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	bowl	footring/footrim	hand painted	polychrome: late palette			7	
6518	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	flatware	base	transfer printed	blue			1	
6519	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	hollowware: cylindrical	rim	industrial slip	banded			2	blue, aqua
6540	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			8	
6535	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: embossed motifs	blue			2	chicken foot
6534	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	vessel portion	edged: embossed motifs	blue			4	chicken foot
6538	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	footring/footrim	plain	clear/colourless			13	
6537	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: indeterminate	blue			2	
6536	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			2	imp curved lines
6533	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	plate: soup	vessel portion	edged: symmetrical scalloped/imp. lines	blue			8	no footrim
6526	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	footring/footrim	hand painted	polychrome: late palette			2	sponged: blue, centre painted lg floral
6539	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	plain	clear/colourless			1	
6525	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged	blue			2	
6529	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	hand painted	polychrome: late palette			5	
6521	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	sponged: cut	brown			4	
6527	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			4	lg floral
6528	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			5	3 pink rim lines
6522	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	sponged: cut	purple		heat altered: burnt	9	
6531	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	teacup	body	hand painted	polychrome: late palette			12	5+ vessels, diff rim lines
6520	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim	sponged: cut	brown			2	
6532	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	teacup	vessel portion	hand painted	polychrome: late palette			12	Tulip shape
6524	Feat. 01				04C	ceramic	refined white earthenware	food/beverage	tableware	teacup	vessel portion	sponged	blue			5	
6523	Feat. 01				04C	ceramic	vitrified white earthenware	food/beverage	tableware	plate: soup	vessel portion	transfer printed	blue			5	partial bl tp mark '..R & Co', matches E116 N110-1, mends with Feat. 01 4A
6515	Feat. 01				04C	ceramic	yelloware	food/beverage	tableware	hollowware: cylindrical	body	industrial slip	rouletted			1	rilled blue line
6069	Feat. 01				04C	fauna		fauna: indeterminate								39	
6511	Feat. 01				04C	fauna	bone	personal/societal	clothing	button: 4 hole	complete	plain				1	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6512	Feat. 01				04C	flora	wood	indeterminate		sample						1	
6503	Feat. 01				04C	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive			3	
6502	Feat. 01				04C	glass	indeterminate	food/beverage	beverage container	bottle: wine	base/body	plain	green: dark olive	indeterminate		6	conical push-up
6507	Feat. 01				04C	glass	indeterminate	indeterminate		bottle: indeterminate	finish: 1 part	plain	aqua: light	indeterminate		1	
6506	Feat. 01				04C	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	aqua: light	indeterminate		4	
6508	Feat. 01				04C	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		2	
6509	Feat. 01				04C	glass	indeterminate	indeterminate		holloware: polygonal	body	plain	clear/colourless			1	
6505	Feat. 01				04C	glass	indeterminate	indeterminate		plate (pane)	incomplete	plain	clear/colourless	indeterminate		1	
6510	Feat. 01				04C	glass	indeterminate	personal/societal	clothing	button: 4 hole	complete	plain	white	Prosser		1	dish type
6504	Feat. 01				04C	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		6	
6489	Feat. 01				04C	metal	iron	food/beverage	food preparation	kettle	incomplete					2	part of body/spout/strainer
6498	Feat. 01				04C	metal	iron	food/beverage	tableware	knife	incomplete					1	complete blade with broken flat tang
6499	Feat. 01				04C	metal	iron	food/beverage	tableware	spoon: table	complete					4	ovate bowls, 1 fiddle handle, 2 Old English
6490	Feat. 01				04C	metal	iron	indeterminate		buckle: indeterminate	frame					1	rectangular, l=5.5cm
6480	Feat. 01				04C	metal	iron	indeterminate		chain: single link	incomplete					1	chain?, oval link
6495	Feat. 01				04C	metal	iron	indeterminate		indeterminate	incomplete					1	rod/shaft, partially threaded, hex nut & washer, l=9cm
6501	Feat. 01				04C	metal	iron	indeterminate		indeterminate	incomplete			cast		1	tool/machinery fragment?
6488	Feat. 01				04C	metal	iron	indeterminate		sheet	incomplete					1	rolled into a tube, handle, closed at one end
6487	Feat. 01				04C	metal	iron	indeterminate		sheet	incomplete					17	one with seam
6478	Feat. 01				04C	metal	iron	indeterminate		strap	incomplete					2	w=3.5cm
6479	Feat. 01				04C	metal	iron	indeterminate		strap	incomplete					3	
6477	Feat. 01				04C	metal	iron	indeterminate		strap	incomplete					8	w=.4cm
6476	Feat. 01				04C	metal	iron	indeterminate		wire	incomplete					7	
6494	Feat. 01				04C	metal	iron	indeterminate	hardware	bolt: threaded	complete					1	
6493	Feat. 01				04C	metal	iron	indeterminate	hardware	screw: slot	complete	countersunk head				2	
6491	Feat. 01				04C	metal	iron	structural	hardware	hinge: butt	complete					1	l=5.5cm
6492	Feat. 01				04C	metal	iron	structural	hardware	hinge: indeterminate	incomplete					1	l=6.5cm
6482	Feat. 01				04C	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		2	
6483	Feat. 01				04C	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		5	
6484	Feat. 01				04C	metal	iron	structural	hardware	nail: indeterminate	incomplete	indeterminate		indeterminate		4	
6485	Feat. 01				04C	metal	iron	structural	hardware	nail: lath	complete	clasp head	sharp	wrought		6	
6481	Feat. 01				04C	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		5	
6486	Feat. 01				04C	metal	iron	structural	hardware	nail: lath	complete	rosehead	sharp	wrought		9	
6500	Feat. 01				04C	metal	iron	tools/equipment	agricultural	tool: sickle	blade					1	rat-tail tang
6497	Feat. 01				04C	metal	iron	tools/equipment	indeterminate	bucket	handle					1	wire handle with attachement pieces
6496	Feat. 01				04C	metal	iron	tools/equipment	indeterminate	bucket	handle					2	attachement pieces
6513	Feat. 01				04C	mortar		structural	building component	sample						1	
5918	Feat. 01				04D	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	indeterminate	blue			1	
5920	Feat. 01				04D	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	rim/body	plain	clear/colourless			2	
5917	Feat. 01				04D	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	moulded	pink			1	checkered pattern, pink rim line
5916	Feat. 01				04D	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	moulded	Wheat			2	
5914	Feat. 01				04D	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged: cut	purple			2	
5921	Feat. 01				04D	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			7	3 pink rim lines
5915	Feat. 01				04D	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim	sponged	blue			1	
5919	Feat. 01				04D	ceramic	vitrified white earthenware	food/beverage	tableware	holloware: polygonal	body	sponged	blue			2	
5909	Feat. 01				04D	fauna		fauna: indeterminate								6	
5913	Feat. 01				04D	glass	indeterminate	food/beverage	beverage container	bottle: case/gin	body	plain	green: dark olive	moulded: contact		2	
5912	Feat. 01				04D	glass	indeterminate	food/beverage	beverage container	bottle: wine	body	plain	green: dark olive	indeterminate		2	
5910	Feat. 01				04D	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		1	
5911	Feat. 01				04D	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		7	
5899	Feat. 01				04D	metal	iron	indeterminate		holloware: indeterminate	lid: perforated					1	like a salt/pepper shaker
5908	Feat. 01				04D	metal	iron	indeterminate		indeterminate	incomplete			cast		1	tool?, cast iron with attached sheet
5907	Feat. 01				04D	metal	iron	indeterminate		ring	incomplete			cast		1	
5900	Feat. 01				04D	metal	iron	indeterminate		sheet	incomplete					6	
5902	Feat. 01				04D	metal	iron	indeterminate		strap	incomplete					1	1 perforation
5905	Feat. 01				04D	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		1	
5906	Feat. 01				04D	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		3	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
5901	Feat. 01				04D	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		2	
5903	Feat. 01				04D	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		2	
5904	Feat. 01				04D	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		2	
6475	Feat. 01				11A	ceramic	coarse stoneware: grey	food/beverage	storage container	holloware: cylindrical	body	slipped/glaze: salt	Albany (interior)/clear (exterior)			1	blue painted
6466	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	bowl	rim	industrial slip	banded			4	brown/blue, London Shape
6465	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	rim	sponged: cut	brown			1	
6473	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			3	
6468	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: symmetrical scalloped/imp. lines	blue			3	bud pattern
6467	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines
6474	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	footring/footrim	plain	clear/colourless			1	
6462	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: embossed motifs	blue			2	chicken foot
6469	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	transfer printed/moulded	blue			2	
6464	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette		spalled	1	pink rim line, green leaves
6471	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			4	pink rim line, blue painted flower
6470	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	teacup	footring/footrim	hand painted	polychrome: late palette			3	tulip-shape?
6472	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	teacup	footring/footrim	plain	clear/colourless			2	
6463	Feat. 01				11A	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim	hand painted	polychrome: late palette			1	pink rim line, lg green leaves
6074	Feat. 01				11A	fauna		fauna: indeterminate								4	
6459	Feat. 01				11A	glass	indeterminate	food/beverage	beverage container	bottle: wine	body	plain	green: dark olive	indeterminate		1	
6461	Feat. 01				11A	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	aqua: light	indeterminate	patinated	1	
6460	Feat. 01				11A	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		1	
6454	Feat. 01				11A	metal	iron	food/beverage	tableware	fork	tine: two					1	flat tang
6456	Feat. 01				11A	metal	iron	indeterminate		strap	incomplete					1	w=2.7cm
6457	Feat. 01				11A	metal	iron	indeterminate		strap	incomplete					4	w=1.6cm, 2 with rivets
6455	Feat. 01				11A	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		1	
6458	Feat. 01				11A	mortar		structural	building component	sample						1	
6706	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	bowl	rim	industrial slip	mocha			2	blue rim band, black mocha on grey-blue background, London Shape
6716	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	plain	clear/colourless			2	
6708	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	plate: bread (3-7")	vessel portion	edged: unscalloped, imp. repetitive patterns	blue			6	imp curved lines
6713	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: unscalloped, imp. repetitive patterns	blue			1	
6715	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	footring/footrim	plain	clear/colourless			5	
6712	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: embossed motifs	blue			1	chicken foot
6711	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	platter	vessel portion	edged: symmetrical scalloped/imp. lines	blue			1	no footrim
6714	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged	blue			1	
6709	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			9	
6710	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	body	hand painted	polychrome: late palette			1	tulip shape? Check
6707	Feat. 01				11B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	footring/footrim	plain	clear/colourless			2	imp base '18'
6718	Feat. 01				11B	glass	indeterminate	indeterminate		holloware: indeterminate	body	plain	clear/colourless	indeterminate		1	
6717	Feat. 01				11B	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		2	
6705	Feat. 01				11B	metal	iron	food/beverage	tableware	spoon: table	complete					1	ovate bowl, rounded handle end
6704	Feat. 01				11B	metal	iron	indeterminate		indeterminate	incomplete			cast		1	cast?, heavy bucket/container base?
6703	Feat. 01				11B	metal	iron	tools/equipment	wood work	tool: axe/hatchet	blade					1	
6365	Feat. 01				11D	ceramic	refined white earthenware	food/beverage	tableware	bowl	body	indeterminate			heat altered: burnt	1	
6359	Feat. 01				11D	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	base	plain	clear/colourless			2	
6361	Feat. 01				11D	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	blue: light	indeterminate	patinated	1	
6362	Feat. 01				11D	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		2	
6360	Feat. 01				11D	glass	indeterminate	structural	building component	window pane	incomplete	plain	blue: light	indeterminate		1	
6356	Feat. 01				11D	metal	iron	indeterminate		sheet	incomplete					1	
6358	Feat. 01				11D	metal	iron	structural	hardware	nail: common	incomplete	rosehead		wrought		1	
6357	Feat. 01				11D	metal	iron	structural	hardware	nail: lath	complete	clasp head	sharp	wrought		1	
6363	Feat. 01				12A	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines
6244	Feat. 01				12C	ceramic	refined white earthenware	food/beverage	tableware	bowl	rim	industrial slip	banded			1	thick blue rim and thin brown
6245	Feat. 01				12C	fauna		fauna: indeterminate								1	
6063	Feat. 01				13A	ceramic	refined white earthenware	food/beverage	tableware	flatware	body	plain	clear/colourless			3	
6061	Feat. 01				13A	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	industrial slip	banded			3	blue, brown
6062	Feat. 01				13A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines
6060	Feat. 01				13A	fauna		fauna: indeterminate								1	

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6059	Feat. 01				13A	metal	iron	indeterminate		sheet	incomplete					1	circle, d=17cm
6113	Feat. 01				13B	ceramic	refined white earthenware	food/beverage	tableware	flatware	base	plain	clear/colourless			1	
6112	Feat. 01				13B	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	moulded	clear/colourless			3	simple geometric pattern, lg sherd
6110	Feat. 01				13B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines, lg sherd
6111	Feat. 01				13B	ceramic	refined white earthenware	food/beverage	tableware	saucer	vessel portion	hand painted	polychrome: late palette			5	lg sherds
6114	Feat. 01				13B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	footring/footrim	plain	clear/colourless			4	
6108	Feat. 01				13B	fauna		fauna: indeterminate								2	
6109	Feat. 01				13B	metal	iron	indeterminate		sheet	rim					1	folded edge
6123	Feat. 01				13C	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	industrial slip	banded			1	blue/brown
6125	Feat. 01				13C	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	plain	clear/colourless			1	
6124	Feat. 01				13C	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged	blue			1	
6122	Feat. 01				13C	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim	hand painted	polychrome: late palette			3	
6115	Feat. 01				13C	fauna		fauna: indeterminate								1	
6121	Feat. 01				13C	glass	indeterminate	indeterminate		bottle: indeterminate	neck	plain	blue: light	indeterminate		1	
6119	Feat. 01				13C	metal	iron	indeterminate		rod						1	l=4.5cm
6116	Feat. 01				13C	metal	iron	indeterminate		strap	complete					1	
6117	Feat. 01				13C	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		1	
6118	Feat. 01				13C	metal	iron	structural	hardware	nail: lath	incomplete	indeterminate		cut		1	
6120	Feat. 01				13C	metal	iron	tools/equipment	writing	pencil	incomplete					1	slate pencil holder?
6064	Feat. 01				13D	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	industrial slip	banded			2	blue
6065	Feat. 01				13D	ceramic	refined white earthenware	food/beverage	tableware	plate: dinner (9-12")	rim	edged: unscalloped, imp. repetitive patterns	blue			1	imp curved lines
6067	Feat. 01				13D	glass	indeterminate	food/beverage	tableware	tumbler	footring/footrim	panel	clear/colourless	moulded: contact		1	
6066	Feat. 01				13D	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		1	
6068	Feat. 01				13D	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		3	
6364	Feat. 01				14A	flora	wood	indeterminate		sample						1	
6655	Feat. 02				05A	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				3	1 complete small bowl
6656	Feat. 02				05A	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	Glasgow: Murray				1	'GLAS../..RRAY
6659	Feat. 02				05A	ceramic	coarse earthenware: red	food/beverage	food preparation	milk pan	rim/body	glaze: lead	brown			5	
6657	Feat. 02				05A	ceramic	coarse earthenware: red	food/beverage	storage container	holloware: cylindrical	body	glaze: lead	black			2	
6658	Feat. 02				05A	ceramic	coarse earthenware: red	food/beverage	storage container	holloware: cylindrical	body	slipped	cream/yellow			1	
6663	Feat. 02				05A	ceramic	earthenware: ind. white	food/beverage	tableware	holloware: cylindrical	footring/footrim	plain	clear/colourless		heat altered: burnt	2	
6667	Feat. 02				05A	ceramic	porcelain: hard paste	food/beverage	tableware	teacup	rim	indeterminate			worn	1	
6666	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	bowl	rim	hand painted	polychrome: late palette			4	int black rim line, ext lg pink flower
6668	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	hand painted	polychrome: late palette			3	
6662	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	footring/footrim	plain	clear/colourless			1	cannister?
6665	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			19	
6660	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	body	transfer printed	blue			1	Willow pattern
6664	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	plain	clear/colourless			4	
6661	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	transfer printed	blue			1	grey-blue
6669	Feat. 02				05A	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			4	
6072	Feat. 02				05A	fauna		fauna: indeterminate								25	+1 didn't get to Rhiannon
6649	Feat. 02				05A	fauna	bone	food/beverage	tableware	fork	handle	plain				1	leaf from a flat tang
6648	Feat. 02				05A	flora	charcoal	indeterminate		sample						1	
6650	Feat. 02				05A	flora	wood	indeterminate		sample						1	
6651	Feat. 02				05A	glass	indeterminate	food/beverage	beverage container	bottle: wine	finish: 2 part	plain	green: dark olive	indeterminate		1	applied finish
6652	Feat. 02				05A	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		2	tableware?
6653	Feat. 02				05A	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	green: light	indeterminate		1	
6654	Feat. 02				05A	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		2	
6645	Feat. 02				05A	metal	copper alloy	personal/societal	clothing	button: 4 hole	complete					1	
6789	Feat. 02				05A	metal	copper alloy	tools/equipment	sewing	thimble	complete					1	from float sample
6646	Feat. 02				05A	metal	copper alloy/iron	tools/equipment	sewing	thimble	complete					1	
6638	Feat. 02				05A	metal	iron	food/beverage	food preparation	cauldron	rim	plain		cast		1	
6639	Feat. 02				05A	metal	iron	indeterminate		strap	incomplete					1	folded in half length-wise
6641	Feat. 02				05A	metal	iron	indeterminate		wire	incomplete					1	
6642	Feat. 02				05A	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		1	
6644	Feat. 02				05A	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		2	

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6643	Feat. 02				05A	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		1	
6640	Feat. 02				05A	metal	iron	tools/equipment	indeterminate	tool: hammer	head					1	
6647	Feat. 02				05A	metal	metal: ind. White	personal/societal	commerce	coin: indeterminate	complete					1	with hole, impressed?
6389	Feat. 02				05B	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	effigy				1	
6388	Feat. 02				05B	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				1	
6390	Feat. 02				05B	ceramic	clay: white	personal/societal	smoking	smoking pipe	mouthpiece	glaze: amber				2	
6392	Feat. 02				05B	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	mark: indeterminate				1	'M..'
6391	Feat. 02				05B	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				5	
6396	Feat. 02				05B	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	brown			1	
6397	Feat. 02				05B	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	slipped	cream/yellow			2	
6395	Feat. 02				05B	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	rim	glaze: lead	clear/colourless			1	
6366	Feat. 02				05B	ceramic	coarse stoneware: grey	food/beverage	storage container	jar: cylindrical	complete	glaze: salt	brown			1	dark brown at top, grey-brown bottom, base d=10.5cm
6393	Feat. 02				05B	ceramic	coarse stoneware: red	food/beverage	tableware	holloware: cylindrical	body	glaze: lead	black			4	
6394	Feat. 02				05B	ceramic	coarse stoneware: red	food/beverage	tableware	holloware: cylindrical	lid	glaze: lead	black			1	
6400	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	flatware	base	transfer printed	blue			2	Willow
6399	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	transfer printed	blue			1	
6404	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	footring/footrim	plain	clear/colourless			4	
6405	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			28	
6398	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	pitcher	spout	transfer printed	blue			1	floral
6403	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	plain	clear/colourless			2	
6402	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	hand painted	polychrome: late palette			4	
6401	Feat. 02				05B	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim	hand painted	polychrome: late palette			3	blk int rim line, lg grn leaves
6261	Feat. 02				05B	fauna		fauna: indeterminate								26	
6367	Feat. 02				05B	fauna	bone	personal/societal	clothing	button: 4 hole	complete	plain				1	
6368	Feat. 02				05B	flora	charcoal	indeterminate		sample						1	
6369	Feat. 02				05B	flora	wood	indeterminate		sample						1	
6387	Feat. 02				05B	glass	indeterminate	indeterminate		holloware: cylindrical	body	plain	clear/colourless	indeterminate		1	tableware?
6386	Feat. 02				05B	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		1	
6375	Feat. 02				05B	metal	copper alloy	indeterminate		scrap						1	
6374	Feat. 02				05B	metal	copper alloy	indeterminate		wire						1	
6385	Feat. 02				05B	metal	copper alloy	personal/societal	clothing	clothing fastener: straight pin	complete			cast		1	
6384	Feat. 02				05B	metal	copper alloy	personal/societal	clothing	clothing fastener: straight pin	complete			wound		1	
6373	Feat. 02				05B	metal	copper alloy	tools/equipment	sewing	thimble	complete					1	
6370	Feat. 02				05B	metal	iron	indeterminate		strap	handle: incomplete					1	folded long edges, galvanized/plated
6383	Feat. 02				05B	metal	iron	indeterminate		strap	incomplete					3	thin
6372	Feat. 02				05B	metal	iron	indeterminate		strap	incomplete					5	
6379	Feat. 02				05B	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		1	
6376	Feat. 02				05B	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		2	
6382	Feat. 02				05B	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		3	
6378	Feat. 02				05B	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		5	
6377	Feat. 02				05B	metal	iron	structural	hardware	nail: common	incomplete	rosehead		wrought		1	
6380	Feat. 02				05B	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		6	
6381	Feat. 02				05B	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		1	
6371	Feat. 02				05B	metal	iron/copper alloy	indeterminate		indeterminate	handle					1	rat-tail tang with pin?
6448	Feat. 02				05C	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				1	
6447	Feat. 02				05C	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				3	
6453	Feat. 02				05C	ceramic	coarse earthenware: red	food/beverage	food preparation	milk pan	rim/body	glaze: lead	brown			3	
6452	Feat. 02				05C	ceramic	coarse earthenware: red	food/beverage	storage container	jar: cylindrical	rim/body	glaze: lead	black			2	
6451	Feat. 02				05C	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			5	
6449	Feat. 02				05C	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	body	transfer printed	blue		spalled	2	Willow pattern
6450	Feat. 02				05C	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			2	
6260	Feat. 02				05C	fauna		fauna: indeterminate								17	
6442	Feat. 02				05C	fauna	bone	personal/societal	clothing	button: 4 hole	complete	plain				1	
6440	Feat. 02				05C	flora	wood	indeterminate		sample						10	
6441	Feat. 02				05C	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		1	
6790	Feat. 02				05C	metal	copper alloy	personal/societal	adornment	brooch	pin					1	heavier than a regular straight pin?
6445	Feat. 02				05C	metal	iron	indeterminate		container: cylindrical	lid	indeterminate				1	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6444	Feat. 02				05C	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		1	
6443	Feat. 02				05C	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		1	
6446	Feat. 02				05C	metal	iron	tools/equipment	indeterminate	tool: indeterminate	blade					1	screwdriver or punch bit?
6437	Feat. 02				05D	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				6	1 amber glazed mouthpiece
6436	Feat. 02				05D	ceramic	coarse earthenware: red	food/beverage	food preparation	milk pan	rim/body	glaze: lead	brown			13	
6433	Feat. 02				05D	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	black			4	lg tableware or sm storage
6434	Feat. 02				05D	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	brown			1	
6435	Feat. 02				05D	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	indeterminate		heat altered: burnt	1	
6431	Feat. 02				05D	ceramic	porcelain: hard paste	food/beverage	tableware	saucer	rim	transfer printed	pink		worn	1	over glaze
6432	Feat. 02				05D	ceramic	porcelain: hard paste	food/beverage	tableware	teacup	rim	transfer printed	pink		worn	1	
6427	Feat. 02				05D	ceramic	refined white earthenware	food/beverage	tableware	bowl	rim	hand painted	polychrome: late palette			1	
6425	Feat. 02				05D	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	transfer printed	blue			1	
6429	Feat. 02				05D	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	hand painted	polychrome: late palette			2	
6430	Feat. 02				05D	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			9	
6424	Feat. 02				05D	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	footring/footrim	transfer printed	blue			1	Willow pattern
6426	Feat. 02				05D	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	plain	clear/colourless			1	
6428	Feat. 02				05D	ceramic	refined white earthenware	food/beverage	tableware	teacup	footring/footrim	hand painted	polychrome: late palette			1	
6077	Feat. 02				05D	fauna		fauna: indeterminate								24	
6410	Feat. 02				05D	fauna	bone	personal/societal	health/hygiene	comb: lice	incomplete	plain				1	
6411	Feat. 02				05D	fauna	shell	personal/societal	clothing	button: 4 hole	complete	decorated				1	incised radiating lines
6412	Feat. 02				05D	flora	wood	indeterminate		sample						8	
6439	Feat. 02				05D	glass	indeterminate	personal/societal	personal gear	eye glasses/lens	complete					1	circular, d=2.9cm
6420	Feat. 02				05D	metal	copper alloy	food/beverage	tableware	spoon: tea	handle: fiddle	plain				3	marked/stamped with 4 sm symbols
6438	Feat. 02				05D	metal	copper alloy	structural	hardware	lock: indeterminate	escutcheon					1	
6414	Feat. 02				05D	metal	copper alloy	tools/equipment	sewing	thimble	complete					2	1 with iron tip
6419	Feat. 02				05D	metal	iron	furnishing	furniture	hasp	incomplete					1	trunk?
6415	Feat. 02				05D	metal	iron	indeterminate		strap	incomplete					1	
6416	Feat. 02				05D	metal	iron	indeterminate		wire						1	
6418	Feat. 02				05D	metal	iron	personal/societal	footwear	heel plate	complete					1	
6421	Feat. 02				05D	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		3	
6422	Feat. 02				05D	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		5	
6423	Feat. 02				05D	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		2	
6417	Feat. 02				05D	metal	iron	tools/equipment	indeterminate	wedge	incomplete					1	sm wedge or tool blade?
6413	Feat. 02				05D	metal	lead	tools/equipment	indeterminate	weight	indeterminate					1	weight? Circle cut in half, d=4.1cm
6547	Feat. 03				06A	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				1	
6548	Feat. 03				06A	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	TD: impressed				1	
6546	Feat. 03				06A	ceramic	clay: white	personal/societal	smoking	smoking pipe	mouthpiece	glaze: amber				1	
6545	Feat. 03				06A	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	Montreal: Henderson				1	'M../..ON'
6544	Feat. 03				06A	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				4	
6543	Feat. 03				06A	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			14	
6541	Feat. 03				06A	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			3	pink & black rim lines
6542	Feat. 03				06A	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim	sponged: cut	brown			3	
6084	Feat. 03				06A	fauna		fauna: indeterminate								12	7=microfauna
6566	Feat. 03				06A	flora	wood	indeterminate		sample						1	
6549	Feat. 03				06A	glass	indeterminate	indeterminate		holloware: polygonal	body	plain	blue: light	moulded: contact	patinated	1	
6550	Feat. 03				06A	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		12	
6552	Feat. 03				06A	metal	copper alloy	personal/societal	personal gear	umbrella	ferrule					1	umbrella ferrule/tip?
6563	Feat. 03				06A	metal	iron	indeterminate		indeterminate	blade					1	blade?, one long edge thicker than the other
6564	Feat. 03				06A	metal	iron	indeterminate		sheet	incomplete					1	half circle, l=3.5
6555	Feat. 03				06A	metal	iron	indeterminate	hardware	screw: indeterminate	complete	countersunk head				1	
6553	Feat. 03				06A	metal	iron	structural	hardware	lock: key						1	
6558	Feat. 03				06A	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		1	
6559	Feat. 03				06A	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		1	
6557	Feat. 03				06A	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		7	
6562	Feat. 03				06A	metal	iron	structural	hardware	nail: indeterminate	incomplete	indeterminate		cut		21	
6560	Feat. 03				06A	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		14	
6561	Feat. 03				06A	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		9	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6556	Feat. 03				06A	metal	iron	structural	hardware	nail: lath	incomplete	rosehead		wrought		2	
6554	Feat. 03				06A	metal	iron	tools/equipment	horse related	nail: common	incomplete	horseshoe head		cut		1	
6565	Feat. 03				06A	metal	metal: ind. White	indeterminate		sheet						7	
6163	Feat. 03				06A	mortar		structural	building component	sample						1	
6551	Feat. 03				06A	stone	slate	indeterminate		indeterminate		plain				1	
6578	Feat. 03				06B	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				1	
6576	Feat. 03				06B	ceramic	clay: white	personal/societal	smoking	smoking pipe	mouthpiece	glaze: amber				1	
6577	Feat. 03				06B	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				2	
6575	Feat. 03				06B	ceramic	coarse stoneware: grey	food/beverage	storage container	jug	handle	glaze: salt	clear/colourless			1	blue painted
6580	Feat. 03				06B	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			2	
6581	Feat. 03				06B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: embossed motifs	blue			2	chicken foot
6582	Feat. 03				06B	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim	hand painted	polychrome: late palette			4	pink rim line, lg pink/blue pattern
6579	Feat. 03				06B	ceramic	vitrified white earthenware	food/beverage	tableware	plate: soup	rim	transfer printed	blue			2	
6080	Feat. 03				06B	fauna		fauna: indeterminate								4	
6569	Feat. 03				06B	metal	iron	indeterminate		strap	incomplete					1	
6570	Feat. 03				06B	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		3	
6574	Feat. 03				06B	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		6	
6573	Feat. 03				06B	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		6	
6571	Feat. 03				06B	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		3	
6572	Feat. 03				06B	metal	iron	structural	hardware	nail: lath	incomplete	rectangular head		cut		2	
6081	Feat. 03				06B	mortar		structural	building component	sample						1	
6568	Feat. 03				06B	stone	slate	tools/equipment	writing	pencil	incomplete					1	
5998	Feat. 03				06C	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	TD: impressed			heat altered: smoked	2	
6005	Feat. 03				06C	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	moulded	Wheat			1	
6006	Feat. 03				06C	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless		heat altered: burnt	3	
6001	Feat. 03				06C	ceramic	refined white earthenware	food/beverage	tableware	pitcher	handle	sponged	blue			9	
6002	Feat. 03				06C	ceramic	refined white earthenware	food/beverage	tableware	plate: bread (3-7")	rim	moulded	clear/colourless			2	floral
6000	Feat. 03				06C	ceramic	refined white earthenware	food/beverage	tableware	saucer	footring/footrim	sponged: cut	brown			1	
5999	Feat. 03				06C	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged: cut	purple			1	
6004	Feat. 03				06C	ceramic	refined white earthenware	personal/societal	recreation	toy: miniature tableware	vessel portion	transfer printed/moulded	brown			1	plate
6003	Feat. 03				06C	ceramic	yelloware	food/beverage	tableware	holloware: cylindrical	body	glaze: Rockingham	brown			1	
5993	Feat. 03				06C	fauna		fauna: indeterminate								8	
5992	Feat. 03				06C	fauna	bone	personal/societal	clothing	button: 4 hole	complete	plain				2	tire shape
5991	Feat. 03				06C	fauna	shell	personal/societal	clothing	button: 4 hole	complete	plain				1	
5996	Feat. 03				06C	glass	indeterminate	indeterminate		holloware: indeterminate	body	plain	aqua: light	indeterminate		1	
5994	Feat. 03				06C	glass	indeterminate	personal/societal	clothing	button: 4 hole	complete	plain	clear/colourless	Prosser		1	
5995	Feat. 03				06C	glass	indeterminate	personal/societal	clothing	button: 4 hole	complete	transfer printed	green	Prosser	worn	1	
5997	Feat. 03				06C	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		17	
6020	Feat. 03				06C	metal	copper alloy	personal/societal	commerce	coin: half penny	complete					1	"BANK OF UPPER CANADA 1852/BANK TOKEN ONE HALF PENNY"
6007	Feat. 03				06C	metal	iron	indeterminate		buckle: indeterminate	incomplete					1	w=2.8cm
6011	Feat. 03				06C	metal	iron	indeterminate		strap	complete					1	bracing?, w=4.5cm
6010	Feat. 03				06C	metal	iron	indeterminate		strap	incomplete					1	w=1.8cm
6019	Feat. 03				06C	metal	iron	indeterminate		wire	incomplete					1	pin/needle?
6008	Feat. 03				06C	metal	iron	indeterminate	hardware	indeterminate	mounting plate					1	d=6cm
6016	Feat. 03				06C	metal	iron	structural	hardware	nail: common	complete	finishing		cut		1	
6017	Feat. 03				06C	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		13	
6014	Feat. 03				06C	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		11	
6012	Feat. 03				06C	metal	iron	structural	hardware	nail: common	incomplete	rosehead		wrought		3	
6015	Feat. 03				06C	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		1	
6013	Feat. 03				06C	metal	iron	structural	hardware	nail: lath	complete	rosehead		wrought		3	
6018	Feat. 03				06C	metal	iron	tools/equipment	horse related	nail: common	incomplete	horseshoe head		cut		1	
6009	Feat. 03				06C	metal	iron	tools/equipment	sewing	scissors	complete					1	l=10.5cm
6627	Feat. 03				06D	ceramic	clay: white	personal/societal	smoking	smoking pipe	bowl	plain				1	
6628	Feat. 03				06D	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	glaze: amber				1	
6629	Feat. 03				06D	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	Montreal: Henderson				1	'..REAL/HEND..'
6626	Feat. 03				06D	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				6	
6630	Feat. 03				06D	ceramic	coarse earthenware: red	food/beverage	storage container	holloware: cylindrical	base	slipped	cream/yellow			1	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6635	Feat. 03				06D	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	sponged	blue			3	
6637	Feat. 03				06D	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			7	
6631	Feat. 03				06D	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: indeterminate	blue		spalled	2	
6633	Feat. 03				06D	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			2	blk and pink rim line
6636	Feat. 03				06D	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged: cut	purple			1	
6634	Feat. 03				06D	ceramic	refined white earthenware	food/beverage	tableware	teabowl/cup	rim/body	hand painted	polychrome: late palette			9	
6632	Feat. 03				06D	ceramic	vitrified white earthenware	food/beverage	tableware	flatware	rim	moulded	rim line: gold			1	
6073	Feat. 03				06D	fauna		fauna: indeterminate								1	
6624	Feat. 03				06D	glass	indeterminate	indeterminate		bottle: polygonal	body	plain	aqua: light	moulded: contact		1	
6625	Feat. 03				06D	glass	indeterminate	indeterminate		jar: liner	incomplete	plain	aqua: light	moulded: contact		3	
6623	Feat. 03				06D	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		5	
6614	Feat. 03				06D	metal	copper alloy	tools/equipment	horse related	horse equipment: harness/sleigh bell	incomplete	impressed		cast		1	
6616	Feat. 03				06D	metal	iron	indeterminate		holloware: indeterminate	spout					1	with seam, tapers, possible spout?
6615	Feat. 03				06D	metal	iron	indeterminate		strap	incomplete					1	triangular
6618	Feat. 03				06D	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		1	
6619	Feat. 03				06D	metal	iron	structural	hardware	nail: common	complete	rosehead		wrought		2	
6622	Feat. 03				06D	metal	iron	structural	hardware	nail: common	incomplete	indeterminate		cut		7	
6620	Feat. 03				06D	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		7	
6621	Feat. 03				06D	metal	iron	structural	hardware	nail: lath	complete	rectangular head		cut		10	
6617	Feat. 03				06D	metal	iron	tools/equipment	horse related	nail: common	incomplete	horseshoe head		cut		1	
6613	Feat. 03				06D	mortar		structural	building component	sample		impressed				1	with lath/board impression?, impr w=1.3cm
6612	Feat. 03				06D	mortar		structural	building component	sample		impressed				1	with lath/board impression?, impr w=1.3cm
6567	Feat. 03				16	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	Montreal: Henderson				1	'MONTREAL/HENDERSON'
5976	Feat. 04	N			07	ceramic	clay: white	personal/societal	smoking	smoking pipe	mouthpiece	glaze: amber				1	
5974	Feat. 04	N			07	ceramic	refined white earthenware	food/beverage	tableware	flatware	footrim/base	plain	clear/colourless			8	
5975	Feat. 04	N			07	ceramic	refined white earthenware	food/beverage	tableware	plate: bread (3-7")	rim	edged: unscalloped, imp. repetitive patterns	blue			6	imp curved lines
5973	Feat. 04	N			07	ceramic	refined white earthenware	food/beverage	tableware	saucer	footrim/body	hand painted	polychrome: late palette			8	
5971	Feat. 04	N			07	ceramic	refined white earthenware	food/beverage	tableware	teacup	rim	sponged	blue			4	dbl curve shape
5972	Feat. 04	N			07	ceramic	refined white earthenware	food/beverage	tableware	teacup	vessel portion	hand painted	pink			6	Tulip shape, dbl pink rim line
5968	Feat. 04	N			07	fauna		fauna: indeterminate								6	
5969	Feat. 04	N			07	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate	heat altered: melted	1	
5970	Feat. 04	N			07	metal	iron	indeterminate		sheet	incomplete					3	
6335	Feat. 04	S			07	ceramic	coarse earthenware: red	food/beverage	indeterminate	holloware: cylindrical	body	glaze: lead	brown: light			1	
6330	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	hand painted	black			2	ptd or stamped?
6332	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	hand painted	polychrome: late palette			2	
6334	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			4	
6333	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	footring/footrim	plain	clear/colourless			6	
6327	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	rim	edged: unscalloped, imp. repetitive patterns	blue			2	imp curved lines
6329	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	sponged: cut	brown		heat altered: burnt	1	
6328	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	sponged	blue			1	
6331	Feat. 04	S			07	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim/body	hand painted	polychrome: late palette			7	pink rim line, purple stems
6246	Feat. 04	S			07	fauna		fauna: indeterminate								1	
6337	Feat. 04	S			07	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate	heat altered: melted	1	
6336	Feat. 04	S			07	metal	iron	structural	hardware	nail: common	incomplete	rectangular head		cut		1	
6340	Feat. 07				10A	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem					1	
6341	Feat. 07				10A	ceramic	coarse stoneware: red	food/beverage	storage container	holloware: cylindrical	rim/body	glaze: lead	black			2	
6342	Feat. 07				10A	ceramic	refined white earthenware	food/beverage	storage container	jar: cylindrical	footring/footrim	plain	clear/colourless			1	jar?
6345	Feat. 07				10A	ceramic	refined white earthenware	food/beverage	tableware	bowl	body	hand painted	polychrome: late palette			1	bowl?, lg pink floral
6343	Feat. 07				10A	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	plain	clear/colourless			1	London shape
6344	Feat. 07				10A	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			3	
6347	Feat. 07				10A	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			1	
6346	Feat. 07				10A	ceramic	refined white earthenware	food/beverage	tableware	saucer	body	hand painted	polychrome: late palette			3	lg pink floral and sm sprig
6248	Feat. 07				10A	fauna		fauna: indeterminate								1	
6339	Feat. 07				10A	flora	wood	indeterminate		sample						1	
6338	Feat. 07				10A	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		1	
6157	Feat. 07				10B	ceramic	clay: white	personal/societal	smoking	smoking pipe	mouthpiece	glaze: yellow				1	
6158	Feat. 07				10B	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	mark: indeterminate				1	

ID	PROV 1	PROV 2	EASTING	NORTHING	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	FUNCTION 2	OBJECT	FRAGMENT	ATTRIBUTE 1	ATTRIBUTE 2	MANUFACTURE	ALTERATION	# OF ARTIFACTS	NOTE
6159	Feat. 07				10B	ceramic	coarse stoneware: red	food/beverage	storage container	holloware: cylindrical	body	glaze: lead	black			1	
6162	Feat. 07				10B	ceramic	porcelain: hard paste	food/beverage	tableware	teacup	body	plain	clear/colourless			1	London shape
6160	Feat. 07				10B	ceramic	refined white earthenware	food/beverage	tableware	bowl	body	hand painted	polychrome: late palette			1	lgr vessel
6161	Feat. 07				10B	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			4	
6153	Feat. 07				10B	fauna		fauna: indeterminate								8	
6156	Feat. 07				10B	glass	indeterminate	food/beverage	tableware	holloware: cylindrical	base	plain	clear/colourless			1	
6155	Feat. 07				10B	metal	iron	food/beverage	food preparation	holloware: cylindrical	rim	plain		cast		1	cauldron/cooking pot?
6154	Feat. 07				10B	metal	iron	indeterminate		holloware: indeterminate	handle					1	strap handle, folded sides, plated
6348	Feat. 07				15A	ceramic	coarse earthenware: red	food/beverage	food preparation	milk pan	base	slipped	cream/yellow			1	milk pan?
6351	Feat. 07				15A	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	footring/footrim	plain	clear/colourless			2	
6350	Feat. 07				15A	ceramic	refined white earthenware	food/beverage	tableware	saucer	footring/footrim	hand painted	polychrome: late palette		heat altered: burnt	1	dk green
6349	Feat. 07				15A	ceramic	refined white earthenware	food/beverage	tableware	saucer	rim	hand painted	polychrome: late palette			2	green sprig
6247	Feat. 07				15A	fauna		fauna: indeterminate								2	
6353	Feat. 07				15A	flora	charcoal	indeterminate		sample						1	
6352	Feat. 07				15A	flora	wood	indeterminate		sample						1	
6354	Feat. 07				15A	metal	iron	indeterminate		rod	incomplete					1	hook/link?, l=7cm
6355	Feat. 07				15A	metal	iron	tools/equipment	hunting/fishing	animal trap	jaw					1	
5939	Feat. 07				15B	ceramic	clay: white	personal/societal	smoking	smoking pipe	stem	plain				1	
5938	Feat. 07				15B	ceramic	coarse earthenware: red	food/beverage	food preparation	milk pan	body	slipped	cream/yellow			4	milk pan?
5937	Feat. 07				15B	ceramic	fine earthenware: red	food/beverage	tableware	teapot	lid	glaze: jackfield	black			1	
5943	Feat. 07				15B	ceramic	porcelain: hard paste	food/beverage	tableware	saucer	vessel portion	lustre	pink			5	with worn overglaze tp?, 2 vessels?
5942	Feat. 07				15B	ceramic	refined white earthenware	food/beverage	storage container	jar: cylindrical	rim	plain	clear/colourless			3	
5940	Feat. 07				15B	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	body	hand painted	polychrome: late palette			2	
5941	Feat. 07				15B	ceramic	refined white earthenware	food/beverage	tableware	holloware: cylindrical	rim	transfer printed	blue			1	
5945	Feat. 07				15B	ceramic	refined white earthenware	food/beverage	tableware	indeterminate	body	plain	clear/colourless			3	
5947	Feat. 07				15B	ceramic	refined white earthenware	food/beverage	tableware	plate: indeterminate	footring/footrim	plain	clear/colourless			1	
5946	Feat. 07				15B	ceramic	refined white earthenware	food/beverage	tableware	plate: lunch (8")	rim	plain	clear/colourless			4	
5944	Feat. 07				15B	ceramic	refined white earthenware	food/beverage	tableware	plate: soup	footring/footrim	plain	clear/colourless			1	
5934	Feat. 07				15B	composite	shell/copper alloy	personal/societal	clothing	button: flat: 1 piece	complete	plain				1	d=2.7cm
6788	Feat. 07				15B	fauna		fauna: indeterminate								15	
5922	Feat. 07				15B	flora	charcoal	indeterminate		sample						1	
5936	Feat. 07				15B	glass	indeterminate	food/beverage	tableware	stemware	foot	moulded	clear/colourless	free-formed		1	pontil mark, heavy scalloped foot, creamer?
5935	Feat. 07				15B	glass	indeterminate	structural	building component	window pane	incomplete	plain	aqua: light	indeterminate		2	
5924	Feat. 07				15B	metal	copper alloy	indeterminate		screen	incomplete					1	fine weave
5931	Feat. 07				15B	metal	copper alloy	personal/societal	clothing	clothing fastener: straight pin	complete			wound		1	
5932	Feat. 07				15B	metal	copper alloy	tools/equipment	sewing	thimble	complete					1	
5926	Feat. 07				15B	metal	iron	food/beverage	tableware	knife	blade					1	
5927	Feat. 07				15B	metal	iron	indeterminate		bar	incomplete			cast		1	tool fragment?, trap?
5925	Feat. 07				15B	metal	iron	indeterminate		sheet	incomplete					1	plated
5923	Feat. 07				15B	metal	iron	indeterminate		wire	incomplete					2	
5930	Feat. 07				15B	metal	iron	indeterminate	hardware	hook	complete					1	"S" hook
5928	Feat. 07				15B	metal	iron	structural	hardware	lock: key	complete					1	
5929	Feat. 07				15B	metal	iron	structural	hardware	nail: common	complete	rectangular head		cut		2	
5933	Feat. 07				15B	metal	lead	indeterminate		bar	incomplete					1	

APPENDIX B

Faunal Fragments

ID	PROJECT NAME	MTCS PIF #	STAGE	BORDEN #	EASTING	NORTHING	PROV 1	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	# OF ARTIFACTS	# OF OBJECTS	Class	Family	Species	Size	Age	Element	Segment	Side	PP	Burnt	Calcined	CM	CML	PM	PML	TM	TML	Notes
6070A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04A	fauna		fauna: indeterminate	5	2	Aves					LBF												
6070B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04A	fauna		fauna: indeterminate	1	1	Mammalia					RIB												
6070C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04A	fauna		fauna: indeterminate	9	1	Mammalia																	
6070D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04A	fauna		fauna: indeterminate	3	1	Mammalia					PEL												
6070E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04A	fauna		fauna: indeterminate	2	1	Mammalia					LBF												
6070F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04A	fauna		fauna: indeterminate	1	1	Mammalia					FEM												Partial MS, trochantor and neck of a femur - likely deer
6070G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04A	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	4		CALC	D EPH, MS											Distal Epiphyses and Portion of MS of Calcaneum
6071A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04B	fauna		fauna: indeterminate	2	1	Mammalia	Bovidae	*B. taurus*	4		T VERT	Thoracic - Corpus, Spinous Process, Transverse Costal Facet											2 fragments - 1 x corpus, 1 x spinous process and costal facet
6071B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04B	fauna		fauna: indeterminate	4	4	Mammalia	Bovidae	*B. taurus*	4		MAX WT, TOOTH	2nd MOL, 1st MOL, 4th PMOL, 3rd PMOL	L										2nd molar is attached to Maxilla Frag; 1st molar and 3rd and 4th Premolars separate from Maxilla - all from L Maxilla
6071C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04B	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	4		PH 1										Y		Complete 1st Phalanx, Rodent tooth marks present
6071D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04B	fauna		fauna: indeterminate	6	1	Mammalia					LBF												5 long bone fragments, 3 likely rib fragments
6071E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04B	fauna		fauna: indeterminate	2	1	Mammalia	Bovidae	*B. taurus*	4		SKULL FRAG												
6071F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04B	fauna		fauna: indeterminate	3	1	Mammalia	Bovidae	*B. taurus*	4		TIB	MS, Tibial Crest					Y						Proximal Half of MS, Pronounced Cut Marks on all 3 Frags. Evidence of bones having broke and then healed
6071G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	04B	fauna		fauna: indeterminate	2	1	Mammalia	Bovidae	*O. aries*	3		MAND WT	1st, 2nd and 3rd MOL, 2nd, 3rd and 4th PMOL											1st and 2nd Molar and 2nd, 3rd and 4th Premolars still attached to Mandible, 3rd Molar Separate from Mandible
6074A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	11A	fauna		fauna: indeterminate	2	1	Mammalia																	
6074B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	11A	fauna		fauna: indeterminate	1	1	Mammalia					RIB												
6074C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	11A	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*	2		MET C	P EPH, MS											
6245	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	12C	fauna		fauna: indeterminate	1	1	Mammalia																	
6060	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	13	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*	2		PH 1												
6108A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	13B	fauna		fauna: indeterminate	1	1	Mammalia					RIB												
6108B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	13B	fauna		fauna: indeterminate	1	1	Mammalia					T VERT												
6115	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	13C	fauna		fauna: indeterminate	1	1	Mammalia					RIB	1st or 2nd											
6069A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	4		PEL	Ilium					Y						Iliac Crest, Iliac Fossa, Cut Marks likely from a circular saw

ID	PROJECT NAME	MTCS PIF #	STAGE	BORDEN #	EASTING	NORTHING	PROV 1	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	# OF ARTIFACTS	# OF OBJECTS	Class	Family	Species	Size	Age	Element	Segment	Side	PP	Burnt	Calcined	CM	CML	PM	PML	TM	TML	Notes
6069B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	3	1	Mammalia	Bovidae	*B. taurus*	4		PEL	Frag										
6069C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	2	1	Mammalia	Bovidae	*O. aries*	2		SCA	Glenoid										
6069D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	8	1	Mammalia					RIB	1st, 2nd and other Frag										
6069E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	2	1	Mammalia					SKULL FRAG											
6069F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	15	1	Mammalia					LBF											
6069G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			RAD	P EPH										
6069H	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			ULN	P Half										
6069I	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	1	1	Mammalia					SCA	Glenoid										Small specimen, juvenille
6069J	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			TIB	D EPH										
6069K	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	2	2	Mammalia					TIB	P EPH										
6069L	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 01	16C	fauna		fauna: indeterminate	1	1	Actinoterygii					VERT											Fused Vert/Spine of a Bony Fish - Percidae?
6072A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	12	1	Mammalia					SKULL FRAG											
6072B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	3	1	Mammalia					LBF											
6072C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*	2		MET C	P EPH, MS										
6072D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*	2		MAND WT	1st and 2nd MOL, 4th PMOL										
6072E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	4	1	Mammalia											Y					Likely Fragments of Pelvis. Circular Saw CM on 1 Frag
6072F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*	2		AST											
6072G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	1	1	Reptilia	Cryptodira (Suborder)				Plastron											Fragment of Turtle Plastron
6072H	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	1	1	Mammalia					MET T	P EPH										
6072I	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05A	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	4		PEL	Acetabulum										Complete Acetabulum
6261A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	2	2	Mammalia	Suidae	*S. scrofa*	2		PH 2, PH3,											2nd and 3rd phalanx articulate perfectly, likely juvenille
6261B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*	2		MET C	D EPH										Distal Epiphyses of a Metacarpal, likely belonging to same specimen as phalanx from 6162A (juvenille)
6261C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	3		CALC	D EPH, MS										Distal Epiphyses and Portion of MS of Calcaneum, Small, possibly juvenille
6261D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	2	2	Mammalia	Bovidae	*B. taurus*	3		PH 1, PH3											Complete 3rd phalanx (hoof), Proximal Epiphyses of 1st phalanx, Small possibly juvenille specimen, likely the same specimen as 6261C
6261E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	6	1	Mammalia					LBF											

ID	PROJECT NAME	MTCS PIF #	STAGE	BORDEN #	EASTING	NORTHING	PROV 1	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	# OF ARTIFACTS	# OF OBJECTS	Class	Family	Species	Size	Age	Element	Segment	Side	PP	Burnt	Calcined	CM	CML	PM	PML	TM	TML	Notes
6261F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*	2		T VERT	Spinous Process, Transverse Costal Facet											Incomplete
6261G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	4	1	Mammalia					SKULL FRAG												
6261H	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	2	2	Aves															Y		Rodent Tooth Marks
6261I	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	2	2	Mammalia	Suidae	*S. scrofa*	2		LBF												Likely Pelvis Frag and Femur Frag - Evidence of Breaking and Healing
6261J	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	3	3	Mammalia	Bovidae	*B. taurus*	2		TOOTH	1st, 2nd and 3rd PMOL											From MAX
6261K	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05B	fauna		fauna: indeterminate	2	2	Mammalia	Suidae	*S. scrofa*	2		TOOTH	1st and 2nd INC											1st and 2nd Incisors
6260A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	2	2	Mammalia	Bovidae	*B. taurus*	3		TOOTH	1st MOL, 4th PMOL											From MAX
6260B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	7	3	Mammalia					LBF												
6260C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	1	1	Mammalia					SKULL FRAG												
6260D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*	2		TIB	D EPH, MS					Y						
6260E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*	2		RAD	D EPH, MS					Y	Y					Cut Clean with Circular Saw
6260F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	2	1	Mammalia			2		MET	MS											2 Metapodial fragments, missing epiphyses - likely juvenille
6260G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	2	1	Mammalia			1		FEM	EPH											2 Fragments of Femoral Head
6260H	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05C	fauna		fauna: indeterminate	1	1	Mammalia					RIB	2nd											
6077A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	9	1	Mammalia					SKULL FRAG												
6077B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	2	1	Mammalia					LBF					Y							
6077C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	2	1	Mammalia					LBF						Y						Cut marks from 2 different tools (circular saw and angled saw?)
6077D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	2	1	Mammalia					RIB												
6077E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	1	1	Mammalia					TIB												Tibia of a small species - Cat? Rabbit?
6077F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	1	1	Mammalia					RIB	1st											
6077G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			SCA	Glenoid											Glenoid Fossa, Spin and Portion of Caracoid
6077H	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	3		PH 2												
6077I	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	3		PAT												
6077J	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			CALC	D EPH, MS											
6077K	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	3		TOOTH	P MOL Frag											
6077L	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 02	05D	fauna		fauna: indeterminate	2	1	Mammalia	Bovidae	*B. taurus*			TOOTH	INC											
6084	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 03	06A	fauna		fauna: indeterminate	5	1	Mammalia																	

ID	PROJECT NAME	MTCS PIF #	STAGE	BORDEN #	EASTING	NORTHING	PROV 1	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	# OF ARTIFACTS	# OF OBJECTS	Class	Family	Species	Size	Age	Element	Segment	Side	PP	Burnt	Calcined	CM	CML	PM	PML	TM	TML	Notes
6080A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 03	06B	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*															
6080B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 03	06B	fauna		fauna: indeterminate	3	1	Mammalia																	
5993	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 03	06C	fauna		fauna: indeterminate	8	1	Mammalia										Y							1 fragment calcined
6073	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 03	06D	fauna		fauna: indeterminate	1	1	Mammalia																	
6246	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 04	07	fauna		fauna: indeterminate	1	1	Mammalia					LBF					Y							
5968A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 04	07	fauna		fauna: indeterminate	3	1	Mammalia	Bovidae	*B. taurus*	4		RIB												
5968B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 04	07	fauna		fauna: indeterminate	1	1	Mammalia					PH 1												Very fragmented and worn 1st phalanx, mammal - likely juvenille cow or deer
5968C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 04	07	fauna		fauna: indeterminate	2	1	Mammalia					LBF	EPH				Y						
6248	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	10A	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*			TUSK												
6153A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	10B	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*		1	PH 3												Juvenille or Infant
6153B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	10B	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*		1	PH 2	P EPH											
6153C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	10B	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			RAD	P EPH											
6153D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	10B	fauna		fauna: indeterminate	1	1	Mammalia					LBF						Y						
6153E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	10B	fauna		fauna: indeterminate	3	1	Mammalia					SKULL FRAG												
6153F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	10B	fauna		fauna: indeterminate	1	1	Mammalia					RIB	1st											
6247	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15A	fauna		fauna: indeterminate	2	2	Mammalia					RIB												
A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15B	fauna		fauna: indeterminate	2	1	Bivalvia																	
B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15B	fauna		fauna: indeterminate	2	1	Mammalia	Suidae	*S. scrofa*			TUSK												
C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15B	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*			TOOTH												
D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15B	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			ULN	P Half											
E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15B	fauna		fauna: indeterminate	3	1	Mammalia					PEL												3 fragments, likely all same specimen, partial glenoid fossa
F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15B	fauna		fauna: indeterminate	5	5	Mammalia					RIB												
G	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 07	15B	fauna		fauna: indeterminate	1	1	Mammalia											Y						Cut Marks on 3 sides, polished, modified
A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 14	14D	fauna		fauna: indeterminate	2	1	Mammalia					RIB												
B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 14	14D	fauna		fauna: indeterminate	3	1	Mammalia																	
C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08			Feat. 14	14D	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*			MET C	P EPH, MS											

ID	PROJECT NAME	MTCS PIF #	STAGE	BORDEN #	EASTING	NORTHING	PROV 1	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	# OF ARTIFACTS	# OF OBJECTS	Class	Family	Species	Size	Age	Element	Segment	Side	PP	Burnt	Calcined	CM	CML	PM	PML	TM	TML	Notes
6195	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	088	136		01	fauna		fauna: indeterminate	1	1	Mammalia																	
6236	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	089	134		01	fauna		fauna: indeterminate	2	1	Mammalia																	
6228	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	090	136		01	fauna		fauna: indeterminate	1	1	Mammalia					LBF												
6192	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	090	137		01	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*			PH 1	D EPH											
6200	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	091	135		01	fauna		fauna: indeterminate	3	1	Mammalia	Suidae	*S. scrofa*			FEM	MS											
6262A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	091	137		01	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*O. aries*			TIB	D EPH											
6262B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	091	137		01	fauna		fauna: indeterminate	2	1	Mammalia	Bovidae	*O. aries*			RAD	P EPH											
6262C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	091	137		01	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*			PH 1												
6044	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	092	134		01	fauna		fauna: indeterminate	1	1	Mammalia	Suidae	*S. scrofa*			CALC												
5986	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	114	111		01	fauna		fauna: indeterminate	4	1	Mammalia	Bovidae	*B. taurus*			MAND WT	1st and 2nd MOL											
6206	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	115	109		01	fauna		fauna: indeterminate	1	1	Mammalia					LBF												
6076A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	115	111		01	fauna		fauna: indeterminate	2	1	Mammalia					TOOTH												
6076B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	115	111		01	fauna		fauna: indeterminate	4	1	Mammalia																	
5949	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	115	112		01	fauna		fauna: indeterminate	4	1	Mammalia										Y							1 fragment calcined
	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	109		1	fanua		indeterminite	6	1	Mammalia																	
6126A	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	110		01	fauna		fauna: indeterminate	1	1	Mammalia	Bovidae	*B. taurus*	4		PH 2												
6126B	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	110		01	fauna		fauna: indeterminate	3	1	Mammalia					LBF												
6126C	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	110		01	fauna		fauna: indeterminate	10	1	Mammalia					SKULL FRAG												
6126D	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	110		01	fauna		fauna: indeterminate	4	1	Mammalia					RIB												
6126E	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	110		01	fauna		fauna: indeterminate	2	1	Mammalia																	
6126F	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	110		01	fauna		fauna: indeterminate	2	2	Mammalia	Suidae	*S. scrofa*			TOOTH	MOL, Frag											
6075	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	116	112		01	fauna		fauna: indeterminate	2	1	Mammalia																	
6082	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	117	109		01	fauna		fauna: indeterminate	6	1	Mammalia																	
6078	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	117	110		01	fauna		fauna: indeterminate	3	1	Mammalia																	
6022	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	117	111		01	fauna		fauna: indeterminate	2	1	Mammalia																	
6085	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	117	112		01	fauna		fauna: indeterminate	3	1	Mammalia																	

ID	PROJECT NAME	MTCS PIF #	STAGE	BORDEN #	EASTING	NORTHING	PROV 1	LOT	MATERIAL 1	MATERIAL 2	FUNCTION 1	# OF ARTIFACTS	# OF OBJECTS	Class	Family	Species	Size	Age	Element	Segment	Side	PP	Burnt	Calcined	CM	CML	PM	PML	TM	TML	Notes
	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	FLOATS				fauna		fauna: indeterminate	2	2	Mammalia	Rodentia																
	Turnbull Site, Highland Line Pit, Cavanagh	P1107-0033-2020	4	BfGd-08	FLOATS				fauna		fauna: indeterminate	5	5	Mammalia																	
												317																			

APPENDIX C

Comprehensive Summary of the Processed Floats

APPENDIX C
Comprehensive Summary of the Processed Floats

Flot. Log Form #	Feature	Notes	Float Quantity	Heavy Fraction Weight, Unsorted (g)	Artifacts	Artifact Comments	Microfauna	Microfauna notes	Light Fraction Weight, Unsorted (g)	Charcoal Weight (size >2mm) (g)	uncharred Amaranthus sp.	uncharred Chenopodium sp.	charred Rubus flesh	charred nut shell	uncharred Panicum capillare	Uncharred Rubus sp.	Uncharred cf. Prunus pensylvanica	charred Carduus sp.	uncharred Sambucus canadensis	Unidentified
1	3	6C	5.1L	N/A	-		-		17.36g	0.27g	16			15	1	3				
2	3	6C	5.1L	1574.41g	-		-		N/A	-				3						
3	2	5C	3.9L	N/A	-		-		2.01g	0.2g	4	2	3			3				2
4	2	5C	3.9L	695.55g	n=1	possible pin/brooch implement	n=1		N/A	<0.01g										
5	2	5A	4.0L	N/A	-		-		18.99g	7.63g	2		1	2						
6	2	5A	4.0L	700.51g	n=1	thimble	-		N/A	0.13g				15						
7	3	6A	5.1L	N/A			n=2		7.83g	0.54g		15		4	2			1	1	
8	3	6A	5.1L	1511.99	n=2	misc. metal	n=5	1 calcined	N/A	-				3			1			

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SUPPLEMENTARY DOCUMENTATION

Stage 4 Archaeological Assessment

Turnbull Site (BfGd-8), Part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario

Licensee: Randy Hahn, Ph.D. (P1107)
PIF Numbers: P1107-0030-2020

Submitted to:

Phil White, Quality Control
Thomas Cavanagh Construction Limited
9094 Cavanagh Road
Ashton, Ontario
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Submitted by:

Golder Associates Ltd.
1931 Robertson Road Ottawa, Ontario, K2H 5B7 Canada

+1 (613) 592 9600

19126620

May 2021

Distribution List

1 e-copy - Thomas Cavanagh Construction Limited

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1 e-copy- Golder Associates Ltd

Table of Contents

1.0 SUPPLEMENTARY DOCUMENATION A: GPS COORDINATES

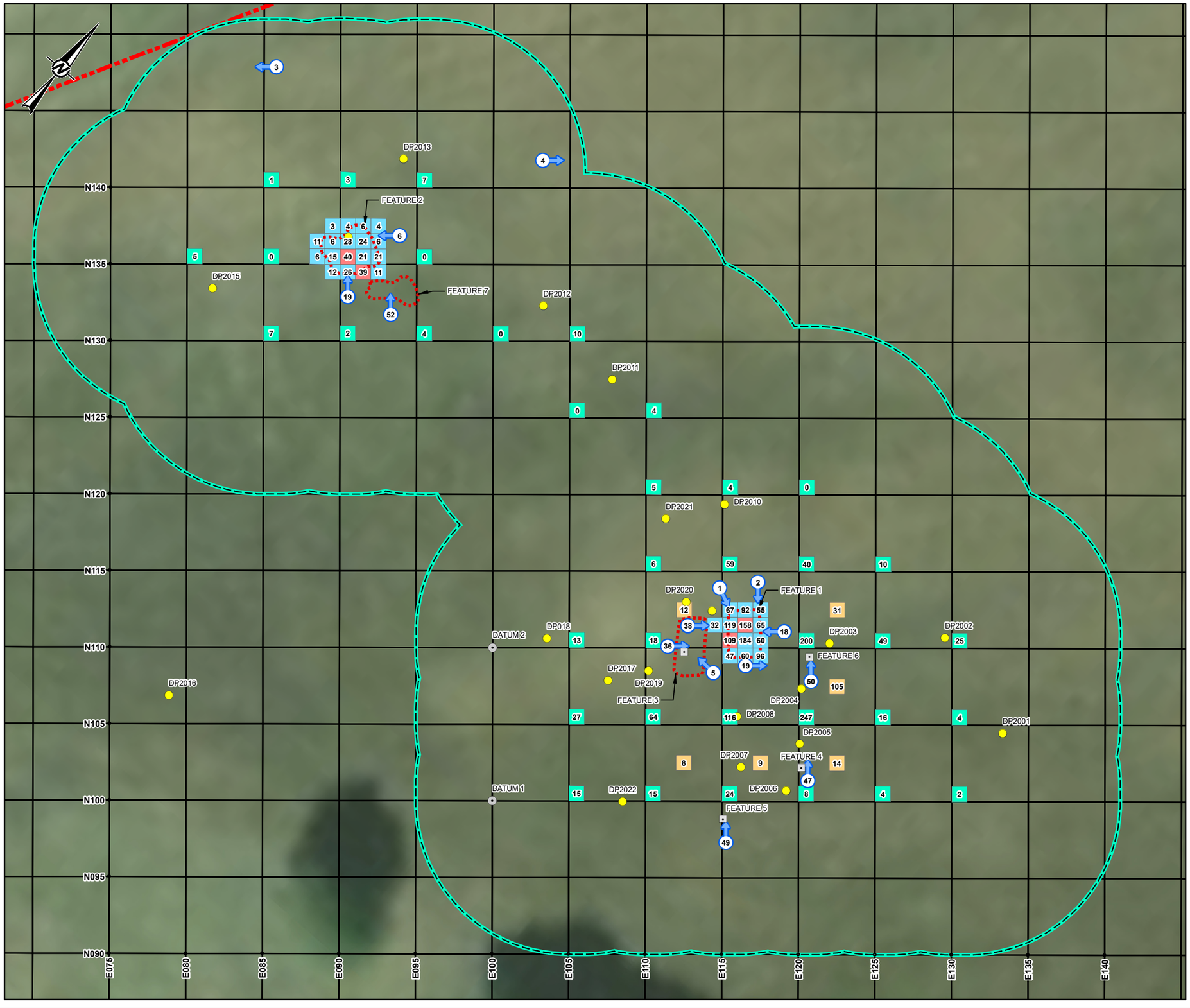
GPS coordinates for the recorded for the dimensions of the Turnbull Site (BfGd-8) using a using a Garmin GPSMap 64s handheld unit. This GPS has a built-in 12 channel high sensitivity receiver (WAAS-enabled) capable of providing solutions utilizing the GPS and GLONASS satellite constellations. The accuracy of this unit is <5 meters 95% typical. All observations collected with the Garmin GPSMap 64s referenced the UTM coordinate system (Zone 18) and the NAD83 datum as six digit easting and seven digit northing coordinates.

The ten metre site grid which was used to create the 5 m Stage 3 excavation grid was placed using a Trimble R8 Model 2 Global Navigation Satellite System (GNSS) unit. The Trimble R8 Model 2 GPS receiver has built in Wide-Area Augmentation System and European Geostationary Navigation Overlay Service capability and supports a wide range of satellite signals, including GPS L1/L2C/L5, GLONASS L1/L2 and Galileo. The GNSS receiver is a dual frequency differential GPS capable of real time kinematic corrections within the Can-Net Virtual Reference Station network. The accuracy of the locations collected range from less than 1 cm to 5 cm depending on the number of satellites in view, the position of satellites in relation to each other, the strengths of the satellite signals and the distance of the base station from the GPS receiver. The positions recorded are typically accurate to a centimeter or less. The projection used was Universal Transverse Mercator (UTM), Grid Zone 18, and referenced to the North American Datum (NAD) 1983. Table 1 shows the GPS coordinate of the limits of the excavation and two of the datum points for the initial 10 m grid measured in with the Trimble.

Table 1: Turnbull (BfGd-8) GPS Coordinates

GPS Point	Easting	Northing
Centre Point	379367.19	4977297.68
North Limit	379354.08	4977312.80
South Limit	379372.62	4977276.17
West Limit	379331.03	4977293.59
East Limit	379403.36	4977301.77
Datum 1	379372.62	4977276.17
Datum 2	379380.31	4977282.59

2.0 SUPPLEMENTARY DOCUMENTATION B: MAPS



SCALE 1:11,890

LEGEND

- PHOTO LOCATION AND DIRECTION
- CSP LOCATIONS (STAGE 2)
- POST MOULD LOCATION
- DATUM
- FEATURE LOCATION
- STAGE 4 TEST UNIT
- STAGE 3 TEST UNIT
- STAGE 3 INFILL UNIT
- FEATURE IDENTIFIED DURING STAGE 3 ARCHAEOLOGICAL ASSESSMENT
- EXTENT OF STAGE 4 MECHANICAL TOPSOIL REMOVAL - NO FURTHER ARCHAEOLOGY
- 5 METRE GRID

NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2020
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

0 2.5 5 10
1:250 METRES

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
STAGE 4 ARCHAEOLOGICAL MITIGATION TURNBULL SITE (BfGd-8), PART OF LOT 5, CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY

TITLE
STAGE 4 RESULTS, RECOMMENDATIONS AND PHOTO LOCATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2021-05-14
DESIGNED	----
PREPARED	BR
REVIEWED	RH
APPROVED	MT

PROJECT NO.	CONTROL	REV.	MAP
19126620	0016	0	**SD1**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

Path: N:\Active\Spatial_IM\ThomasCavanagh\Duncan, Pat\99_PRO\19126620_Cavanagh_ARA\0016_St4_Arch_Turnbull\Mxd\19126620-0016-HA-05D1.mxd

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Ministry of Heritage, Sport, Tourism, and Culture Industries

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Ontario

Apr 29, 2021

Randy Hahn (P1107)
Golder Associates Ltd.
F - 101 Artesa Ottawa ON K2S 0J8

RE: Review and Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 3 Archaeological Assessment Duncan Site (BfGd-9), Part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario", Dated Feb 9, 2021, Filed with MHSTCI Toronto Office on Feb 17, 2021, MHSTCI Project Information Form Number P1107-0029-2020, MHSTCI File Number 0013076

Dear Dr. Hahn:

This office has reviewed the above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18.[1] This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment of the study area as depicted in SD Map 1 of the Supplementary Documentation and Map 1 and Map 4 of the above titled report and recommends the following:

1) The Duncan site (BfGd-9) is of sufficient cultural heritage value or interest to warrant mitigative measures through a Stage 4 mitigation of development impacts.

2) As complete avoidance of the site is not considered to be a viable option, Stage 4 mitigation would entail mechanical topsoil removal followed by the hand excavation of cultural features. This strategy was developed in consultation with an MHSTCI review officer on September 10, 2020.

3) Mechanical topsoil removal will employ an excavator with a flat-edged bucket and follow Standards 2 to 6 of Section 4.2.3 of the Standards and Guidelines for Consultant Archaeologists (MHSTCI 2011).

4) As per Standard 1 of Section 4.3 of the Standards and Guidelines for Consultant Archaeologists (MHSTCI 2011), mechanical excavation must extend to a minimum of 10 m beyond uncovered cultural features or to the end of the project boundary.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Wai Hadlari
Archaeology Review Officer

cc. Archaeology Licensing Officer
Phil White,Thomas Cavanagh Construction Ltd.
TBD TBD,Lanark County Planning Department

[1] *In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

Ministry of Heritage, Sport, Tourism, and Culture Industries

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Ontario

Jun 11, 2021

Randy Hahn (P1107)
Golder Associates Ltd.
F - 101 Artesa Ottawa ON K2S 0J8

RE: Review and Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 4 Archaeological Mitigation Duncan Site (BfGd-9), Part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario", Dated Jun 8, 2021, Filed with MHSTCI Toronto Office on Jun 10, 2021, MHSTCI Project Information Form Number P1107-0032-2020, MHSTCI File Number 0013076

Dear Dr. Hahn:

This office has reviewed the above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18.[1] This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment/mitigation of the study area as depicted in Map 4 of the above titled report and recommends the following:

1) The Duncan site (BfGd-9) has been fully mitigated and requires no additional archaeological assessments.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Jessica Marr
Archaeology Review Officer

cc. Archaeology Licensing Officer
Phil White,Thomas Cavanagh Construction Ltd.
Julie Stewart,Lanark County Planning Department

[1] *In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

Ministry of Heritage, Sport, Tourism, and Culture Industries

Archaeology Program Unit
Programs and Services Branch
Heritage, Tourism and Culture Division
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel.: (416) 418-0949
Email: Zeeshan.Abedin@ontario.ca

Ministère des Industries du patrimoine, du sport, du tourisme et de la culture

Unité des programme d'archéologie
Direction des programmes et des services
Division du patrimoine, du tourisme et de la culture
401, rue Bay, bureau 1700
Toronto ON M7A 0A7
Tél. : (416) 418-0949
Email: Zeeshan.Abedin@ontario.ca

Ontario

Jun 21, 2021

Randy Hahn (P1107)
Golder Associates Ltd.
F - 101 Artesa Ottawa ON K2S 0J8

RE: Review and Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 4 Archaeological Mitigation Turnbull Site (BfGd-8), Part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario", Dated May 14, 2021, Filed with MHSTCI Toronto Office on May 21, 2021, MHSTCI Project Information Form Number P1107-0033-2020, MHSTCI File Number 0013076

Dear Dr. Hahn:

This office has reviewed the above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18.[1] This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the mitigation of the study area as depicted in Map 4 of the above titled report and recommends the following:

The results of the Stage 4 mitigation of the Turnbull Site (BfGd-8) provide the basis for the following recommendation:

1) The Turnbull Site (BfGd-8) has been fully excavated and documented, and, as such, the site has no further cultural heritage value or interest and requires no additional archaeological assessment.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

Sincerely,

Zeeshan Abedin
Archaeology Review Officer

cc. Archaeology Licensing Officer
Phil White,Thomas Cavanagh Construction Ltd.
TBD TBD,Lanark County Planning Department

[1] *In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

Ministry of Heritage, Sport, Tourism, and Culture Industries

Archaeology Program Unit
Programs and Services Branch
Heritage, Tourism and Culture Division
401 Bay Street, Suite 1700
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Ministère des Industries du patrimoine, du sport, du tourisme et de la culture

Unité des programme d'archéologie
Direction des programmes et des services
Division du patrimoine, du tourisme et de la culture
401, rue Bay, bureau 1700
Toronto ON M7A 0A7
Tél. : (416) 212-4019
Email: heather.kerr2@ontario.ca

Ontario

Oct 29, 2020

Randy Hahn (P1107)
Golder Associates Ltd.
F - 101 Artesa Ottawa ON K2S 0J8

RE: Review and Entry into the Ontario Public Register of Archaeological Reports: Archaeological Assessment Report Entitled, "Stage 1 and 2 Archaeological Assessment Duncan Pit Property, Part of Lot 5, Concession 10, Dalhousie Township, Lanark County, Ontario", Dated Oct 5, 2020, Filed with MHSTCI Toronto Office on Oct 9, 2020, MHSTCI Project Information Form Number P1107-0027-2020, MHSTCI File Number 0013076

Dear Dr. Hahn:

This office has reviewed the above-mentioned report, which has been submitted to this ministry as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18.[1] This review has been carried out in order to determine whether the licensed professional consultant archaeologist has met the terms and conditions of their licence, that the licensee assessed the property and documented archaeological resources using a process that accords with the 2011 *Standards and Guidelines for Consultant Archaeologists* set by the ministry, and that the archaeological fieldwork and report recommendations are consistent with the conservation, protection and preservation of the cultural heritage of Ontario.

The report documents the assessment/mitigation of the study area as depicted in Map 2, Map 6, and Map 7 of the above titled report and recommends the following:

The Stage 1 and 2 AA has provided the basis for the following recommendations:

1) The Turnbull site (BfGd-8) possesses Cultural Heritage Value or Interest and the site should be subject to Stage 3 site-specific archaeological assessment prior to any development impacts.

2) The Stage 3 assessment of the Turnbull site (BfGd-8) should involve the hand excavation of 1 m x 1 m test units in a 5 m grid across the site and the excavation of additional 1 m x 1 m infill test units amounting to 20% of the grid unit total, as outlined in Sections 3.2 and Table 3.1 of the MHSTCI' Standards and Guidelines for Consultant Archaeologists (MHSTCI 2011). As a controlled surface pickup was completed during the Stage 2, one is not required as part of the Stage 3 archaeological assessment. The test unit excavation should consist of one metre by one metre square test units laid out in a systematic grid at 5 m intervals.

3) The Duncan site (BfGd-9) possesses Cultural Heritage Value or Interest and the site should be subject to Stage 3 site-specific archaeological assessment prior to any development impacts.

4) The Stage 3 assessment of the Duncan site (BfGd-9) should involve the hand excavation of 1 m x 1 m test units in a 5 m grid across the site and the excavation of additional 1 m x 1 m infill test units amounting to 20% of the grid unit total, as outlined in Sections 3.2 and Table 3.1 of the MHSTCI' Standards and Guidelines for Consultant Archaeologists (MHSTCI 2011). As a controlled surface pickup was completed during the Stage 2, one is not required as part of the Stage 3 archaeological assessment. The test unit excavation should consist of one metre by one metre square test units laid out in a systematic grid at 5 m intervals.

5) Should ground disturbance extend beyond the present Stage 1 and 2 study area, additional archaeological assessment may be required.

Based on the information contained in the report, the ministry is satisfied that the fieldwork and reporting for the archaeological assessment are consistent with the ministry's 2011 *Standards and Guidelines for Consultant Archaeologists* and the terms and conditions for archaeological licences. This report has been entered into the Ontario Public Register of Archaeological Reports. Please note that the ministry makes no representation or warranty as to the completeness, accuracy or quality of reports in the register.

Should you require any further information regarding this matter, please feel free to contact me.

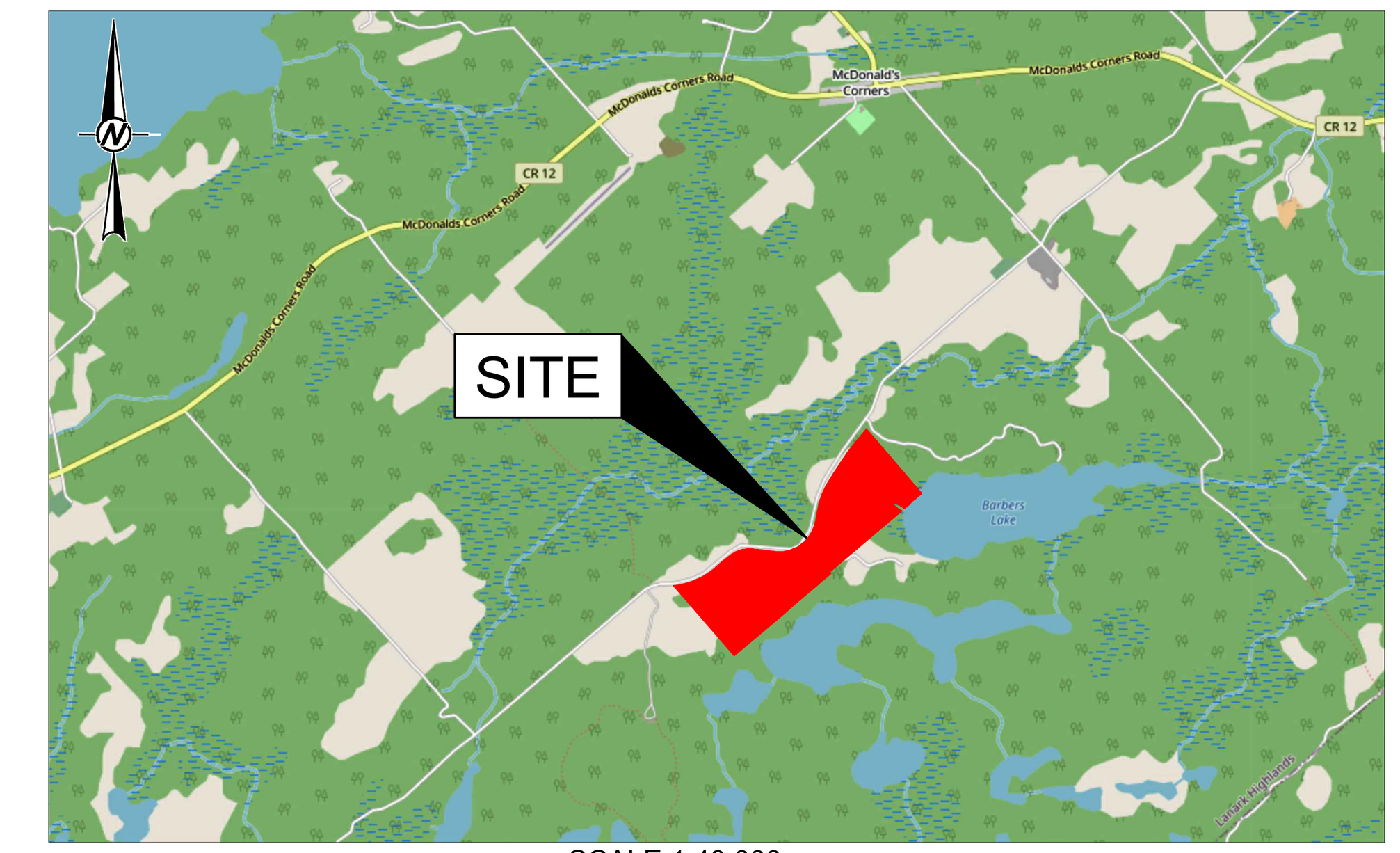
Sincerely,

Heather Kerr
Archaeology Review Officer

cc. Archaeology Licensing Officer
Phil White,Thomas Cavanagh Construction Ltd.
Julie Stewart,Lanark County Planning Department

[1] *In no way will the ministry be liable for any harm, damages, costs, expenses, losses, claims or actions that may result: (a) if the Report(s) or its recommendations are discovered to be inaccurate, incomplete, misleading or fraudulent; or (b) from the issuance of this letter. Further measures may need to be taken in the event that additional artifacts or archaeological sites are identified or the Report(s) is otherwise found to be inaccurate, incomplete, misleading or fraudulent.*

KEY MAP



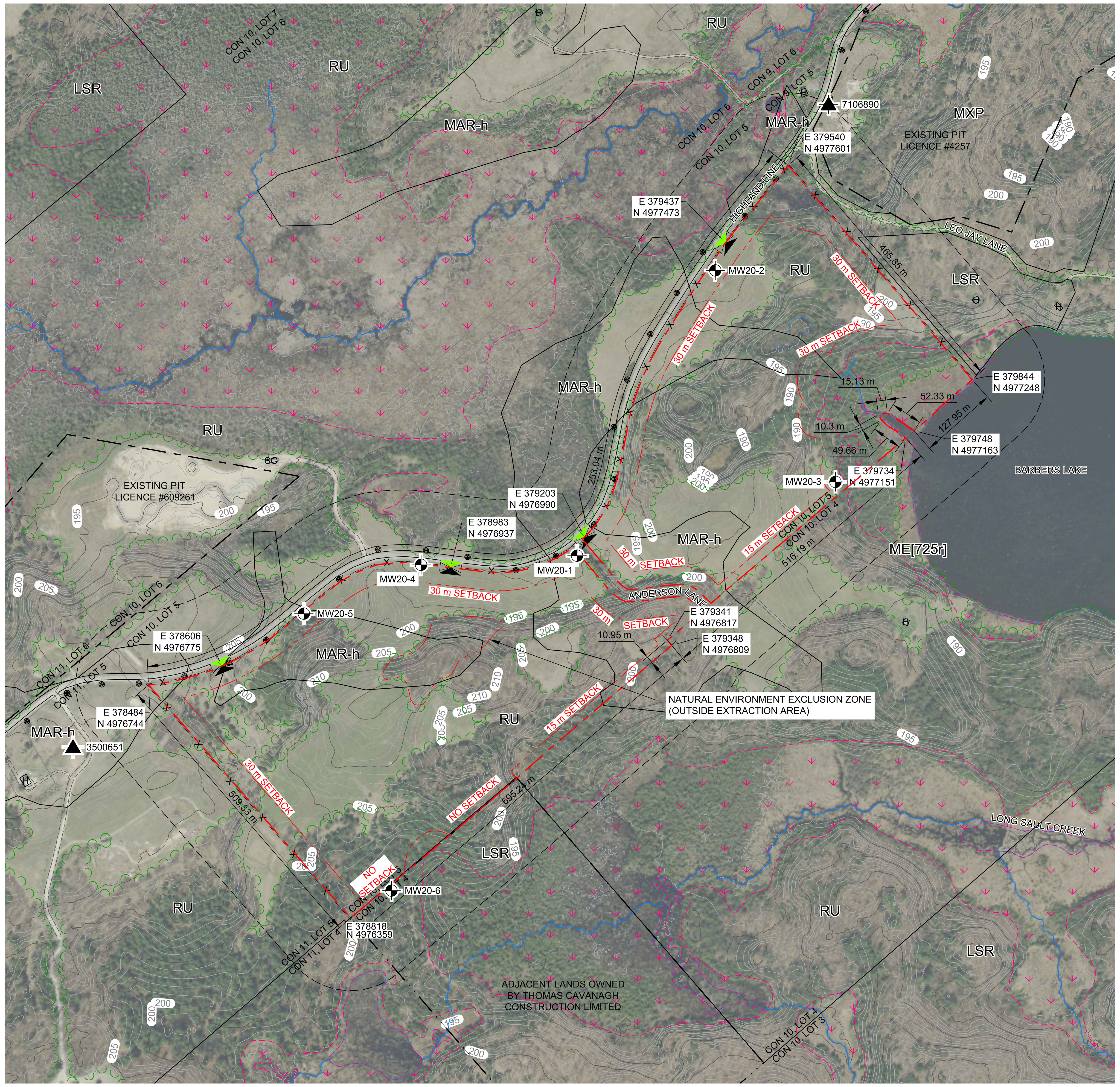
SCALE 1:40,000 m

HIGHLAND LINE PIT

LOT 5, CONCESSION 10
TOWNSHIP OF LANARK HIGHLANDS,
LANARK COUNTY, ONTARIO

APPLICANT:
THOMAS CAVANAGH CONSTRUCTION LIMITED
9094 CAVANAGH ROAD
ASHTON, ONTARIO
KOA 1B0

PIT LICENCE NO. ___________



EXISTING FEATURES - GENERAL
SCALE 1:4,000 m

LAND USE / ZONING TWP. OF LANARK HIGHLANDS BY-LAW NO. 2003-451	
RU	RURAL
LSR	LIMITED SERVICES RURAL
MAR-h	MINERAL AGGREGATE RESOURCES RESERVE
MXP	MINERAL AGGREGATE RESOURCES PIT

NOTE:
1. ZONES WITH AN "h" FOLLOWING THE ZONE SYMBOL (e.g. MAR-h) ILLUSTRATES PROPERTIES WHICH HAVE BEEN PLACED IN A HOLDING ZONE.

NOTE(S)
1. LICENCED AREA, HIGHLAND LINE PIT **50.6** HECTARES.
2. AREA OF OPERATION, HIGHLAND LINE PIT **35.1** HECTARES.
3. THIS SITE PLAN IS PEPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE FOR A PIT BELOW THE GROUND WATER TABLE.
4. THIS PLAN WAS PREPARED USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS.
5. LOT, CONCESSION AND BOUNDARY LINES ON THIS PLAN ARE APPROXIMATE.
6. THIS IS NOT A LEGAL SURVEY DRAWING IN ACCORDANCE WITH THE PROVINCE OF ONTARIO SURVEYORS ACT 1987. THIS DRAWING WAS PRODUCED USING STANDARD PHOTOGRAMMETRIC PRACTICES.

LEGEND
- BOUNDARY OF AREA TO BE LICENCED
- LIMIT OF EXTRACTION
- 120-METRE SURROUND
- BOREHOLE / MONITORING WELL
- PRIVATE WELL (AS PER MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS WATER WELL INFORMATION SYSTEM)
- CON 10, LOT 5 / CON 10, LOT 4 — LOTS AND CONCESSION LINES
- MAR-h — LAND ZONING BY-LAW
- ADJACENT PIT AND QUARRY BOUNDARY
- UTILITY POLE
- BUILDING; S-SILO, H-HOUSE, G-GARAGE, B-BARN, S-SHED, O-OFFICE, SC-SCALE HOUSE
- ROAD: PAVED
- ROAD: GRAVEL
- CONTOURS/INDEX CONTOURS
- WOODED AREA
- WATERCOURSE
- WETLAND
- PAGE WIRE FENCE/GATE
- ENTRANCE
- EXIT

REFERENCE(S)
1. KEY PLAN: Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.
2. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

EXISTING FEATURES - GENERAL NOTES (PAGE 1 OF 5)

NOTE: THE NUMBERS BELOW REFER TO AGGREGATE RESOURCES OF ONTARIO: SITE PLAN STANDARDS (AUGUST 2020)

16 EXISTING ZONING

THE EXISTING ZONING OF LAND ON AND WITHIN 120 METRES OF THE SITE IS SHOWN ON THIS PLAN (PAGE 1 OF 5).

SIGNATURE OF APPLICANT/LICENSEE — DATE 12-13-22
PREPARED UNDER THE DIRECTION OF: BRIAN HENDERSON — DATE 12-13-22

THOMAS CAVANAGH CONSTRUCTION LIMITED

LICENSED PROFESSIONAL ENGINEER
B. J. HENDERSON
100110984
12-13-22
PROVINCE OF ONTARIO

AMENDMENTS	DATE	APPROVAL DATE

SITE PLANS APPROVED BY THE MINISTRY OF NATURAL RESOURCES AND FORESTRY.

SIGNATURE ______________ DATE ______________

0 200 400
1:4,000 METRES

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
HIGHLAND LINE PIT

TITLE
EXISTING FEATURES - GENERAL

APPLICANT
THOMAS CAVANAGH CONSTRUCTION LIMITED

YYYY-MM-DD	2022-12-13
DESIGNED	BH
PREPARED	JM
REVIEWED	KAM
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	DRAWING
19126620	0014	0	1 OF 5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI F
0 25 mm

Path: \\golder.gds\gal\ottawa\... | File Name: 19126620-CH-0014-0001.dwg | Last Edited By: jmcconnell Date: 2022-12-22 | Printed By: JMcConnell Date: 2022-12-22 Time: 10:04:19 AM

EXISTING FEATURES - SITE NOTES (PAGE 2 OF 5):

NOTE: THE NUMBERS BELOW REFER TO *AGGREGATE RESOURCES OF ONTARIO: SITE PLAN STANDARDS* (AUGUST 2020)

17 EXISTING LAND USE

LAND USES ON AND AROUND THE SITE INCLUDE EXISTING LICENCED PITS TO THE NORTHWEST AND NORTHEAST, AN EXISTING SUGARBUSH, RESTAURANT AND MUSEUM TO THE WEST, DECIDUOUS, MIXED AND CONIFEROUS FOREST AND WETLAND TO THE SOUTH, EAST AND NORTH, INTERSPERSED WITH SMALL PATCHES OF ACTIVE AGRICULTURE. THE EXISTING LAND USE ON THE SITE IS VACANT.

18 MAXIMUM PREDICTED WATER TABLE

BASED ON THE AVAILABLE GROUNDWATER ELEVATION DATA, THE MAXIMUM PREDICTED WATER TABLE ON THE SITE IS 195.4 METRES ABOVE SEA LEVEL ON THE SOUTHERN CORNER (AS MEASURED AT MW20-6). BASED ON THE GROUNDWATER ELEVATION DATA MEASURED AT MW20-3 LOCATED ON THE EASTERN SIDE OF THE SITE, THE WATER TABLE SLOPES DOWN MOVING FROM SOUTHWEST TO EAST, AND THE MAXIMUM PREDICTED WATER TABLE ON THE EAST SIDE OF THE SITE IS APPROXIMATELY 182.9 METRES ABOVE SEA LEVEL (PAGE 2 OF 5).

19 LOCATION OF EXISTING ENTRANCES TO AND EXITS FROM THE SITE

THERE ARE CURRENTLY FOUR ENTRANCES/EXITS FOR THE SITE AS SHOWN ON THIS PLAN (PAGE 2 OF 5).

20 SIGNIFICANT NATURAL FEATURES ON AND WITHIN 120 METRES OF SITE

SIGNIFICANT NATURAL FEATURES ON THE SITE INCLUDE HABITAT FOR ENDANGERED SPECIES (BLANDING'S TURTLE, TRI-COLOURED BAT AND BLACK ASH), UNEVALUATED WETLANDS AND SIGNIFICANT WILDLIFE HABITAT (SEEPS).

SIGNIFICANT NATURAL FEATURES OFF OF THE SITE, BUT WITHIN 120 METRES OF THE SITE INCLUDE POTENTIAL HABITAT FOR ENDANGERED AND THREATENED SPECIES, UNEVALUATED WETLANDS, FISH HABITAT AND POTENTIAL SIGNIFICANT WILDLIFE HABITAT (VARIOUS TYPES).

21 SIGNIFICANT HUMAN-MADE FEATURES ON AND WITHIN 120 METRES OF SITE

THERE ARE NO SIGNIFICANT HUMAN-MADE FEATURES ON THE SITE. SIGNIFICANT HUMAN-MADE FEATURES WITHIN 120 METRES OF THE SITE INCLUDE EXISTING PITS LOCATED TO THE NORTHWEST (LICENCE NUMBER 609261) AND TO THE NORTHEAST (LICENCE NUMBER 4257), HIGHLAND LINE TO THE NORTH AND TWO PRIVATE RESIDENCES LOCATED NORTH AND EAST OF THE SITE.

22 THE LOCATION AND USE OF ALL BUILDINGS AND STRUCTURES EXISTING ON AND WITHIN 120 METRES OF THE SITE

THERE ARE CURRENTLY NO EXISTING PERMANENT BUILDINGS OR STRUCTURES LOCATED ON THE SITE. WITHIN 120 METRES OF THE SITE THERE IS ONE HOUSE LOCATED ON THE EAST SIDE OF THE SITE, ACCESSED FROM LEO JAY LANE.

23 SITE TOPOGRAPHY

THE EXISTING SITE TOPOGRAPHY, ILLUSTRATED BY A ONE-METRE CONTOUR INTERVAL, EXPRESSED IN METRES ABOVE SEA LEVEL IS PRESENTED ON THIS PLAN (PAGE 2 OF 5).

24 EXISTING SURFACE WATER AND DRAINAGE FACILITIES ON AND WITHIN 120 METRES OF THE SITE

SURFACE WATER FEATURES ON THE SITE INCLUDE A SINGLE SMALL INTERMITTENT WATERCOURSE THAT FLOWS TO BARBERS LAKE AS WELL AS UNEVALUATED WETLANDS. THERE ARE LOW MOIST AREAS THROUGHOUT SOME OF THE FORESTS ON THE SITE, INCLUDING A SMALL POND IN THE MIXED FOREST. BARBERS LAKE (SOUTHEAST) AND UNEVALUATED WETLANDS (NORTH AND SOUTH) ARE LOCATED WITHIN 120 METRES OF THE SITE.

WITHIN 120 METRES OF THE SITE, SHALLOW ROADSIDE DITCHES EXIST ALONG THE NORTH AND SOUTH SIDES OF HIGHLAND LINE.

25 LOCATION OF EXISTING TREE COVER

THE EXISTING ON-SITE AND OFF-SITE TREE COVER IS SHOWN ON THIS PLAN (PAGE 2 OF 5). THE EASTERN, SOUTHWEST AND NORTHWEST PORTIONS OF THE SITE ARE TREE COVERED. THE OFF-SITE LANDS SURROUNDING THE SITE TO THE SOUTH, NORTHEAST AND SOUTHWEST ARE GENERALLY TREE COVERED.

26 LOCATION/TYPE OF EXISTING FENCING

EXISTING LOCATIONS FOR FENCING AROUND THE SITE ARE SHOWN ON THIS PLAN (PAGE 2 OF 5). PAGE WIRE FENCING EXISTS ON THE NORTHERN, EASTERN AND WESTERN LICENCE BOUNDARIES. THERE IS NO FENCING PRESENT ON THE SOUTHERN BOUNDARY OF THE SITE.

EXISTING FEATURES CROSS-SECTIONS

69 LOCATION OF CROSS-SECTIONS

REFER TO DRAWING (PAGE 2 OF 5) FOR LOCATION OF EXISTING FEATURES CROSS-SECTIONS.

70 HORIZONTAL AND VERTICAL SCALES

APPROPRIATE HORIZONTAL AND VERTICAL SCALES ARE MARKED ON THE CROSS-SECTIONS.

71 EXISTING FEATURES CROSS-SECTIONS

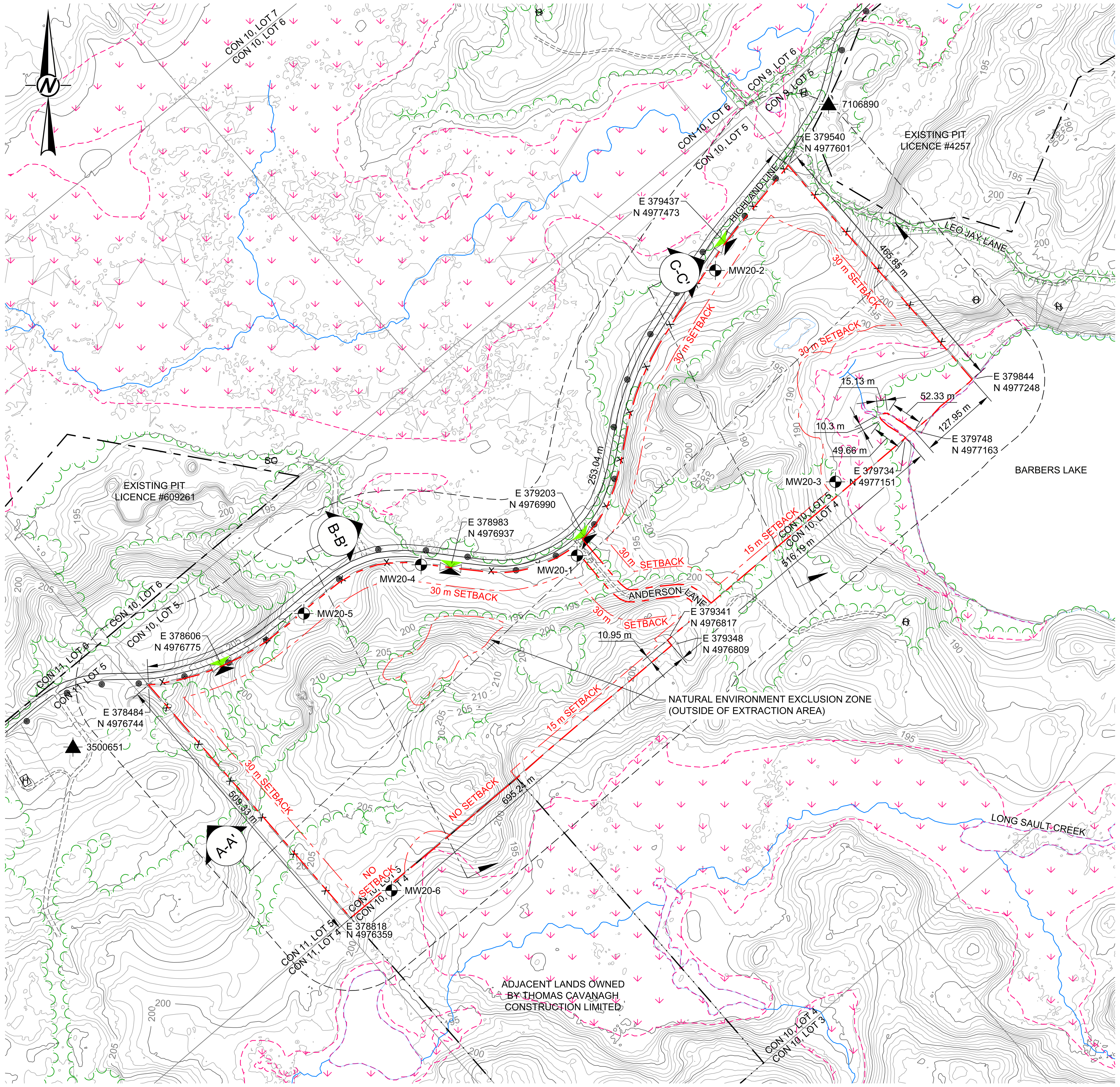
THREE EXISTING FEATURES CROSS-SECTIONS ARE PROVIDED ON THE EXISTING FEATURES PLAN (PAGE 2 OF 5).

72 MAXIMUM PREDICTED WATER TABLE

THE MAXIMUM PREDICTED WATER TABLE IS IDENTIFIED ON THE EXISTING FEATURES CROSS-SECTIONS (PAGE 2 OF 5). BASED ON THE AVAILABLE GROUNDWATER ELEVATION DATA, THE MAXIMUM PREDICTED WATER TABLE ON THE SITE IS 195.4 METRES ABOVE SEA LEVEL ON THE SOUTHERN CORNER (AS MEASURED AT MW20-6). BASED ON THE GROUNDWATER ELEVATION DATA MEASURED AT MW20-3 LOCATED ON THE EASTERN SIDE OF THE SITE, THE WATER TABLE SLOPES DOWN MOVING FROM SOUTHWEST TO EAST, AND THE MAXIMUM PREDICTED WATER TABLE ON THE EAST SIDE OF THE SITE IS APPROXIMATELY 182.9 METRES ABOVE SEA LEVEL.

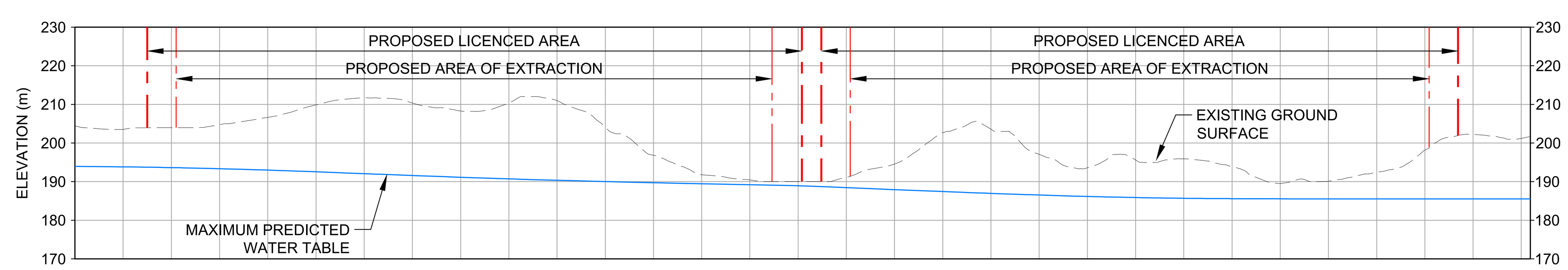
73 TYPICAL BERM DESIGN

A CROSS-SECTION OF A TYPICAL BERM DESIGN IS SHOWN ADJACENT TO THE EXISTING FEATURE CROSS-SECTIONS (PAGE 2 OF 5).

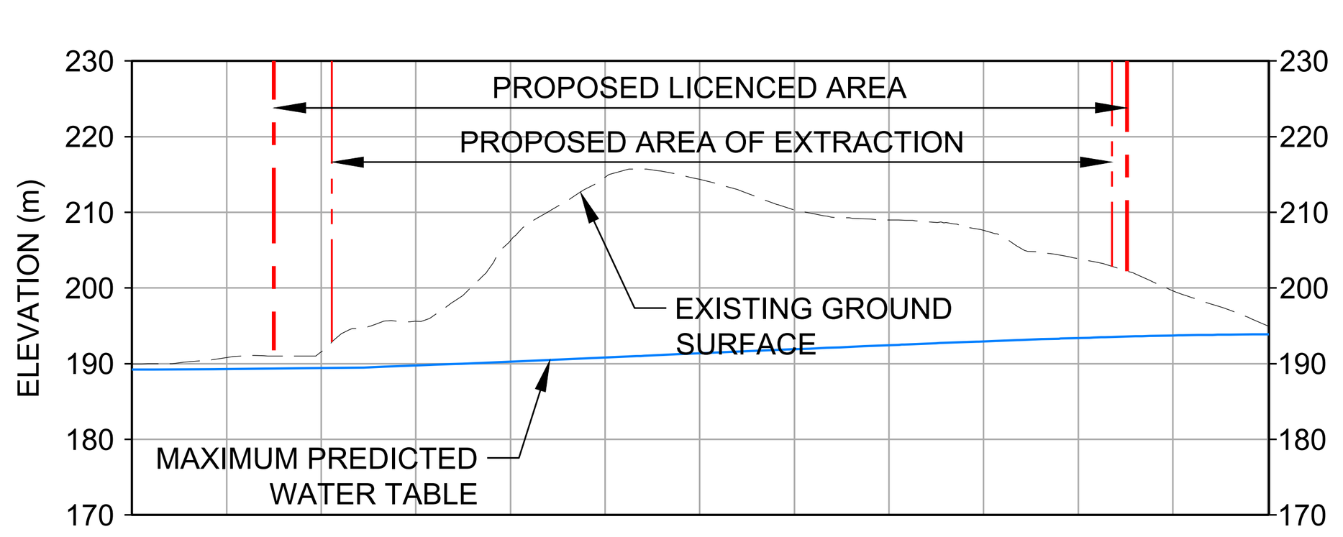


EXISTING FEATURES - SITE

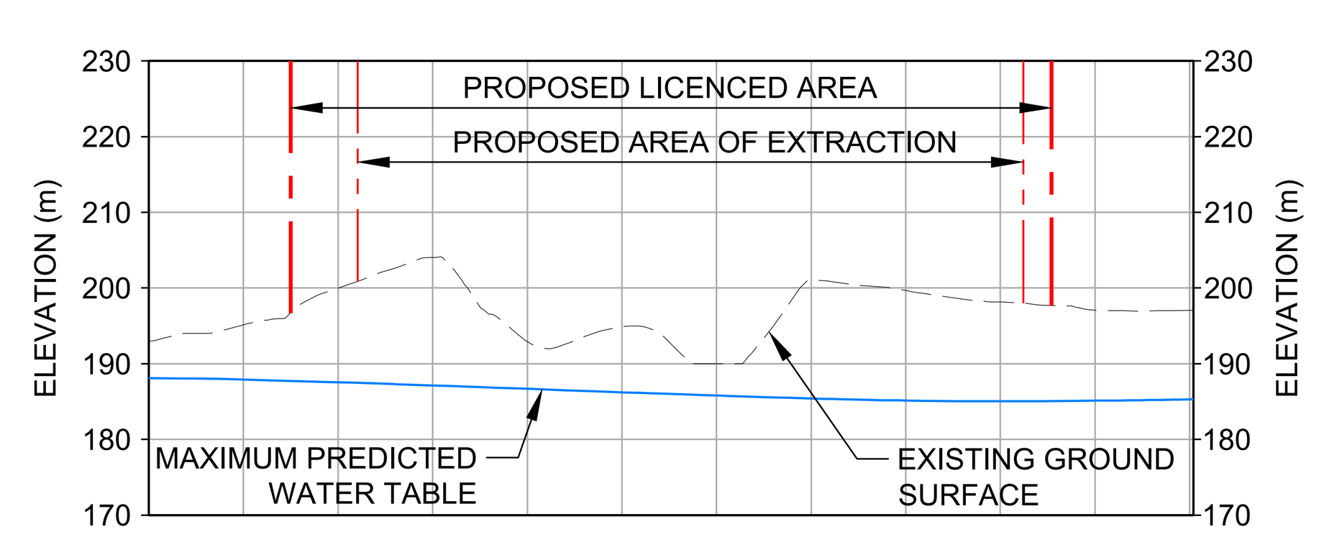
SCALE 1:4,000 m



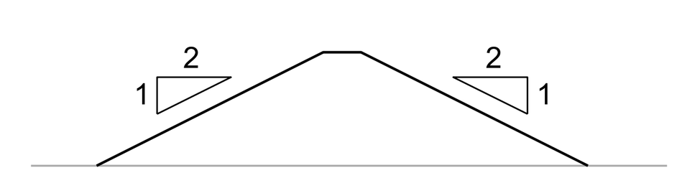
SCALE 1:4,000 m VERT. 1:1,000 m A-A' PROFILE



SCALE 1:4,000 m VERT. 1:1,000 m B-B' SECTION



SCALE 1:4,000 m VERT. 1:1,000 m C-C' SECTION



TYPICAL BERM DETAIL

SCALE NTS

SIGNATURE OF APPLICANT/LICENSEE	12-13-22 DATE
PREPARED UNDER THE DIRECTION OF: BRIAN HENDERSON	12-13-22 DATE

THOMAS CAVANAGH CONSTRUCTION LIMITED

AMENDMENTS	DATE	APPROVAL DATE

SITE PLANS APPROVED BY THE MINISTRY OF NATURAL RESOURCES AND FORESTRY.

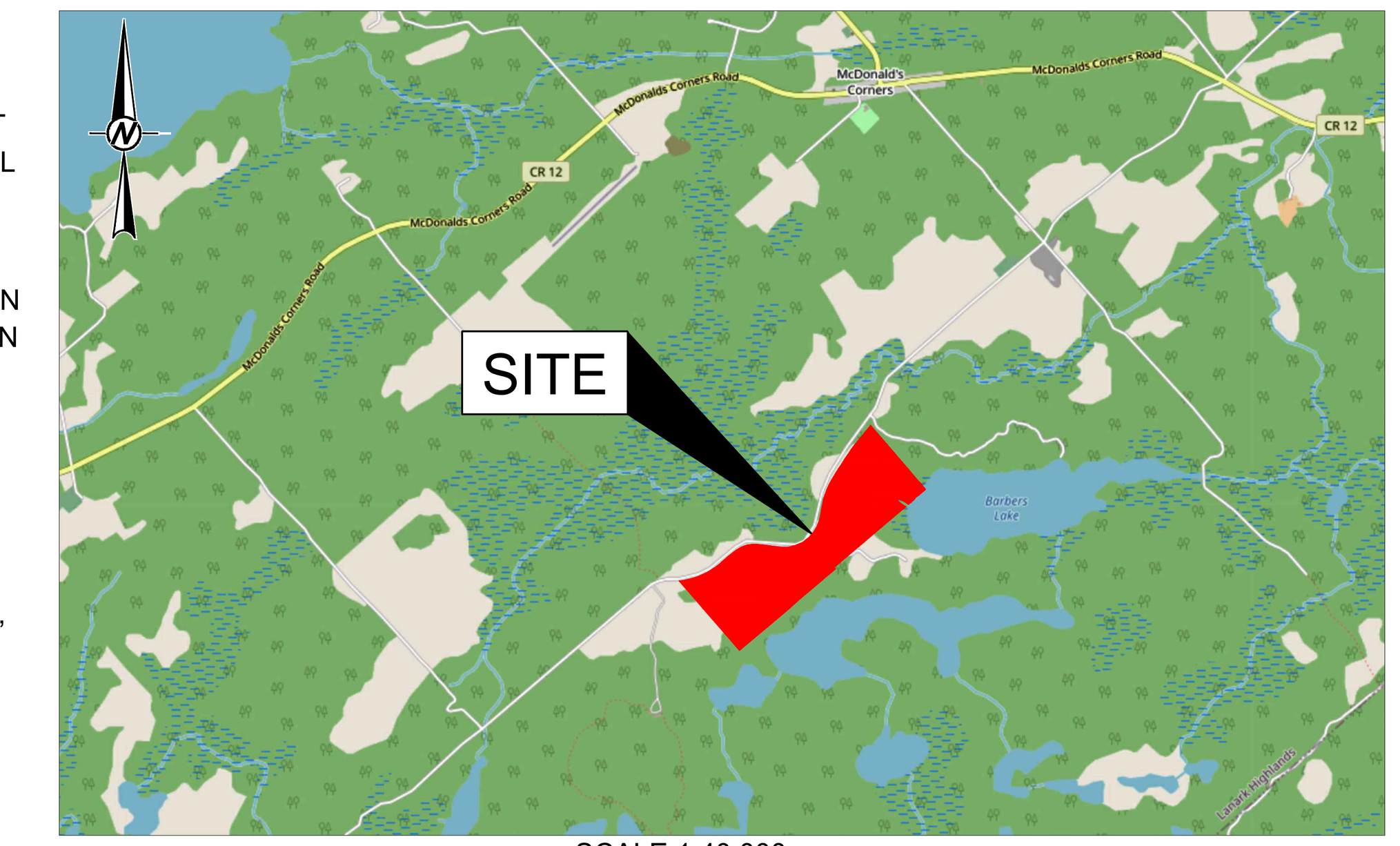
SIGNATURE DATE

0 200 400

1:4,000 METRES

LICENSED PROFESSIONAL ENGINEER B. J. HENDERSON 100110984 12-13-22 PROVINCE OF ONTARIO

KEY MAP



SCALE 1:40,000 m

HIGHLAND LINE PIT

LOT 5, CONCESSION 10
TOWNSHIP OF LANARK HIGHLANDS,
LANARK COUNTY, ONTARIO

APPLICANT:
THOMAS CAVANAGH CONSTRUCTION LIMITED
9094 CAVANAGH ROAD
ASHTON, ONTARIO
KOA 1B0

PIT LICENCE NO. ___________

NOTE(S)

1. LICENCED AREA, HIGHLAND LINE PIT 50.6 HECTARES.
2. AREA OF OPERATION, HIGHLAND LINE PIT 35.1 HECTARES.
3. THIS SITE PLAN IS PREPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE FOR A PIT BELOW THE GROUND WATER TABLE.
4. THIS PLAN WAS PREPARED USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS.
5. LOT, CONCESSION AND BOUNDARY LINES ON THIS PLAN ARE APPROXIMATE.
6. THIS IS NOT A LEGAL SURVEY DRAWING IN ACCORDANCE WITH THE PROVINCE OF ONTARIO SURVEYORS ACT 1987. THIS DRAWING WAS PRODUCED USING STANDARD PHOTOGRAMMETRIC PRACTICES.

LEGEND

- BOUNDARY OF AREA TO BE LICENCED
- LIMIT OF EXTRACTION
- 120-METRE SURROUND
- BOREHOLE / MONITORING WELL
- PRIVATE WELL (AS PER MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS WATER WELL INFORMATION SYSTEM)
- CON 10, LOT 5 / CON 10, LOT 4 — LOTS AND CONCESSION LINES
- ADJACENT PIT AND QUARRY BOUNDARY
- UTILITY POLE
- BUILDING; S-SILO, H-HOUSE, G-GARAGE, B-BARN, S-SHED, O-OFFICE, SC-SCALE HOUSE
- ROAD: PAVED
- ROAD: GRAVEL
- CONTOURS/INDEX CONTOURS
- WOODED AREA
- WATERCOURSE
- WETLAND
- PAGE WIRE FENCE/GATE
- A-A' — CROSS-SECTIONS
- ENTRANCE
- EXIT

REFERENCE(S)

1. KEY PLAN: Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.
2. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

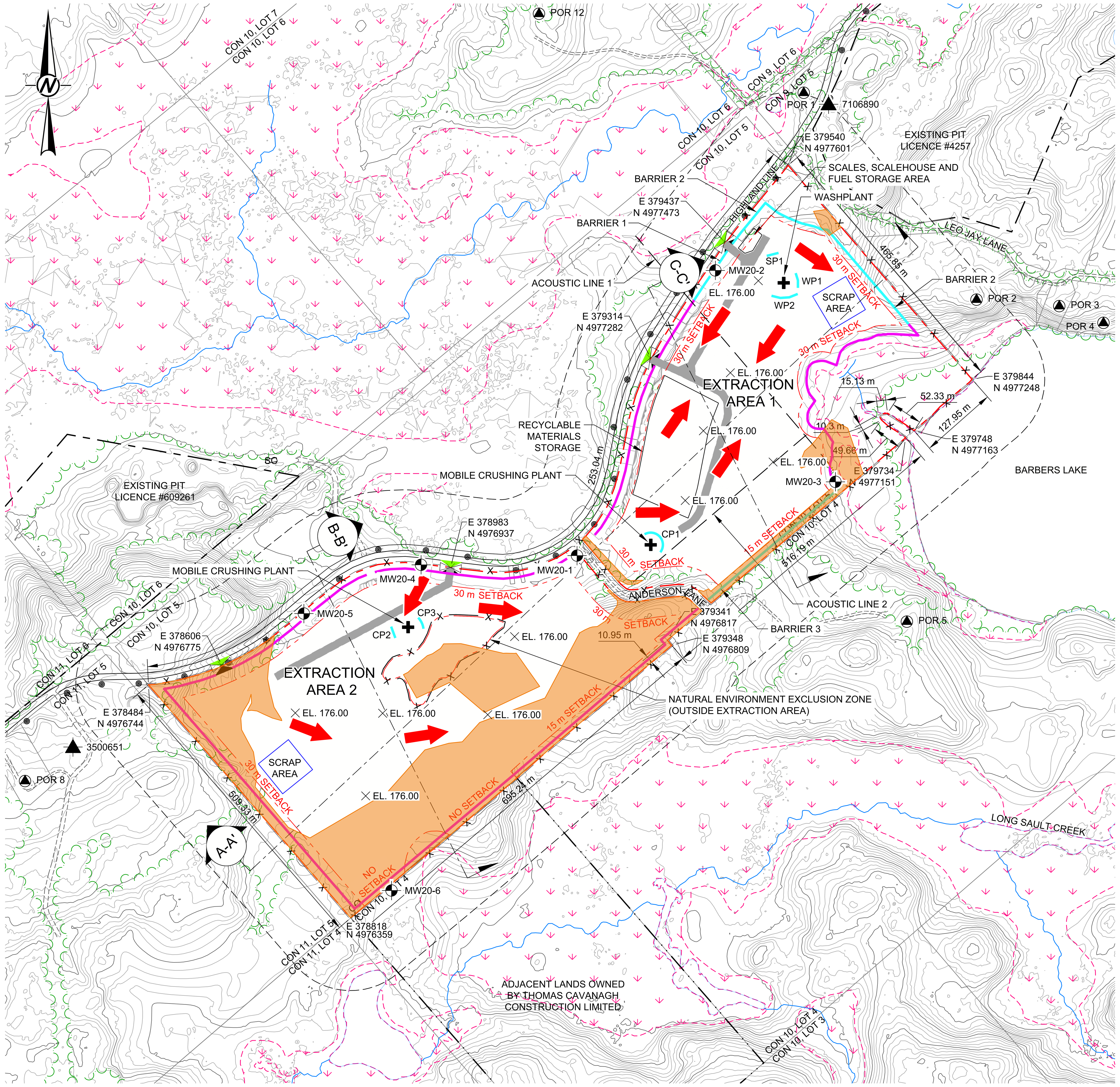
PROJECT
HIGHLAND LINE PIT

TITLE
EXISTING FEATURES - SITE

APPLICANT
THOMAS CAVANAGH CONSTRUCTION LIMITED

YYYY-MM-DD	2022-12-13
DESIGNED	BH
PREPARED	JM
REVIEWED	KAM
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	DRAWING
19126620	0014	0	2 OF 5



EXISTING FEATURES - SITE

SCALE 1:4,000 m

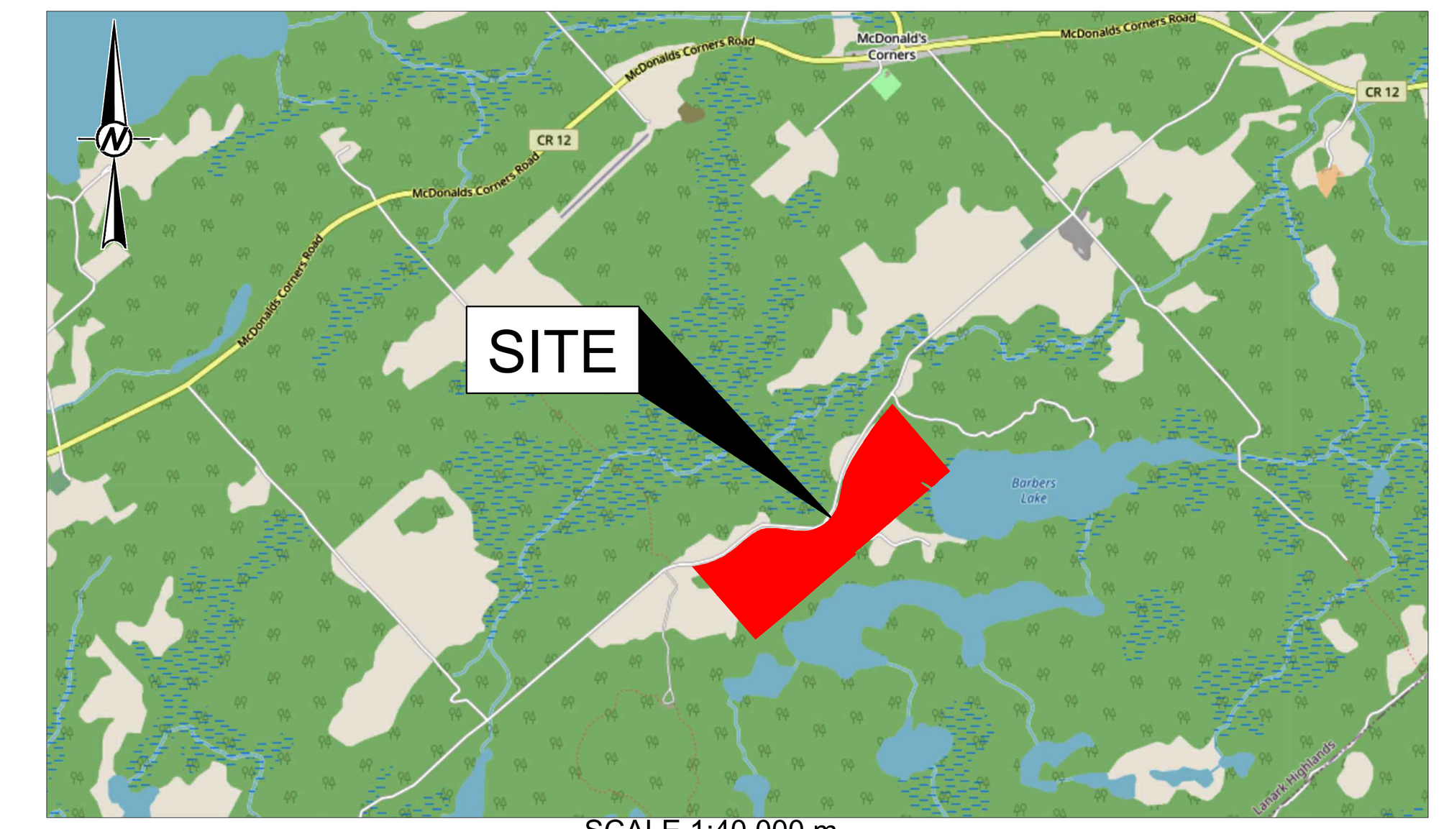
RECOMMENDED NOISE BARRIERS

BARRIER	MINIMUM HEIGHT (M / MASL)	MINIMUM LENGTH (M)	MAXIMUM DISTANCE FROM SOURCE (M)	REQUIRED TO SHIELD LINE OF SIGHT FROM IDENTIFIED SOURCE ID	REQUIRED TO SHIELD LINE OF SIGHT TO IDENTIFIED RECEPTOR/S	DESCRIPTION
BARRIER_1 (SITE BERM)	196 MASL	UP TO 100 M	-	MOBILE SCREENING PLANT AND EXTRACTION OPERATIONS OCCURRING IN EXTRACTION AREA 1 EAST OF LINE AA	POR_12*	NEW BARRIER (BERM / LIFT FACE): REQUIRED TO SHIELD NOISE IMPACTS TO THE IDENTIFIED RECEPTORS WHEN OPERATING IN EXTRACTION AREA 1 EAST OF ACOUSTIC LINE 1 (ONLY REQUIRED FOLLOWING DEVELOPMENT OF A NEW NOISE SENSITIVE DEVELOPMENT AT POR 12)
BARRIER_2 (SITE BERM)	196 MASL	UP TO 400 M	-	MOBILE SCREENING PLANT AND EXTRACTION OPERATIONS OCCURRING IN EXTRACTION AREA 1 EAST OF LINE AA	POR_1 POR_2 POR_3 POR_4	NEW BARRIER (BERM / LIFT FACE): REQUIRED TO SHIELD NOISE IMPACTS TO THE IDENTIFIED RECEPTORS WHEN OPERATING IN EXTRACTION AREA 1 EAST OF ACOUSTIC LINE 1
BARRIER_3 (SITE BERM)	3 M	UP TO 285 M	-	MOBILE SCREENING PLANT AND EXTRACTION OPERATIONS OCCURRING IN EXTRACTION AREA 1 SOUTH OF LINE BB	POR_5	NEW BARRIER (BERM): REQUIRED TO SHIELD NOISE IMPACTS AT THE IDENTIFIED RECEPTOR WHEN OPERATING IN EXTRACTION AREA 1 SOUTH OF ACOUSTIC LINE 2
BARRIER_SP1 (STOCKPILE)	4 M	10 M	20 M	SCREENER WHEN OPERATING IN EXTRACTION AREA 1	POR_1 POR_2 POR_3 POR_5	NEW BARRIER (STOCKPILE): REQUIRED TO BE MAINTAINED TO SHIELD NOISE IMPACTS AT THE IDENTIFIED RECEPTORS WHEN OPERATING GREATER THAN 20 M FROM A LIFT FACE OR SITE BERM THAT OTHERWISE SHIELDS IN THE DIRECTION OF THE IDENTIFIED RECEPTORS
BARRIER_WP1 (STOCKPILE)	7 M	20 M	25 M	WASH PLANT AND ASSOCIATED GENERATOR WHEN OPERATING IN EXTRACTION AREA 1	POR_2	NEW BARRIER (STOCKPILE): REQUIRED TO BE MAINTAINED TO SHIELD NOISE IMPACTS AT THE IDENTIFIED RECEPTOR
BARRIER_WP2 (STOCKPILE)	6 M	30 M	25 M	WASH PLANT AND ASSOCIATED GENERATOR WHEN OPERATING IN EXTRACTION AREA 1	POR_5	NEW BARRIER (STOCKPILE): REQUIRED TO BE MAINTAINED TO SHIELD NOISE IMPACTS AT THE IDENTIFIED RECEPTOR
BARRIER_CP1 (STOCKPILE)		47 M (55 M)*	20 M	CRUSHER WHEN OPERATING IN EXTRACTION AREA 1	POR_1 POR_2 POR_3 POR_5 POR_12	NEW BARRIER (STOCKPILE): REQUIRED TO BE MAINTAINED TO SHIELD NOISE IMPACTS AT THE IDENTIFIED RECEPTOR
BARRIER_CP2 (STOCKPILE)	6 M	20 M	25 M	CRUSHER WHEN OPERATING IN EXTRACTION AREA 2	POR_8	NEW BARRIER (STOCKPILE): REQUIRED TO BE MAINTAINED TO SHIELD NOISE IMPACTS AT THE IDENTIFIED RECEPTOR
BARRIER_CP3 (STOCKPILE)	6 M	30 M	25 M	CRUSHER WHEN OPERATING IN EXTRACTION AREA 2	POR_1 POR_2 POR_3 POR_4 POR_5	NEW BARRIER (STOCKPILE): REQUIRED TO BE MAINTAINED TO SHIELD NOISE IMPACTS AT THE IDENTIFIED RECEPTOR

RECOMMENDED NOISE BARRIERS

*SHIELDING OF RECEPTORS REPRESENTING VACANT LOTS ONLY REQUIRED FOLLOWING DEVELOPMENT OF A NEW NOISE SENSITIVE DEVELOPMENT.

KEY MAP



SCALE 1:40,000 m

HIGHLAND LINE PIT

LOT 5, CONCESSION 10
TOWNSHIP OF LANARK HIGHLANDS,
LANARK COUNTY, ONTARIO

APPLICANT:
THOMAS CAVANAGH CONSTRUCTION LIMITED
9094 CAVANAGH ROAD
ASHTON, ONTARIO
KOA 1B0

PIT LICENCE NO. ____________

NOTE(S)

1. LICENCED AREA, HIGHLAND LINE PIT 50.6 HECTARES.
2. AREA OF OPERATION, HIGHLAND LINE PIT 35.1 HECTARES.
3. THIS SITE PLAN IS PEPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE FOR A PIT BELOW THE GROUND WATER TABLE.
4. THIS PLAN WAS PREPARED USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS.
5. LOT, CONCESSION AND BOUNDARY LINES ON THIS PLAN ARE APPROXIMATE.
6. THIS IS NOT A LEGAL SURVEY DRAWING IN ACCORDANCE WITH THE PROVINCE OF ONTARIO SURVEYORS ACT 1987. THIS DRAWING WAS PRODUCED USING STANDARD PHOTOGRAMMETRIC PRACTICES.

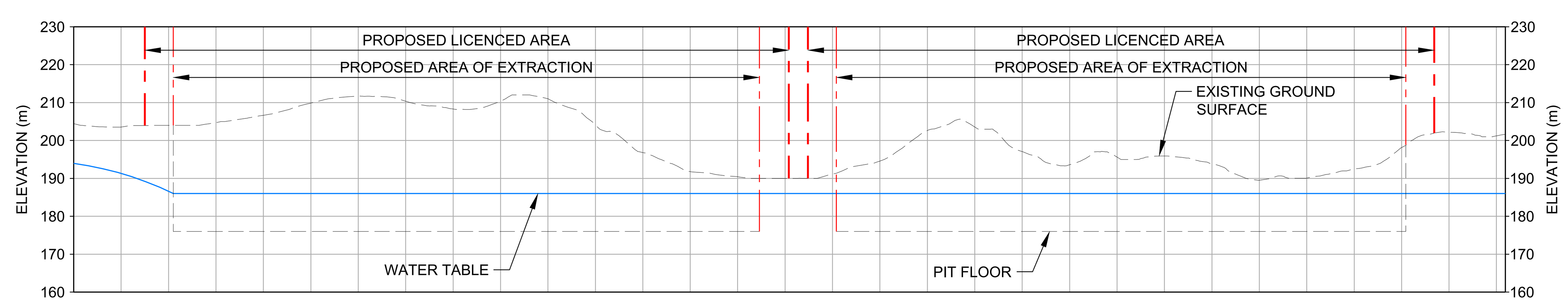
LEGEND

- BOUNDARY OF AREA TO BE LICENCED
- LIMIT OF EXTRACTION
- 120-METRE SURROUND
- BOREHOLE / MONITORING WELL
- PRIVATE WELL (AS PER MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS WATER WELL INFORMATION SYSTEM)
- CON 10, LOT 5 / CON 10, LOT 4 — LOTS AND CONCESSION LINES
- ADJACENT PIT AND QUARRY BOUNDARY
- UTILITY POLE
- BUILDING; S-SILO, H-HOUSE, G-GARAGE, B-BARN, S-SHED, O-OFFICE, SC-SCALE HOUSE
- ROAD: PAVED
- ROAD: GRAVEL
- CONTOURS/INDEX CONTOURS
- WOODED AREA
- WATERCOURSE
- WETLAND
- PAGE WIRE FENCE/GATE
- A-A' — CROSS-SECTIONS
- ENTRANCE
- EXIT
- GENERAL DIRECTION OF EXCAVATION
- POINTS OF RECEPTION (PORs) FROM ACOUSTIC REPORT
- ACOUSTIC BERM
- BERM
- HAUL ROAD
- ARCHAEOLOGICAL EXCLUSION ZONE
- EL. 176.00 — PROPOSED PIT FLOOR SPOT ELEVATION, mASL

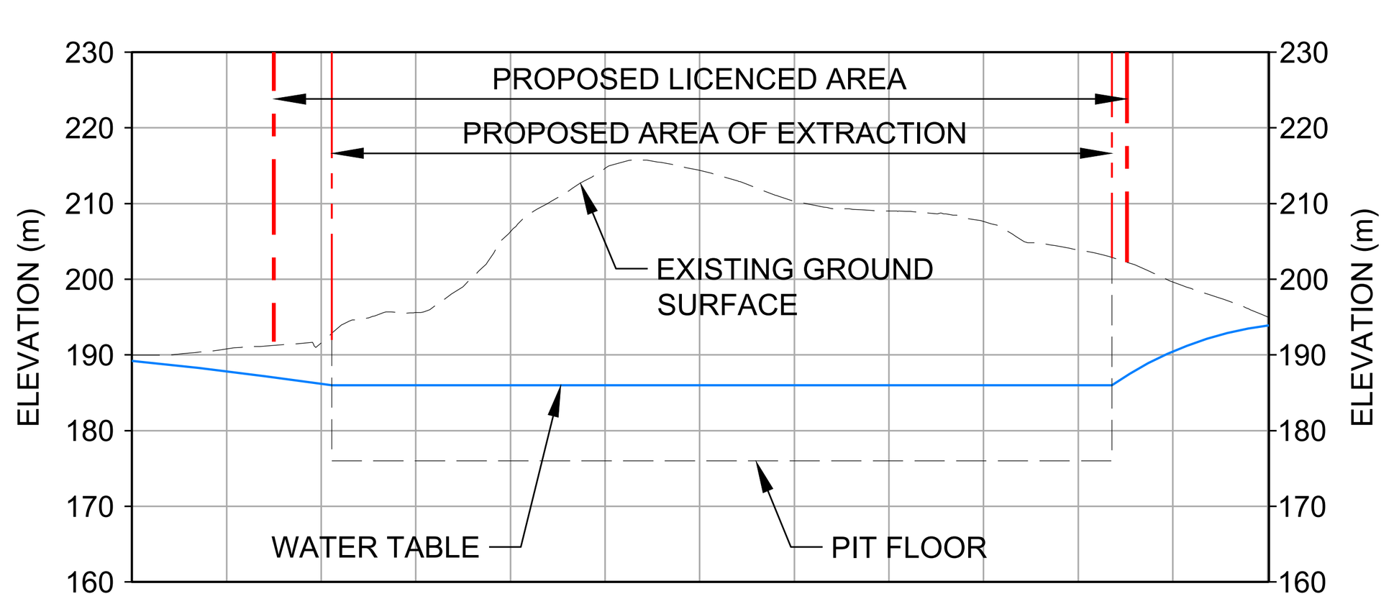
ITEM/OPERATIONAL STANDARD (O.REG. 244/97)	VARIATION TO OPERATIONAL STANDARDS	RATIONALE
EXCAVATION SETBACK AREAS 0.13 (1) 9 0.13 (1) 10 0.13 (1) 11	EXCAVATION IN THE SETBACK AREAS CAN OCCUR ALONG HIGHLAND LINE ROAD IN AREAS WHERE ELEVATIONS OF THE EXISTING GROUND SURFACE IS ABOVE THE ELEVATION OF THE ROAD. AGGREGATE WILL BE REMOVED IN THE SETBACK AREA TO MATCH THE ELEVATION OF THE ROAD.	REMOVAL OF AGGREGATE WITHIN THE SETBACK AREA ALONG THE ROAD WILL ALLOW FOR A CLEARER VIEW OF THE HIGHWAY IN BOTH DIRECTIONS AT THE ENTRANCES AND EXISTS.
SETBACKS 0.13 (1) 10i	NO SETBACK ALONG THE SOUTHEASTERN EDGE OF THE SITE WHERE THE ADJACENT LANDS ARE OWNED BY THE APPLICANT.	REDUCTION OF SETBACK ALONG COMMON BOUNDARY TO ALLOW FOR AGGREGATE EXTRACTION.

REFERENCE(S)

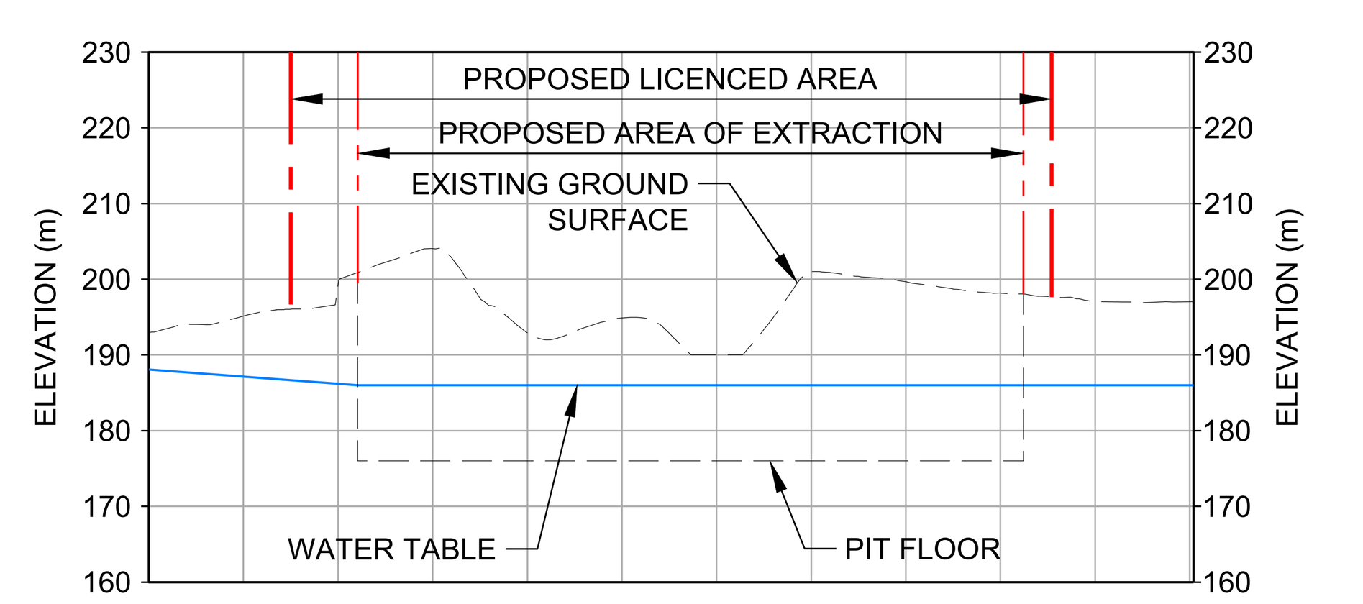
1. KEY PLAN: Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.
2. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28



SCALE 1:4,000 m
VERT. 1:1,000 m
A-A' PROFILE



SCALE 1:4,000 m
VERT. 1:1,000 m
B-B' SECTION

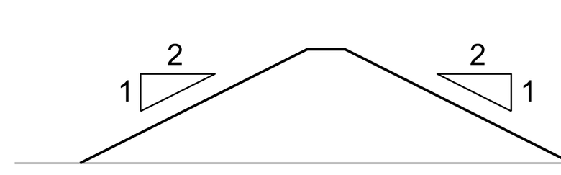


SCALE 1:4,000 m
VERT. 1:1,000 m
C-C' SECTION

SIGNATURE OF APPLICANT/LICENSEE — DATE 12-13-22

PREPARED UNDER THE DIRECTION OF: BRIAN HENDERSON — DATE 12-13-22

THOMAS CAVANAGH CONSTRUCTION LIMITED



TYPICAL BERM DETAIL

SCALE NTS

LICENSED PROFESSIONAL ENGINEER
B.J. HENDERSON
100110984
12-13-22
PROVINCE OF ONTARIO

AMENDMENTS	DATE	APPROVAL DATE

SITE PLANS APPROVED BY THE MINISTRY OF NATURAL RESOURCES AND FORESTRY.

SIGNATURE — DATE

0 200 400
1:4,000 METRES

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
HIGHLAND LINE PIT

TITLE
OPERATIONS PLAN

APPLICANT

THOMAS CAVANAGH CONSTRUCTION LIMITED

YYYY-MM-DD	2022-12-13
DESIGNED	BH
PREPARED	JM
REVIEWED	KAM
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	DRAWING
19126620	0014	0	3 OF 5

OPERATIONS PLAN NOTES (PAGE 4 OF 5):

NOTE: THE NUMBERS BELOW REFER TO AGGREGATE RESOURCES OF ONTARIO: SITE PLAN STANDARDS (AUGUST 2020)

33 PROPOSED ENTRANCE AND EXIT

ACCESS TO THE SITE FOR HAULAGE PURPOSES WILL BE FROM/TO HIGHLAND LINE ROAD. THE ENTRANCE/EXIT POINTS FOR THE SITE ARE SHOWN ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5). THE WESTERNMOST ACCESS IN EXTRACTION AREA 2 CANNOT BE USED BY HEAVY EQUIPMENT DUE TO DEFICIENT SITE DISTANCE CHARACTERISTICS. ACCESS TO THE SITE WILL BE CONTROLLED BY GATES ERECTED AND MAINTAINED AT THE ENTRANCES/EXITS OF THE PROPERTY. THESE GATES WILL BE KEPT CLOSED WHEN THE SITE IS NOT IN OPERATION.

34 AREA TO BE EXTRACTED

THE MAXIMUM AREA OF EXTRACTION IS 35.1 HECTARES. THE SITE WILL BE DIVIDED INTO TWO EXTRACTION AREAS (EXTRACTION AREA 1 AND 2) WITH THE TWO AREAS SEPARATED BY ANDERSON LANE. THE MAXIMUM AREA OF EXTRACTION FOR AREA 1 IS 14.3 HECTARES AND THE MAXIMUM AREA OF EXTRACTION FOR AREA 2 IS 20.8 HECTARES. THE BOUNDARY OF THE AREA OF EXTRACTION IS SHOWN ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5). THE EXTRACTION AREAS INCLUDE THE ARCHEOLOGICAL EXCLUSION ZONE BUT DO NOT INCLUDE THE NATURAL ENVIRONMENT EXCLUSION ZONE. NO GROUND DISTURBANCE CAN TAKE PLACE IN THE ARCHEOLOGICAL EXCLUSION ZONES UNTIL SUCH TIME AS AN AREA HAS BEEN CLEARED OF ARCHEOLOGICAL SIGNIFICANCE BY THE MINISTRY OF TOURISM, CULTURE AND SPORT.

36 PROPOSED FENCING

THE EXISTING FENCING WILL BE REPAIRED/REPLACED, AS NECESSARY, BEFORE EXTRACTION OPERATIONS BEGIN AT THE SITE. NEW FENCING IS PROPOSED FOR THE SOUTHERN BOUNDARY OF THE SITE. ALL SIDES OF THE SITE WILL BE FENCED DURING THE OPERATIONAL PERIOD INCLUDING BOTH SIDES OF ANDERSON LANE.

37 PROPOSED BUILDINGS AND STRUCTURES, SCRAP STORAGE, STOCKPILES AND INTERNAL HAUL ROAD

A. NO BUILDINGS OR PERMANENT STRUCTURES ARE PROPOSED FOR THE SITE. A SCALE HOUSE AND SCALES WILL BE ESTABLISHED AT THE SITE HOWEVER IT WILL BE PORTABLE AND WILL MOVE WITHIN THE LICENSED AREA. THE SCALE HOUSE AND SCALES WILL INITIALLY BE ESTABLISHED NEAR THE ENTRANCE/EXIT AT THE NORTHEAST CORNER OF THE SITE.

B. SCRAP FROM THE SITE WILL BE TEMPORARILY STORED WITHIN THE AREAS DESIGNATED ON THE OPERATIONS SITE PLAN (PAGE 3 OF 4).

C. LOCATIONS OF THE AGGREGATE STOCKPILES WILL FOLLOW OPERATIONS AND THEREFORE VARY ON SITE. STOCKPILES WILL BE LOCATED NO CLOSER THAN 30 METRES TO THE LICENSED BOUNDARY.

EXCESS TOPSOIL WILL BE STOCKPILED IN BERMS WITHIN THE LICENSED AREA AS IT BECOMES AVAILABLE, FOR LATER USE IN REHABILITATION.

D. INTERNAL HAUL ROADS WILL BE ESTABLISHED WITHIN THE PIT FOLLOWING THE DIRECTION OF EXCAVATION. DUST WILL BE MITIGATED ON SITE. WATER OR ANOTHER PROVINCIALLY APPROVED DUST SUPPRESSANT WILL BE APPLIED TO INTERNAL HAUL ROADS AS OFTEN AS REQUIRED TO MITIGATE DUST.

38 LOCATION OF ANY PROPOSED PERMANENT AND/OR TEMPORARY PROCESSING AREA(S) ON THE SITE

PROCESSING WILL OCCUR IN ACCORDANCE WITH THE ACOUSTIC ASSESSMENT REPORT OF THE SITE PREPARED BY FREEFIELD LTD. AND THE OTHER TECHNICAL REPORTS. PROCESSING AREAS WILL OPERATE IN THE AREAS IDENTIFIED ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5).

DUST WILL BE MITIGATED ON SITE. WATER OR ANOTHER PROVINCIALLY APPROVED DUST SUPPRESSANT WILL BE APPLIED TO PROCESSING AREAS AS OFTEN AS NECESSARY TO MITIGATE DUST. PROCESSING EQUIPMENT WILL BE EQUIPPED WITH DUST SUPPRESSION OR COLLECTION DEVICES WHERE THE EQUIPMENT CREATES DUST AND IS BEING OPERATED WITHIN 300 METRES OF A SENSITIVE RECEPTOR.

PROCESSING EQUIPMENT WILL NOT BE LOCATED WITHIN 30 METRES OF THE LICENSED BOUNDARY.

39 LOCATION OF ANY PROPOSED RECYCLABLE MATERIALS

AGGREGATE STOCKPILES MAY INCLUDE RECYCLABLE MATERIALS AND IMPORTED AGGREGATE MATERIALS REQUIRED FOR BLENDING PROCESSES. THE LOCATION OF THE RECYCLEABLE MATERIAL WILL BE IN AREAS DESIGNATED ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5). A MAXIMUM OF 100,000 METRIC TONNES OF RECYCLEABLE MATERIAL WOULD BE PRESENT ON SITE.

STOCKPILES WILL BE LOCATED NO CLOSER THAN 30 METRES TO THE LICENSED BOUNDARY.

RECYCLING OF CONCRETE AND ASPHALT WILL BE PERMITTED AS AN ACCESSORY ACTIVITY ON THIS SITE. ASPHALT MATERIALS WILL BE STORED AT LEAST 30 METRES HORIZONTALLY FROM ANY WATER SOURCE. ANY REBAR AND OTHER STRUCTURAL METAL REMOVED FROM THE MATERIAL DURING PROCESSING WILL BE STORED IN THE DESIGNATED SCRAP AREAS AND WILL BE REMOVED ON AN ONGOING BASIS. RECYCLING ACTIVITIES MUST NOT PRECLUDE OR HINDER THE PROGRESSIVE OR FINAL REHABILITATION REQUIREMENTS OF THIS PLAN. ONCE FINAL REHABILITATION HAS BEEN COMPLETED, ALL RECYCLING ACTIVITIES WILL CEASE AND RECYCLABLE MATERIALS WILL BE REMOVED FROM THE SITE.

40 SEQUENCE/DIRECTION OF OPERATION

THE SITE WILL BE DIVIDED INTO TWO EXTRACTION AREAS (EXTRACTION AREA 1 AND AREA 2). THE TWO EXTRACTION AREAS CAN BE OPERATED SIMULTANEOUSLY.

IN EXTRACTION AREA 1, EXTRACTION WILL COMMENCE IN THE AREA OF EACH ENTRANCE/EXIT. FROM THE NORTHERN ENTRANCE/EXIT, EXTRACTION WILL PROCEED TO THE SOUTHEAST AND THEN TO THE SOUTHWEST. FROM THE SOUTHERN ENTRANCE/EXIT, EXTRACTION WILL PROCEED TO THE SOUTHEAST AND NORTHEAST.

IN EXTRACTION AREA 2, EXTRACTION WILL COMMENCE IN THE AREA OF EACH ENTRANCE/EXIT. FROM THE NORTHERN ENTRANCE/EXIT, EXTRACTION WILL PROCEED TO THE SOUTH AND EAST. FROM THE SOUTHERN ENTRANCE/EXIT, EXTRACTION WILL PROCEED TO THE NORTHEAST AND RADIATE TO THE NORTH, EAST AND SOUTH.

41 STRIPPING AND STOCKPILING OF TOPSOIL/OVERBURDEN

TOPSOIL OR OVERBURDEN STRIPPED IN THE OPERATION OF THE SITE MAY BE STORED IN BERMS WITHIN THE SETBACK ON ALL SIDES OF THE SITE AND WILL BE USED IN THE REHABILITATION OF THE SITE.

DURING CONSTRUCTION AND EARTH-MOVING OPERATIONS, SEDIMENT CONTROL MEASURES WILL BE PUT IN PLACE TO PREVENT RUNOFF OF SUSPENDED SOLIDS FROM LEAVING THE SITE.

THE LOCATIONS OF THE BERMS ARE AS SHOWN ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5).

42 EXTRACTION LIFTS

THE EXTRACTION WILL TAKE PLACE IN A SERIES OF THREE LIFTS, WITH THE BOTTOM LIFT REACHING A FINAL ELEVATION OF 176 METRES ABOVE SEA LEVEL AS INDICATED ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5). THE MAXIMUM LIFT HEIGHT WOULD BE TEN (10) METRES.

EXTRACTION LIFTS AND BENCH HEIGHTS WILL BE IN COMPLIANCE WITH MINISTRY OF LABOUR REQUIREMENTS. THE PIT MAY OPERATE MULTIPLE LIFTS AND BENCHES IN ORDER TO MEET MARKET DEMAND AND/OR CONTRACT REQUIREMENTS FOR SPECIFIC MATERIALS.

43 SURFACE WATER DIVERSION/DISCHARGE

BASED ON TOPOGRAPHY, WATER FROM THE SITE CURRENTLY FLOWS NORTH TOWARDS HIGHLAND LINE, SOUTH TOWARDS THE UNEVALUATED WETLAND ALONG LONG SAULT CREEK, AND EAST TOWARDS BARBERS LAKE. DURING OPERATIONS, THE WATER FROM THE ACTIVE SITE WILL DRAIN TO THE OPEN PIT AREAS AND REMAIN AS WATER BODY FEATURES ONCE THE EXCAVATION IS BELOW THE WATER TABLE. THE PIT LAKES WILL OUTLET INTO BARBERS LAKE ON THE EASTERN LIMIT OF EXTRACTION AREA 1.

44 SOURCE WATER PROTECTION POLICIES

THE SITE FALLS OUTSIDE OF ANY IDENTIFIED SOURCE WATER PROTECTION AREAS AND, AS SUCH, NO SOURCE WATER PROTECTION POLICIES ARE APPLICABLE TO THE SITE.

45 PROPOSED FUEL STORAGE AREAS

A FUEL STORAGE AREA WILL BE ESTABLISHED AT THE SITE NEAR THE SCALE HOUSE. FUEL AND ASSOCIATED PRODUCTS WILL BE STORED IN ABOVE GROUND TANKS OR CONTAINERS AND IN COMPLIANCE WITH THE TECHNICAL STANDARDS AND SAFETY ACT, 2000, LIQUID FUELS REGULATION O.REG.217/01 AND LIQUID FUELS HANDLING CODE, 2000. FUEL TRUCKS MAY BE USED FOR REFUELING OF ON-SITE EQUIPMENT WITHIN THE PIT IN ACCORDANCE WITH THE "PRESCRIBED CONDITIONS" THAT APPLY TO ALL CLASS A, BELOW WATER TABLE PIT LICENCES. A SPILLS CONTINGENCY PLAN WILL BE DEVELOPED PRIOR TO THE FIRST FUEL DELIVERY.

46 LOCATION OF ALL EXCAVATION SETBACKS

EXCAVATION SETBACKS INCLUDE A 30-METRE SETBACK ON THE NORTH (HIGHLAND LINE ROAD) AND WEST (ROAD ALLOWANCE BETWEEN CONCESSION 10 AND CONCESSION 11) SIDES OF THE SITE AND THROUGH THE CENTRE OF THE SITE ADJACENT TO ANDERSON LANE. A 30-METRE SETBACK ALSO EXISTS FROM WETLANDS ON OR WITHIN 120 METRES FROM THE SITE.

A 15-METRE SETBACK EXISTS ON THE NORTHEAST SIDE OF THE SITE AND ALONG THE WESTERN BOUNDARY OF THE PROPERTY. NO SETBACK IS PRESENT IN THE SOUTHEASTERN PORTION OF THE SITE AS THE ADJACENT PROPERTY IS ALSO OWNED BY THOMAS CAVANAGH CONSTRUCTION LIMITED.

ARCHAEOLOGICAL EXCLUSION ZONES HAVE ALSO BEEN ESTABLISHED TO INCLUDE PORTIONS OF THE SITE THAT HAVE NOT BEEN SUBJECT TO A STAGE 2 ARCHAEOLOGICAL ASSESSMENT AND AS A RESULT HAVE NOT BEEN CLEARED BY THE MINISTRY OF TOURISM, CULTURE AND SPORT. FOLLOWING FURTHER ASSESSMENT, SHOULD THESE AREAS BE CLEARED BY THE MINISTRY OF TOURISM, CULTURE AND SPORT, EXTRACTION CAN PROCEED TO THE STANDARD REGULATORY EXCAVATION SETBACK.

THE EXCAVATION SETBACKS ARE AS SHOWN ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5).

47 FINAL ELEVATION

THE FINAL FLOOR ELEVATION OF THE SITE WILL BE APPROXIMATELY 176 METRES ABOVE SEA LEVEL AS INDICATED BY THE SPOT ELEVATIONS ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5).

OPERATIONS PLAN NOTES (PAGE 4 OF 5) CONTINUED:

48 PROPOSED BERMS

STORAGE BERMS FOR TOPSOIL AND OVERBURDEN WILL BE LOCATED WITHIN THE SETBACK ON ALL SIDES OF THE SITE. THE MINIMUM HEIGHT FOR THE BERMS THAT ARE ARE REQUIRED FOR NOISE ATTENUATION WILL BE CONSTRUCTED AS PER THE RECOMMENDED NOISE BARRIERS TABLE (PAGE 3 OF 5). MATERIAL MAY BE IMPORTED TO COMPLETE THE BERMS SHOULD THERE BE INSUFFICIENT ON-SITE MATERIAL. IMPORTED MATERIAL MUST MEET THE REQUIREMENTS OF NOTE 62 (PAGE 5 OF 5).

49 BERM VEGETATION AND MAINTENANCE

BERMS WILL BE KEPT BACK AT LEAST 3 METRES FROM THE LICENSE BOUNDARY AND WILL HAVE AN APPROXIMATE SLOPE OF 2:1. THE SLOPES WILL BE SEEDED WITH NATIVE VEGETATION TO ENSURE THAT ADEQUATE VEGETATION IS ESTABLISHED AND MAINTAINED TO CONTROL EROSION.

50 METHOD OF EXTRACTION AND EQUIPMENT TO BE USED

THE AGGREGATE AT THE SITE WILL BE EXTRACTED USING EXCAVATION EQUIPMENT. THE EQUIPMENT TO BE LOCATED ON SITE WILL INCLUDE THE FOLLOWING: LOADERS, DUMP TRUCKS, WATER TRUCKS, EXCAVATORS, BULLDOZERS, HAULAGE TRUCKS, SCRAPERS, AND MOBILE CRUSHING/SCREENING AND WASHING PLANTS.

THE PLANTS WILL INCLUDE A SCREENING/WASHING OPERATION CONSISTING OF, BUT NOT LIMITED TO, A HOPPER (FEED BIN), DRY SCREEN AND WET SCREEN DECKS, A CLASSIFIER, TWO DOUBLE SCREW MATERIAL WASHERS, A DEWATERING DERRICK, DIESEL ENGINE, SPRAYBARS AND CONVEYORS AND STACKERS, AND A CRUSHING OPERATION, CONSISTING OF, BUT NOT LIMITED TO, A HOPPER (FEED BIN), PRIMARY AND SECONDARY CRUSHING UNITS, A DIESEL ENGINE, VIBRATING SCREENS, A MAGNETIC SEPARATOR AND CONVEYORS.

51 PROPOSED TREE SCREENS

NO ADDITIONAL TREE SCREENS ARE PROPOSED AT THIS TIME. NATURAL TREE SCREENS CURRENTLY EXIST ON THE NORTHEAST, SOUTHEAST AND PORTIONS OF THE SOUTHWEST SIDES OF THE SITE.

52 HOURS OF OPERATION

HOURS OF OPERATION ARE 24 HOURS SUBJECT TO THE FOLLOWING RESTRICTIONS:

DAYTIME OPERATIONS (07:00 - 19:00) - DURING THE DAYTIME PERIOD, ALL SIGNIFICANT NOISE SOURCES ARE ASSUMED TO BE IN OPERATION AND INCLUDE THE FOLLOWING:

- ONE MOBILE SCREENING PLANT
- ONE MOBILE WASH PLANT
- ONE MOBILE CRUSHING PLANT
- UP TO SIX LOADERS OR EXCAVATORS
- ON-SITE TRUCK MOVEMENTS USED TO DELIVER MATERIAL TO THE MOBILE CRUSHING PLANT AND SHIP PROCESSED PRODUCT OFF-SITE.

EVENING AND NIGHT TIME OPERATIONS (19:00 - 07:00) - DURING THE EVENING AND NIGHT TIME PERIOD THE FOLLOWING SIGNIFICANT NOISE SOURCES MAY BE IN OPERATION:

- UP TO TWO LOADERS OR EXCAVATORS
- ON-SITE TRUCK MOVEMENTS USED TO SHIP PROCESSED PRODUCT OFF-SITE.

FURTHER DETAILS ARE PROVIDED WITHIN THE RECOMMENDATIONS OF THE ACOUSTIC ASSESSMENT REPORT (REFER TO TECHNICAL REPORT RECOMMENDATIONS).

RESPONSES TO EMERGENCIES AND REQUIRED MAINTENANCE IS NOT LIMITED BY THE HOURS OF OPERATION LISTED IN THE ACOUSTIC ASSESSMENT REPORT.

53 TREES AND STUMPS

WITHIN THE AREA TO BE EXTRACTED, ALL TREES WITHIN 5 METRES OF THE EXCAVATION FACE WILL BE REMOVED. ANY TREES PRESENT WITHIN THE EXTRACTION AREA ARE TO BE HARVESTED AND UTILIZED IN THE MOST APPROPRIATE MANNER. SMALL TREES AND STUMPS REMAINING ONSITE WILL BE GROUND UP OR BROKEN DOWN USING AN EXCAVATOR AND MIXED WITH TOPSOIL TO BE UTILIZED DURING REHABILITATION OF THE SITE. LARGE PIECES OF WOOD MATERIAL MAY BE LEFT IN THE REHABILITATED AREAS AS HABITAT STRUCTURE AND COVER FOR SMALL MAMMALS AS WELL AS BASKING AREAS FOR REPTILES AND PERCHING AREAS FOR WATERFOWL.

54 VARIATIONS FROM OPERATIONAL REQUIREMENTS

REFER TO VARIATIONS FROM OPERATIONAL REQUIREMENTS TABLE ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5).

55 MAXIMUM ANNUAL TONNAGE

THE NUMBER OF TONNES TO BE REMOVED FROM THE SITE IN A CALENDAR YEAR WILL NOT EXCEED 1,000,000.

OPERATIONS CROSS-SECTIONS

69 LOCATION OF CROSS-SECTIONS

REFER TO OPERATIONS PLAN (PAGE 3 OF 5) FOR LOCATION OF OPERATIONS CROSS-SECTIONS.

70 HORIZONTAL AND VERTICAL SCALES

APPROPRIATE HORIZONTAL AND VERTICAL SCALES ARE MARKED ON THE CROSS-SECTIONS.

71 OPERATIONS CROSS-SECTIONS

THREE OPERATIONS CROSS-SECTIONS ARE PROVIDED ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5). DURING OPERATIONS, THE WATER TABLE SURROUNDING THE PITS WILL MATCH THE WATER LEVEL IN THE PIT LAKE (186 METRES ABOVE SEA LEVEL). THE PREDICTED WATER TABLE DURING OPERATIONS IS SHOWN ON THE OPERATIONS CROSS-SECTIONS ON THIS PLAN (PAGE 3 OF 5).

73 TYPICAL BERM DESIGN

A CROSS-SECTION OF A TYPICAL BERM DESIGN IS SHOWN ADJACENT TO THE OPERATIONS CROSS-SECTIONS (PAGE 3 OF 5).

TECHNICAL REPORT RECOMMENDATIONS AND/OR MONITORING

LIST OF REFERENCES WHICH APPLY SPECIFICALLY TO THE SITE PLAN:

FREEFIELD LTD., 2022. ACOUSTIC ASSESSMENT FOR THE HIGHLAND LINE PIT, LANARK HIGHLAND TOWNSHIP, LANARK COUNTY, ONTARIO. PREPARED FOR THOMAS CAVANAGH CONSTRUCTION LIMITED, SEPTEMBER 2022.

GOLDER ASSOCIATES LTD., 2022. NATURAL ENVIRONMENT REPORT, PROPOSED HIGHLAND LINE PIT, LANARK COUNTY, ONTARIO. PREPARED FOR THOMAS CAVANAGH CONSTRUCTION LIMITED, DECEMBER 2022.

GOLDER ASSOCIATES LTD., 2022. LEVEL 1 AND LEVEL 2 WATER REPORT, PROPOSED HIGHLAND LINE PIT, TOWNSHIP OF LANARK HIGHLANDS, ONTARIO. PREPARED FOR THOMAS CAVANAGH CONSTRUCTION LIMITED, DECEMBER 2022.

GOLDER ASSOCIATES LTD., 2021. STAGE 1 ARCHAEOLOGICAL ASSESSMENT, HIGHLAND LINE PIT, PART OF LOTS 4 AND 5, CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY, ONTARIO. PREPARED FOR THOMAS CAVANAGH CONSTRUCTION LIMITED, APRIL 2021.

STUDY RECOMMENDATIONS AND MONITORING REQUIREMENTS HAVE BEEN INCORPORATED INTO THE SITE PLAN NOTES, AS APPROPRIATE, AND ARE SUMMARIZED BELOW:

NATURAL ENVIRONMENT:

- NO CLEARING OF VEGETATION WILL TAKE PLACE WITHIN THE CORE BREEDING BIRD SEASON (APRIL 1 - AUGUST 31) UNLESS A NESTING SURVEY HAS BEEN COMPLETED BY A QUALIFIED BIOLOGIST WITHIN 24 HOURS OF THE CLEARING, AND NO ACTIVE NESTS WERE OBSERVED.
- FENCE AND PROTECT THE AREA IDENTIFIED AS MATERNITY ROOST HABITAT FOR TRI-COLOURED BAT TO PREVENT INTRUSION INTO THIS AREA. AVOID PLACING LIGHTING IN THE VICINITY OF THIS AREA.
- AN AWARENESS PACKAGE, SPECIES AT RISK ENCOUNTER PROTOCOL AND SPECIES AT RISK TRAINING PROGRAM IS TO BE PREPARED THAT LISTS THE SPECIES AT RISK THAT MAY BE PRESENT ON THE SITE OR IN THE LOCAL LANDSCAPE, AND IDENTIFIES WHAT TO DO IF ONE IS OBSERVED ON THE SITE. THE AWARENESS PACKAGE WILL INCLUDE:
  - INFORMATION / TRAINING ON IDENTIFYING SPECIES AT RISK;
  - WHAT TO DO IF A SPECIES AT RISK IS OBSERVED (MOVING, INJURED, DEAD OR NESTING);
  - HOW TO PROTECT A TURTLE OR BIRD NEST;
  - INFORMATION ON HOW TO REPORT A SPECIES AT RISK SIGHTING TO THE NATURAL HERITAGE INFORMATION CENTRE; AND,
  - A REQUIREMENT THAT IF A SPECIES AT RISK IS FOUND ON THE SITE, ALL WORK MUST STOP AND THE SPECIES SHALL BE PROTECTED FROM HARM. MECP SHALL BE NOTIFIED IMMEDIATELY TO SEEK GUIDANCE ON WAYS TO AVOID IMPACTS UNDER THE ENDANGERED SPECIES ACT (E.G., MITIGATION, CONDITIONAL EXEMPTION) PRIOR TO RESUMING WORK.
- STANDARD BEST MANAGEMENT PRACTICES FOR NOISE AND DUST MITIGATION AT PIT OPERATIONS WILL BE EMPLOYED TO REDUCE IMPACTS ON ADJACENT LANDS, AND THE HABITATS THEY PROVIDE.

OPERATIONS PLAN NOTES (PAGE 4 OF 5) CONTINUED:

ACOUSTIC ASSESSMENT:

- NOISE BARRIERS AND BERMS:
  - NOISE BARRIERS AND BERMS ARE TO BE PROVIDED AS PER RECOMMENDED NOISE BARRIERS TABLE AND OPERATIONS SITE PLAN (PAGE 3 OF 5).
  - NOISE BARRIERS AND BERMS ARE TO BE SOLID, HAVING NO GAPS, AND ARE TO HAVE A SURFACE DENSITY OF NO LESS THAN 20 KG/M^2. EXAMPLES OF SUITABLE BARRIERS OR BERMS INCLUDE:
    - LIFT FACE OR EXISTING TERRAIN;
    - EARTH, GRAVEL OR AGGREGATE BERMS OR STOCKPILES;
    - CONCRETE OR BRICK WALLS;
    - COMMERCIAL NOISE BARRIERS;
    - SHIPPING CONTAINERS OR BUILDINGS;
    - A PORTABLE BARRIER SUCH AS A TRUCK TRAILER EQUIPPED WITH MOVABLE FLAPS TO BLOCK THE SPACE BETWEEN THE GROUND AND THE BOTTOM OF THE TRAILER AND INCREASE HEIGHT IF REQUIRED.
  - NOISE BARRIERS SHIELDING PORTABLE EQUIPMENT MAY BE PROGRESSIVELY ESTABLISHED TO PROVIDE SHIELDING FROM LOCATION OF OPERATION TO THE IDENTIFIED NOISE SENSITIVE POINT OF RECEPTION (POR).
- MOBILE SCREENING PLANT
  - THE OPERATION OF THE MOBILE SCREENING PLANT (SCREENER) MAY TAKE PLACE ONLY DURING THE DAYTIME PERIOD (07:00 TO 19:00) AND SHALL COMPLY WITH THE FOLLOWING:
    - THE SCREENER IS TO BE LOCATED ON THE PIT FLOOR AT A MAXIMUM ELEVATION OF 188 METRES ABOVE SEA LEVEL.
    - NOISE BARRIERS ARE TO BE PROVIDED AS PER RECOMMENDED NOISE BARRIERS TABLE AND OPERATIONS SITE PLAN (PAGE 3 OF 5).
- WASH PLANT
  - THE OPERATION OF THE WASH PLANT AND ASSOCIATED DIESEL GENERATOR MAY TAKE PLACE ONLY DURING THE DAYTIME PERIOD (07:00 TO 19:00) AND SHALL COMPLY WITH THE FOLLOWING:
    - THE WASH PLANT IS TO BE LOCATED ON THE PIT FLOOR AT A MAXIMUM ELEVATION OF 188 METRES ABOVE SEA LEVEL IN LOCATIONS SHOWN ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5).
    - NOISE BARRIERS ARE TO BE PROVIDED AS PER RECOMMENDED NOISE BARRIERS TABLE AND OPERATIONS SITE PLAN (PAGE 3 OF 5).
    - THE MAXIMUM OUTDOOR SOUND POWER OF THE GENERATOR, IF USED TO PROVIDE POWER TO THE WASH PLANT, MUST NOT EXCEED 108.5 DBA. TO ACHIEVE THESE RATINGS THE GENERATOR WILL LIKELY NEED TO BE HOUSED INSIDE AN ENCLOSURE AND FITTED WITH AN EXHAUST SILENCER THAT MEETS THE MINIMUM INSERTION LOSS REQUIREMENTS LISTED IN THE MINIMUM INSERTION LOSS FOR GENERATOR EXHAUST SILENCER TABLE (PAGE 4 OF 5). THE SILENCER IS TO BE LOCATED INSIDE THE ENCLOSURES OR AS CLOSE AS POSSIBLE TO THE LOCATION WHERE THE EXHAUST EXITS THE ENCLOSURES WITH THE DUCT MATERIAL BETWEEN THE SILENCER AND THE GENERATOR CONSTRUCTED OF 16-GAUGE WEATHER RESISTANT METAL. THE SILENCERS SHALL HAVE A HIGH TRANSMISSION LOSS CASING. THIS ITEM DOES NOT APPLY IF HYDRO IS USED TO PROVIDE POWER TO THE PLANT.
- MOBILE CRUSHING PLANT
  - THE OPERATION OF THE MOBILE CRUSHING PLANT (CRUSHER) MAY TAKE PLACE ONLY DURING THE DAYTIME PERIOD (07:00 TO 19:00) AND SHALL COMPLY WITH THE FOLLOWING:
    - THE CRUSHER IS TO BE LOCATED ON THE PIT FLOOR AT A MAXIMUM ELEVATION OF 188 METRES ABOVE SEA LEVEL IN LOCATIONS SHOWN ON THE OPERATIONS SITE PLAN (PAGE 3 OF 5).
    - NOISE BARRIERS ARE TO BE PROVIDED AS PER RECOMMENDED NOISE BARRIERS TABLE AND OPERATIONS SITE PLAN (PAGE 3 OF 5).
- LOADERS AND EXCAVATORS
  - THE OPERATION OF THE LOADERS AND EXCAVATORS MAY TAKE PLACE DURING THE DAYTIME, EVENING AND NIGHTTIME PERIOD (24 HOURS) ANYWHERE IN THE EXTRACTION AREA.
- HIGHWAY TRUCKS
  - THE LOADING AND SHIPPING OF PRODUCT USING HIGHWAY TRUCKS MAY TAKE PLACE DURING THE DAYTIME, EVENING AND NIGHTTIME PERIOD (24 HOURS) AND SHALL COMPLY WITH THE FOLLOWING:
    - WHEN OPERATING ON-SITE, HIGHWAY TRUCKS SHALL NOT EXCEED 30 KM/H AND SHALL NOT USE COMPRESSION BRAKING (JAKE BRAKES).
  - PORTABLE CONSTRUCTION EQUIPMENT
  - PORTABLE CONSTRUCTION EQUIPMENT USED FOR SITE PREPARATION (E.G. LAND CLEARING AND CONSTRUCTION OF BERMS) AND REHABILITATION SHALL COMPLY WITH MECP PUBLICATION NPC-115, CONSTRUCTION EQUIPMENT, AUGUST 1978. (THIS PUBLICATION GIVES NOISE STANDARDS TO BE MET BY CONSTRUCTION EQUIPMENT IN ONTARIO.) SITE PREPARATION AND REHABILITATION ACTIVITIES SHALL TAKE PLACE ONLY DURING DAYTIME HOURS (07:00 - 19:00).
- NEW PROCESS
  - IF A NEW PROCESS IS INTRODUCED TO THE SITE, THEN THIS PROCESS SHALL BE ASSESSED BY A QUALIFIED ACOUSTICAL CONSULTANT PRIOR TO COMMISSIONING. NOISE MITIGATION MEASURES SHALL BE REVIEWED, AND ALTERED IF NECESSARY, TO ENSURE THAT MECP SOUND LEVEL LIMITS ARE MET AT ALL POINTS OF RECEPTION.

ARCHAEOLOGY:

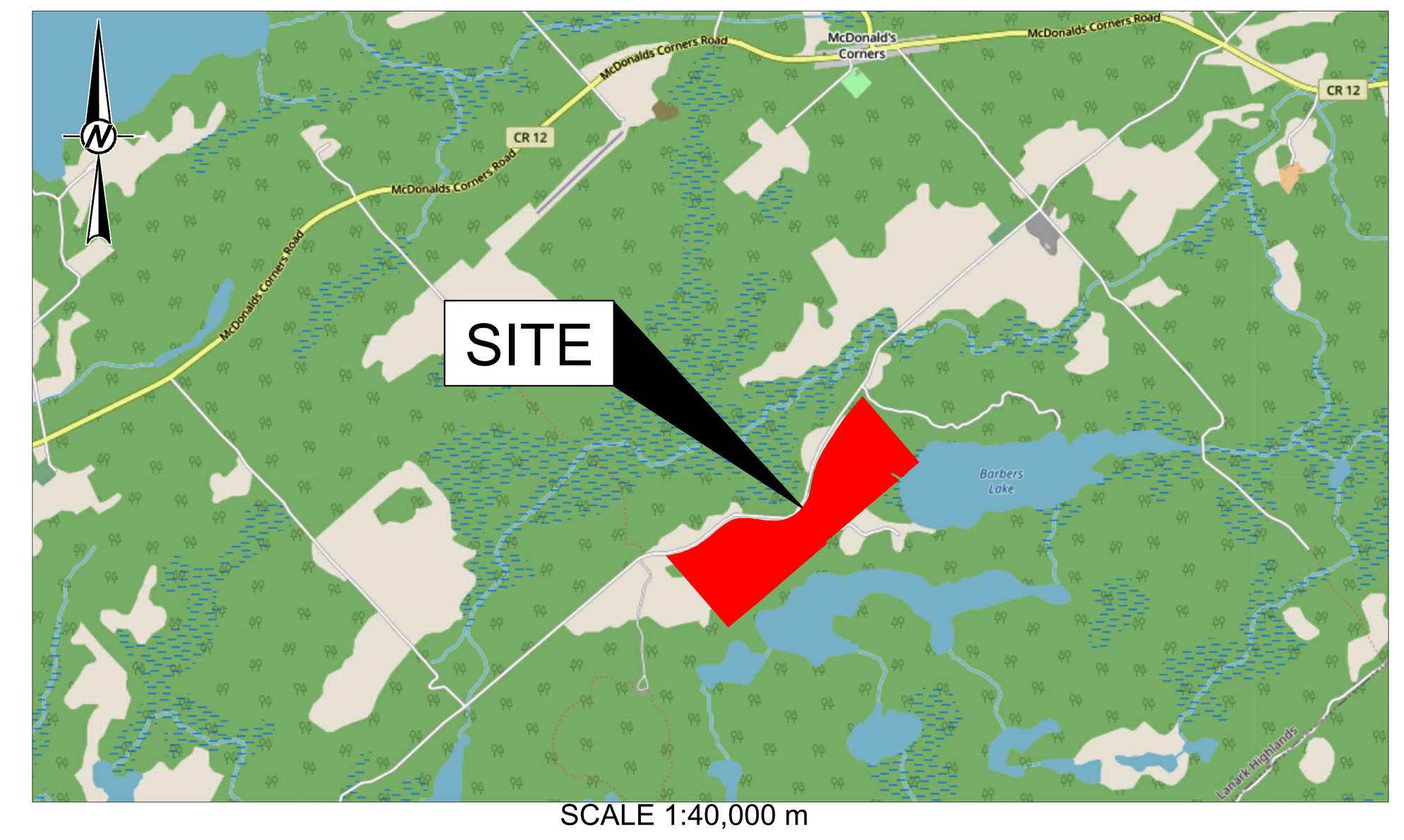
- PORTIONS OF THE STUDY AREA WITH ARCHAEOLOGICAL POTENTIAL (I.E., ARCHAEOLOGICAL EXCLUSION ZONE ON PAGE 3 OF 5) REQUIRE STAGE 2 ARCHAEOLOGICAL ASSESSMENT PRIOR TO DEVELOPMENT IMPACTS.

MINIMUM INSERTION LOSS FOR GENERATOR EXHAUST SILENCER

NAME	OCTAVE BAND CENTRE FREQUENCY, HZ MINIMUM DYNAMIC INSERTION LOSS (DB)								RW
	63	125	250	500	1000	2000	4000	8000	
SILENCER TO BE INSTALLED AT THE GENERATOR EXHAUST[2] (SOURCE: GENERATOR)	10	30	38	30	25	20	20	20	24

NOTES:
1. OCTAVE BAND CENTRE FREQUENCY, HZ, WITH MINIMUM DYNAMIC INSERTION LOSS IN DB OR DBA UNITS RE 10-12 WATTS. ALTERNATIVE LEVELS AT EACH FREQUENCY BAND PERMISSIBLE PROVIDING THE OVERALL INSERTION LOSS MEETS THE OVERALL INSERTION LOSS (RW) AS NOTED ABOVE AND IS NOT TONAL IN CHARACTER.
2. INSERTION LOSS BASED ON SILEX SILENCER MODEL JB 6.

KEY MAP



SCALE 1:40,000 m

HIGHLAND LINE PIT

LOT 5, CONCESSION 10
TOWNSHIP OF LANARK HIGHLANDS,
LANARK COUNTY, ONTARIO

APPLICANT:
THOMAS CAVANAGH CONSTRUCTION LIMITED
9094 CAVANAGH ROAD
ASHTON, ONTARIO
KOA 1B0

PIT LICENCE NO. ___________

NOTE(S)

1. LICENCED AREA, HIGHLAND LINE PIT 50.6 HECTARES.
2. AREA OF OPERATION, HIGHLAND LINE PIT 35.1 HECTARES.
3. THIS SITE PLAN IS PREPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENSE FOR A PIT BELOW THE GROUND WATER TABLE.

REFERENCE(S)

1. KEY PLAN: Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community.

SIGNATURE OF APPLICANT/LICENSEE	12-13-22 DATE
PREPARED UNDER THE DIRECTION OF: BRIAN HENDERSON	12-13-22 DATE

THOMAS CAVANAGH CONSTRUCTION LIMITED

AMENDMENTS	DATE	APPROVAL DATE

SITE PLANS APPROVED BY THE MINISTRY OF NATURAL RESOURCES AND FORESTRY.

SIGNATURE ____________ DATE ____________

LICENSED PROFESSIONAL ENGINEER B. J. HENDERSON 100110984 12-13-22 PROVINCE OF ONTARIO

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
HIGHLAND LINE PIT

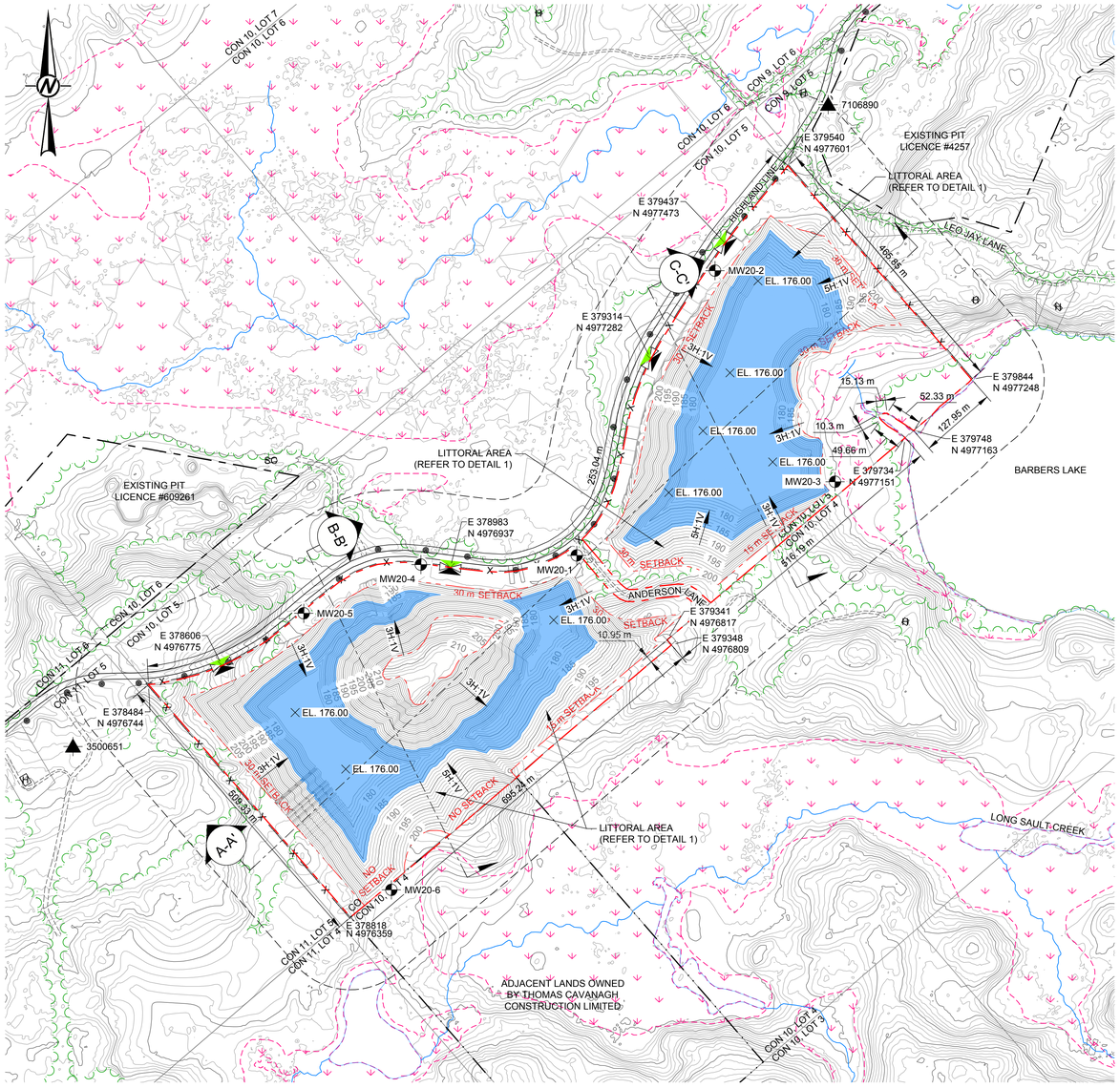
TITLE
OPERATIONS PLAN NOTES

APPLICANT

THOMAS CAVANAGH CONSTRUCTION LIMITED

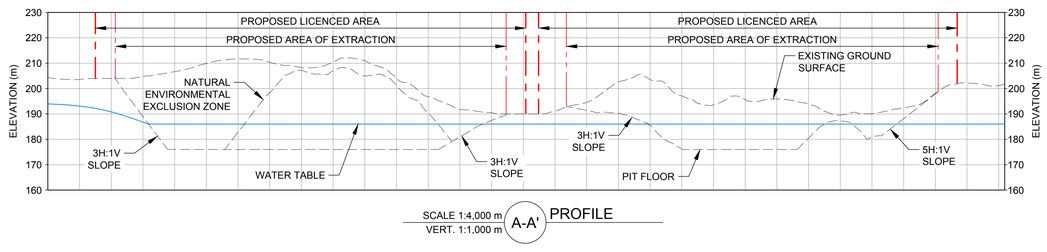
YYYY-MM-DD	2022-12-13
DESIGNED	BH
PREPARED	JM
REVIEWED	KAM
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	DRAWING
19126620	0014	0	4 OF 5

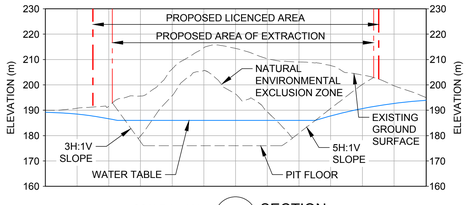


EXISTING FEATURES - SITE

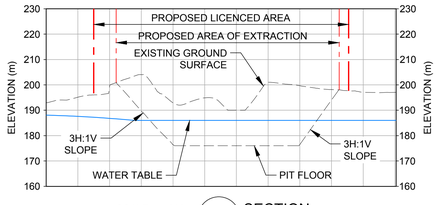
SCALE 1:4,000 m



SCALE 1:4,000 m
VERT. 1:1,000 m
A-A' PROFILE



SCALE 1:4,000 m
VERT. 1:1,000 m
B-B' SECTION



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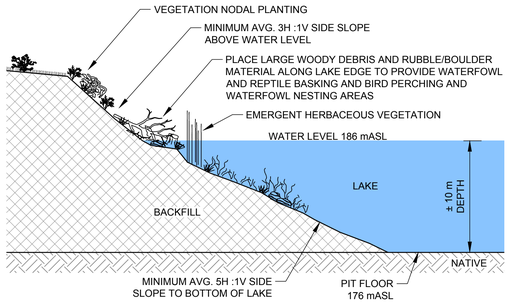
VERT. 1:1,000 m
C-C' SECTION



DETAIL 1

NOT TO SCALE

0 200 400

1:4,000 METRES

REHABILITATION PLAN NOTES (PAGE 5 OF 5):

NOTE: THE NUMBERS BELOW REFER TO AGGREGATE RESOURCES OF ONTARIO: SITE PLAN STANDARDS (AUGUST 2020)

59 PROPOSED FINAL REHABILITATION OF THE SITE

THE PROPOSED FINAL REHABILITATION OF THE SITE IS AS A LAKE. ALONG THE SIDES OF THE EXCAVATIONS, TYPICAL 3:1 (HORIZONTAL:VERTICAL) SLOPES WILL BE CONSTRUCTED. ALONG THE MAJORITY OF THE BOUNDARIES WITH SELECTED AREAS HAVING SHALLOWER SLOPES AT THE LAKE LEVEL (I.E., 5:1 HORIZONTAL:VERTICAL) TO CREATE SHALLOW LITTORAL ZONES FOR INCREASED HABITAT DIVERSITY.

60 SEQUENCE AND DIRECTION OF PROGRESSIVE REHABILITATION

PROGRESSIVE REHABILITATION WILL BE COMPLETED IN DIRECT CORRELATION TO THE DEVELOPMENT OF THE PIT AS THE EXTRACTION LIMITS ARE REACHED AND ENOUGH AREA IS AVAILABLE TO ENSURE THAT THE PRODUCTION, STOCKPILING AND PROCESSING OF AGGREGATE MATERIALS WILL NOT INTERFERE WITH REHABILITATION ACTIVITIES.

DURING OPERATIONS, REHABILITATED SIDE SLOPES WILL BE ESTABLISHED IN AREAS WHERE THE PIT HAS REACHED THE FINAL DEPTH AND HAS EXTENDED TO THE EXCAVATION LIMIT.

61 USE OF OVERBURDEN AND TOPSOIL IN PROGRESSIVE AND FINAL REHABILITATION

OVERBURDEN WILL BE USED IN REHABILITATION TO COVER THE BACKFILLED PORTIONS OF THE REHABILITATED PIT AND THE ABOVE WATER SLOPES APPROACHING THE PIT LAKE. ALL TOPSOIL OR OVERBURDEN STRIPPED IN THE OPERATION OF THE SITE WILL BE USED IN THE REHABILITATION OF THE SITE.

62 PROPOSED IMPORTATION OF MATERIAL TO FACILITATE REHABILITATION

ALL TOPSOIL AND OVERBURDEN STRIPPED IN THE OPERATION OF THE SITE WILL BE USED IN THE REHABILITATION OF THE SITE. AS THERE WILL BE INSUFFICIENT QUANTITIES OF NATIVE TOPSOIL AND/OR OVERBURDEN AVAILABLE FOR THE PROPOSED REHABILITATION, SOIL AND ROCK MAY BE IMPORTED FOR USE IN THE ESTABLISHMENT OF THE FINAL REHABILITATION CONTOURS OUTLINED IN THIS PLAN (PAGE 5 OF 5).

EXCESS SOIL, AS DEFINED IN ONTARIO REGULATION 244/97 MAY BE IMPORTED TO THIS SITE TO FACILITATE THE FOLLOWING REHABILITATION:

A. FOR USE IN THE CONSTRUCTION OF BERMS FOR FUTURE USE IN FINAL REHABILITATION

B. ESTABLISH FINAL GRADES AS DESCRIBED ON THE SITE PLAN

C. TOP DRESSING TO ESTABLISH VEGETATION

LIQUID SOIL, AS DEFINED IN ONTARIO REGULATION 406/19 UNDER THE ENVIRONMENTAL PROTECTION ACT, IS NOT AUTHORIZED FOR IMPORTATION TO THE SITE.

THE QUALITY OF EXCESS SOIL IMPORTED TO THE SITE FOR FINAL PLACEMENT MUST BE EQUIVALENT TO OR MORE STRINGENT THAN THE APPLICABLE EXCESS SOIL QUALITY STANDARDS AS DETERMINED IN ACCORDANCE WITH ONTARIO REGULATION 244/97 AS AMENDED FROM TIME TO TIME AND MUST BE CONSISTENT WITH THE SITE CONDITIONS AND THE END USE IDENTIFIED IN THE APPROVED REHABILITATION PLAN.

WHERE A QUALIFIED PERSON IS RETAINED OR REQUIRED TO BE RETAINED IN ACCORDANCE WITH ONTARIO REGULATION 244/97, THE QUALITY, STORAGE, AND FINAL PLACEMENT OF EXCESS SOILS SHALL BE DONE ACCORDING TO THE ADVICE OF THE QUALIFIED PERSON.

EXCESS SOIL IMPORTED TO FACILITATE REHABILITATION AS DESCRIBED ON THIS SITE PLAN SHALL BE UNDERTAKEN IN ACCORDANCE WITH ONTARIO REGULATION 244/97 UNDER THE AGGREGATE RESOURCES ACT, AS AMENDED FROM TIME TO TIME.

THE CUMULATIVE TOTAL AMOUNT OF EXCESS SOIL THAT MAY BE IMPORTED TO THIS SITE FOR REHABILITATION PURPOSES IS 4,110,000 CUBIC METRES.

63 VEGETATION TO BE ESTABLISHED DURING PROGRESSIVE AND FINAL REHABILITATION

DURING PROGRESSIVE AND FINAL REHABILITATION, ABOVE WATER SLOPES WILL BE SEEDED WITH A MIX OF BUNCH AND SPREADING GRASSES AND FORBS CONSISTING OF NON-INVASIVE SPECIES TO PREVENT EROSION. EXAMPLES OF SUITABLE SPECIES OF GRASS AND FORBS INCLUDE, BUT ARE NOT LIMITED TO, WHITE CLOVER, RED CLOVER, ALFALFA, ORCHARD GRASS, PERENNIAL RYEGRASS, MEADOW BROME, KENTUCKY BLUEGRASS, CANADA BLUEGRASS, CREEPING RED FESCUE AND TALL FESCUE. ORCHARD GRASS AND PERENNIAL RYEGRASS ARE FAST-ESTABLISHING. NATIVE SPECIES WILL ALSO BE INCLUDED IN THE SEED MIX, SUCH AS BLACK-EYED SUSAN, NEW ENGLAND ASTER, CANADA WILD RYE AND LITTLE BLUESTEM (AS AVAILABLE FROM SUPPLIERS).

FINAL REHABILITATION WILL ALSO INCLUDE THE CREATION OF SHALLOW LITTORAL ZONES AT SELECT LOCATIONS TO CREATE MORE DIVERSE AQUATIC HABITAT. SHALLOW EMERGENT MARSH VEGETATION WILL BE PLANTED IN WATER +/- 0.15 METRES DEEP AND EXTEND +/-5 METRES FROM THE SHORE AND WILL BE INTERSPERSED WITH COVER STRUCTURES (E.G., BOULDERS AND ROOT WADS). IN ADDITION, BASKING LOGS, WOODY DEBRIS AND NESTING PLATFORMS WILL BE INSTALLED FOR WILDLIFE HABITAT, SUCH AS TURTLES, WATERFOWL AND FISH. A CONCEPTUALIZATION OF THE SHALLOW SHORELINE TREATMENTS IS SHOWN ON DETAIL 1 INCLUDED ON THIS PLAN.

NODAL PLANTINGS WILL ALSO BE COMPLETED WITHIN SELECTED AREAS AROUND THE LAKE AND WILL INCLUDE EDGE, SUBMERGENT AND EMERGENT SPECIES SUCH AS RED-OSIER DOGWOOD, SLENDER WILLOW AND HERBACEOUS PLANTS SUCH AS WATER PLANTAIN, LAKE SEDGE, SWAMP MILKWEED, SOFTSTEM BULRUSH AND COMMON CATTAIL.

THE FINAL DETAILS OF THE REHABILITATION PLANTING PROGRAM WILL BE ESTABLISHED IN CONSULTATION WITH MINISTRY OF NORTHERN DEVELOPMENT, NATURAL RESOURCES AND FORESTRY STAFF JUST PRIOR TO FINAL REHABILITATION TO ENSURE THAT THE PLAN IS APPROPRIATE FOR CONDITIONS AT THAT TIME.

64 PIT SLOPING

IN MOST CASES, 3:1 (HORIZONTAL:VERTICAL) SLOPES WILL BE CONSTRUCTED AROUND THE SIDES OF THE PIT SO THAT IT CAN BE REHABILITATED AS A LAKE. SELECTED AREAS DESIGNATED FOR SHALLOW SHORELINE TREATMENTS (LITTORAL ZONES) AT THE LAKE LEVEL WILL BE SLOPED ACCORDINGLY (APPROXIMATELY 5:1 HORIZONTAL:VERTICAL). A CONCEPTUALIZATION OF THE SHALLOW SHORELINE TREATMENTS IS SHOWN ON DETAIL 1 INCLUDED ON THIS PLAN (PAGE 5 OF 5).

65 ANY BUILDINGS OR STRUCTURES TO REMAIN ON SITE

NO BUILDINGS OR STRUCTURES WILL REMAIN ON SITE. INTERNAL HAUL ROADS WILL BE REMOVED.

66 FINAL SURFACE WATER DRAINAGE

THE SITE WILL BE REHABILITATED AS TWO LAKES. DRAINAGE FROM EXTRACTION AREA 2 WILL FLOW TOWARDS EXTRACTION AREA 1 THROUGH THE UNEXTRACTED MATERIAL BENEATH ANDERSON LANE. DRAINAGE FROM EXTRACTION AREA 1 WILL BE TOWARDS BARBERS LAKE, DISCHARGING AT THE LOW POINT ON THE EDGE OF THE EXCAVATION AND FLOWING INTO THE LAKE.

67 FINAL ELEVATIONS OF REHABILITATED AREA

THE FINAL ELEVATIONS OF THE REHABILITATED AREAS OF THE SITE EXPRESSED AS METRES ABOVE SEA LEVEL ARE SHOWN ON THE DRAWING ON REHABILITATION PLAN (PAGE 5 OF 5).

REHABILITATION CROSS-SECTIONS

69 LOCATION OF CROSS-SECTIONS

REFER TO DRAWING (THIS PLAN) FOR LOCATION OF REHABILITATION CROSS-SECTIONS.

70 HORIZONTAL AND VERTICAL SCALES

APPROPRIATE HORIZONTAL AND VERTICAL SCALES ARE MARKED ON THE CROSS-SECTIONS.

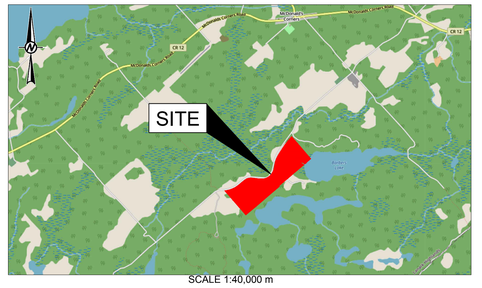
71 REHABILITATION CROSS-SECTIONS

THREE REHABILITATION CROSS-SECTIONS ARE PROVIDED ON THE REHABILITATION PLAN (PAGE 5 OF 5). THE GROUNDWATER TABLE IN THE AREA OF THE PIT WILL REMAIN AT PRE-DEVELOPMENT CONDITIONS. CLOSER TO THE PIT THE WATER TABLE WILL SLOPE UP OR DOWN TO MEET THE ANTICIPATED PIT LAKE LEVEL (APPROXIMATELY 186 METRES ABOVE SEA LEVEL). THE PREDICTED WATER TABLE DURING REHABILITATION IS SHOWN ON THE CROSS-SECTIONS ON THIS PLAN (PAGE 5 OF 5).

73 TYPICAL BERM DESIGN

A CROSS-SECTION OF A TYPICAL BERM DESIGN IS SHOWN ADJACENT TO THE REHABILITATION CROSS-SECTIONS (PAGE 5 OF 5).

KEY MAP



SCALE 1:40,000 m

HIGHLAND LINE PIT

LOT 5, CONCESSION 10
TOWNSHIP OF LANARK HIGHLANDS,
LANARK COUNTY, ONTARIO

APPLICANT:
THOMAS CAVANAGH CONSTRUCTION LIMITED
9094 CAVANAGH ROAD
ASHTON, ONTARIO
K0A 1B0

PIT LICENCE NO. _____

NOTE(S)

1. LICENCED AREA, HIGHLAND LINE PIT **50.6** HECTARES.
2. AREA OF OPERATION, HIGHLAND LINE PIT **35.1** HECTARES.
3. THIS SITE PLAN IS PREPARED UNDER THE AGGREGATE RESOURCES ACT FOR A CLASS A LICENCE FOR A PIT BELOW THE GROUND WATER TABLE.
4. THIS PLAN WAS PREPARED USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS.
5. LOT, CONCESSION AND BOUNDARY LINES ON THIS PLAN ARE APPROXIMATE.
6. THIS IS NOT A LEGAL SURVEY DRAWING IN ACCORDANCE WITH THE PROVINCE OF ONTARIO SURVEYORS ACT 1987. THIS DRAWING WAS PRODUCED USING STANDARD PHOTOGRAMMETRIC PRACTICES.

LEGEND

- BOUNDARY OF AREA TO BE LICENCED
- LIMIT OF EXTRACTION
- 120-METRE SURROUND
- BOREHOLE / MONITORING WELL
- PRIVATE WELL (AS PER MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS WATER WELL INFORMATION SYSTEM)
- CON 10, LOT 5 / CON 10, LOT 4 — LOTS AND CONCESSION LINES
- ADJACENT PIT AND QUARRY BOUNDARY
- UTILITY POLE
- BUILDING; S-SILO, H-HOUSE, G-GARAGE, B-BARN, S-SHED, O-OFFICE, SC-SCALE HOUSE
- ROAD: PAVED
- ROAD: GRAVEL
- CONTOURS/INDEX CONTOURS
- WOODED AREA
- WATERCOURSE
- WETLAND
- x — x PAGE WIRE FENCE/GATE
- A-A' CROSS-SECTIONS
- EL. 176.00 PROPOSED PIT FLOOR SPOT ELEVATION, mASL

REFERENCE(S)

1. KEY PLAN: Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, Mapmyindia, © OpenStreetMap contributors, and the GIS User Community.
2. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

LICENSED PROFESSIONAL ENGINEER
B. J. HENDERSON
100110864
12-13-22
PROVINCE OF ONTARIO

SIGNATURE OF APPLICANT/LICENSEE — 12-13-22 DATE

PREPARED UNDER THE DIRECTION OF: BRIAN HENDERSON — 12-13-22 DATE

THOMAS CAVANAGH CONSTRUCTION LIMITED

AMENDMENTS	DATE	APPROVAL DATE

SITE PLANS APPROVED BY THE MINISTRY OF NATURAL RESOURCES AND FORESTRY.

SIGNATURE _____ DATE _____

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
HIGHLAND LINE PIT

TITLE
REHABILITATION PLAN

APPLICANT
THOMAS CAVANAGH CONSTRUCTION LIMITED

YYYY-MM-DD	2022-12-13
DESIGNED	BH
PREPARED	JM
REVIEWED	KAM
APPROVED	KAM

PROJECT NO.	CONTROL	REV.	DRAWING
19126620	0014	0	5 OF 5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI F

0 25 mm

Path: \\golder.gds\corp\ontario\toffice\Projects\GIS\Clients\Thomas_Cavanagh_Construction\Duncan_PA99_PRO\19126620_Cavanagh_ARA\0014_Site_Plans\ | File Name: 19126620-CH-0014-0005.dwg | Last Edited By: jmcconnell Date: 2022-12-22 Time:9:53:47 AM | Printed By: JMcConnell Date: 2022-12-22 Time:10:25:16 AM

HIGHLAND PIT MINERAL EXTRACTION SITE, TOWNSHIP OF LANARK HIGHLANDS, ONTARIO

TRAFFIC IMPACT STUDY

SEPTEMBER 15, 2022

Presented to:

Mr. Phil White
Quality Control
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September 15, 2022

Castleglenn Consultants
Engineers, Project Managers & Planners

Project No. 7298

CASTLEGLENN CONSULTANTS LTD.

THIRD PARTY DISCLAIMER

This study has been prepared by Castleglenn Consultants Inc. ("CGI") for the benefit of the Client to whom it is addressed. The information and data contained herein represents CGI's best professional judgment in light of the knowledge and information available to CGI at the time of preparation. Except as required by law, this study and the information and data contained herein are to be treated as confidential and may be used and relied upon only by the Client, its officers and employees. CGI denies any liability whatsoever to other parties who may obtain access to this study for any injury, loss or damage suffered by such parties arising from their use of, or reliance upon, this study or any of its contents without the express written consent of CGI and the Client.

The following Traffic Impact Study (TIS) report has been produced, reviewed, and is respectfully submitted for consideration to whom it has been addressed.

Mr. Arthur Gordon B.A., P.Eng
Principal Engineer
Castleglenn Consultants Inc.
September 15, 2022

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Transportation Planner
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September 15, 2022

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LIST OF EXHIBITS

1.0 INTRODUCTION

Castleglenn Consultants Inc. were retained to undertake a Traffic Impact Study (TIS) in support of the proposed Highland Pit Mineral Extraction Site.

The proposed development is located on Highland Line Road, approximately 3 km west of the County Road 12 and Highland Line intersection. Highland Line is characterized as rural roadway that is infrequently travelled.

The proposed development includes two extraction sites on the south side of Highland Line. The two sites are bisected by Anderson Lane.

This traffic impact study includes the following components:

- A review of the study area, the quarry site locations, the roadway and intersection configurations adjacent land uses and existing Highland Line accesses within the vicinity of the two extraction sites;
- A review of existing (2021) background traffic operational conditions within the study area. The study saw the collection of traffic count information from the following intersections:
  - County Road 12 and Highland Line;
  - Highland Line and North Quarry Access.
- A description of the proposed extraction site development and its anticipated impact on future (2024) traffic operations;
- A site traffic forecast for the proposed development that reflected typical weekday morning and afternoon peak hour quarry operations. Intersection capacity analyses that were conducted assuming both existing and forecast operational morning and afternoon peak hours of travel demand within the study area; and
- A review of the proposed access arrangements along with suggested refinements that Ftook into account sight line requirements.

The following sections describe the analyses of traffic operations associated with the proposed development and presents the resulting performance measures (levels, of service, (v/c) volume-to-capacity ratios, queue length and delay estimates) for the anticipated time of (2024) build-out as well as proposed access locations.

2.0 EXISTING CONDITIONS

2.1 STUDY AREA AND SITE LOCATION

Exhibit 2-1 illustrates the general location of the proposed development on the south side of Highland Line. The proposed development includes two extraction sites (Extraction Area 1 and Extraction Area 2) bisected by Anderson Lane, which is a local road. The proposed development is opposite the existing mineral extraction site (McKinnon Pit owned by Arnott Bros. Construction, see Appendix D – Site Photos, Image 2).

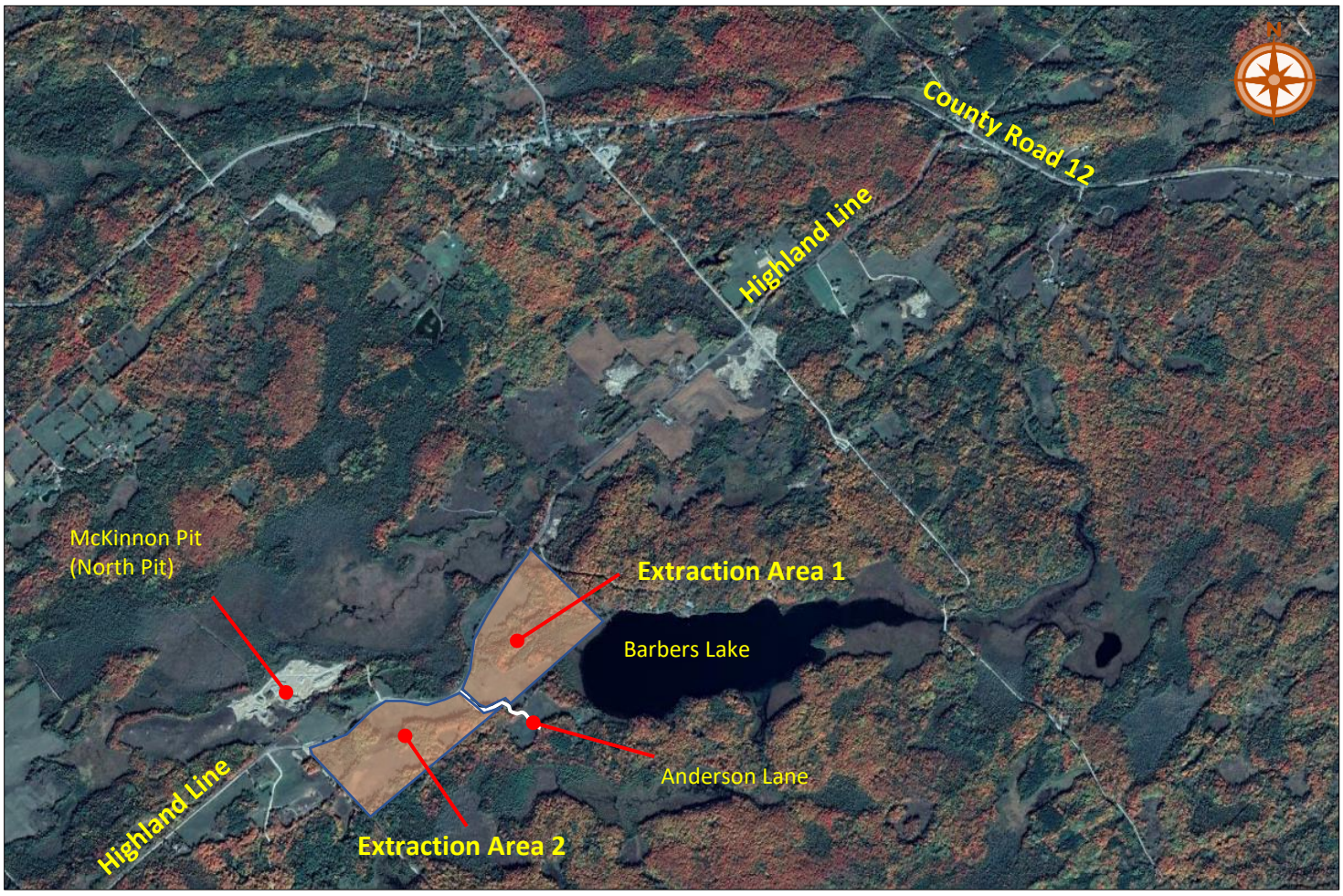


Exhibit 2-1: Study Area Context

2.2 STUDY AREA ROADWAYS

The following sub-sections serve to characterize the primary roadways within the vicinity of the proposed development:

LANARK COUNTY ROAD 12:

- County Road 12 is an east-west road between County Road 15 near Fergusons Falls in the east and Hamlet of Elphin in the west, where it becomes County Road 36. The road is a 2-lane undivided roadway with a posted speed limit of 80 km/h in the vicinity of the study area. The roadway has a rural cross-section.

HIGHLAND LINE:

- Highland Line is an east-west local road between County Road 12 in the east and County Road 36 in the west. The road runs largely parallel to County Road 12 and serves as an access to sparse developments in the area. The road is a 2-lane undivided roadway with a posted speed limit of 60 km/h and a rural cross-section. Highland Line is presently used by trucks, as there are four licensed pits along the roadway between the site's location and County Road 12.

Exhibit 2-2 illustrates the location of above roadways within the study area.

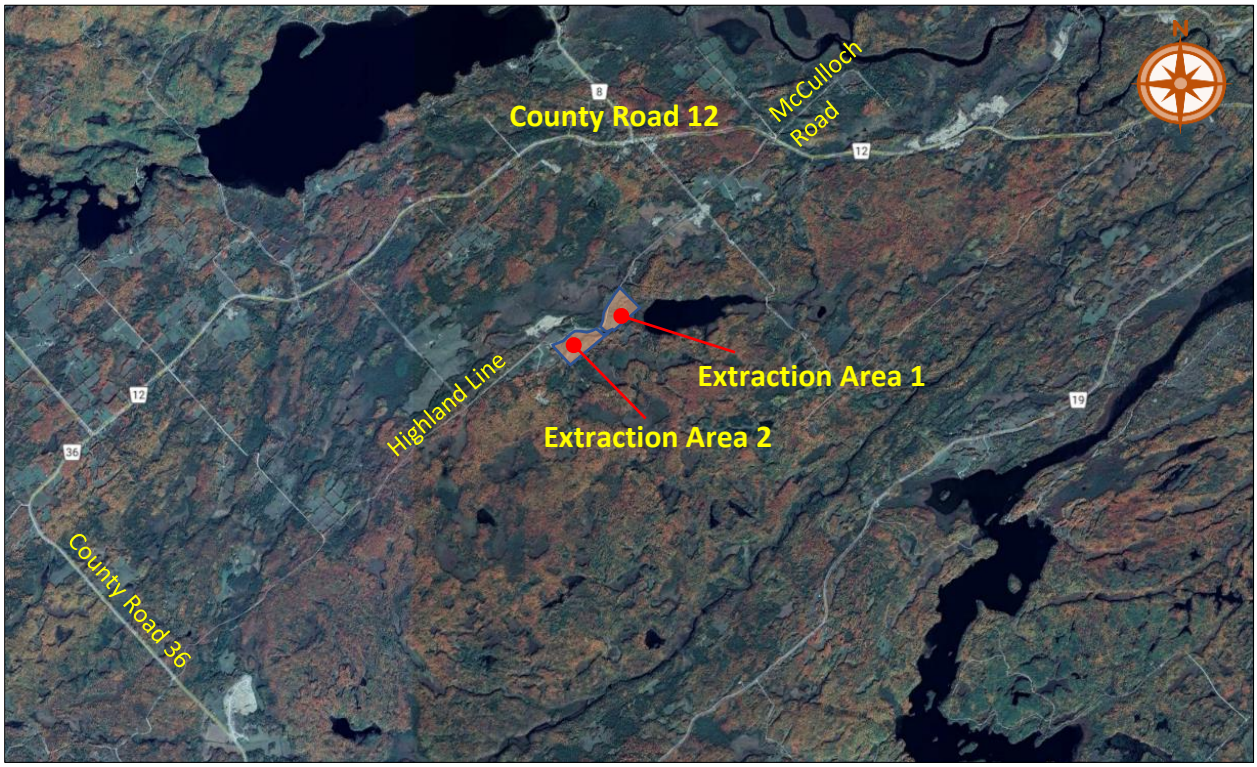


Exhibit 2-2: Study Area Roadways

2.3 STUDY AREA INTERSECTIONS

Traffic count information was collected on December 1st, 2021 at the following two intersections/access within the study area. The intersection lane arrangement-configuration was documented and the traffic operational performance characteristics determined for the following intersections:

Exhibit 2-3: County Road 12 / Highland Line Intersection

1. COUNTY ROAD 12 / HIGHLAND LINE-MCCULLOCH ROAD

- Exhibit 2-3 illustrates the County Road 12 / Highland Line 4-leg intersection;
- It STOP-controlled on the minor legs of the intersection;
- Highland Line is located on the south leg of the intersection, while McCulloch Road is on the north leg;
- The north and south leg are offset by about 30 meters;
- Each approach of the intersection provides for one lane of shared through-turn movement and no auxiliary lanes.

2. HIGHLAND LINE / NORTH QUARRY ACCESS

- Exhibit 2-4 illustrates the 3-leg Highland Line / North Quarry Access;
- It is a 3-way uncontrolled "T"-intersection;
- For the purposes of the traffic analysis, the minor north leg (Quarry Access) is assumed to be yield-controlled;
- Each approach of the intersection provides for one lane of shared through-turn movement and no auxiliary lanes;
- In the operational conditions, the intersection will effectively become a 4-leg intersection with the site access located on the south leg of the intersection.

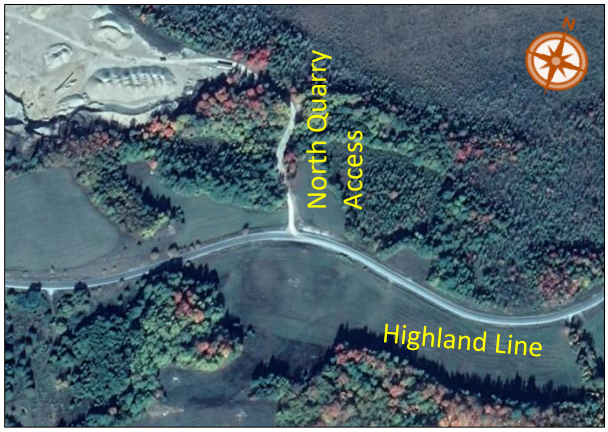


Exhibit 2-4: Highland Line and North Quarry Access

2.4 ADJACENT LAND USES

Exhibit 2-5 illustrates the general location of the proposed development site superimposed upon the Township of Lanark Highlands zoning by-law mapping and indicates that:

- The proposed site is zoned "MAR – Mineral Aggregate Resources Reserve";
- Surrounding Land uses are dominated by "Rural" and "Limited Services Rural"; and
- the Hamlet of Mcdonald's Corners is located about 2.5 km (straight line distance) to the northeast of site, or about 3.5 km via roadways.

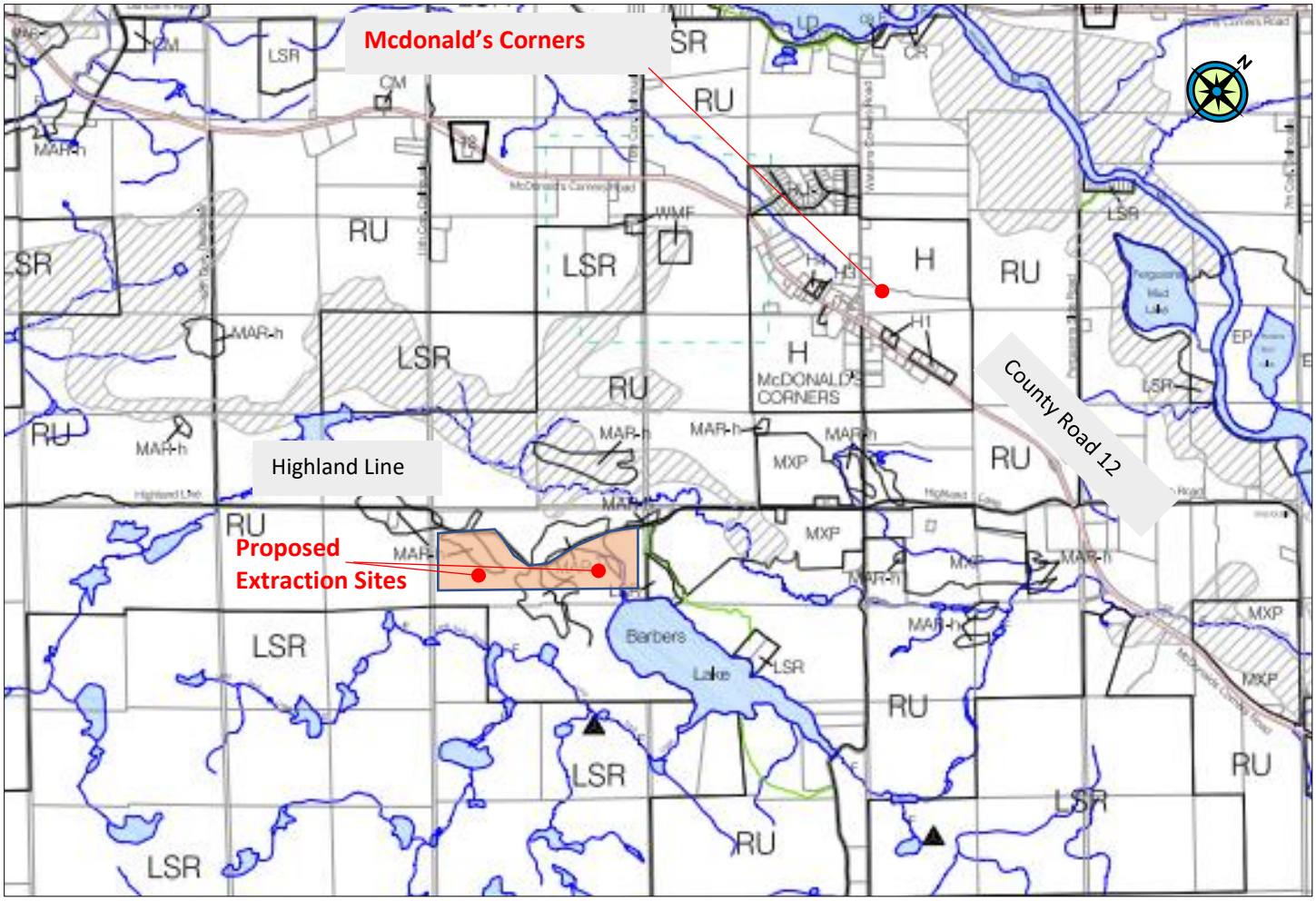


Exhibit 2-5: Development Location and Lanark Highlands Township Zoning By-Law Mapping

2.5 ADJACENT DRIVEWAYS

Exhibit 2-6 illustrates the locations of the existing access/driveways along Highland Line. The following provides a short description of each access/driveway:

- **1001 Highland Line** is an existing access connecting to the "*Wheelers Pancake House and Sugar Camp*" which provides for a sit-down restaurant and retail store located to the west of the proposed Extraction Area 2 site;
- A **Closed Township Road Allowance** is located immediately to the west of proposed Extraction Area 2 site. The Township noted that there are no plans for future development related to this access at the time of writing of this report;
- An access if provided to the **North (McKinnon) Pit** operated by Arnott Bros. Construction under the Aggregate Resource Act (License #609261) located opposite the proposed Extraction Area 2 site;
- **Anderson Lane** is a local Township roadway located between Extraction Areas 1 and 2. The roadway provides access to 137 Anderson Lane, a 2-storey residential dwelling;
- The **626 Highland Line** driveway provides access to a 2-storey residential dwelling to the east of Extraction Area 1; and
- **Leo Jay Road** is designated as a local Township roadway located east of the proposed Extraction Area 1 site. A review of aerial photography suggests that the road provides access to 5 residential dwellings.

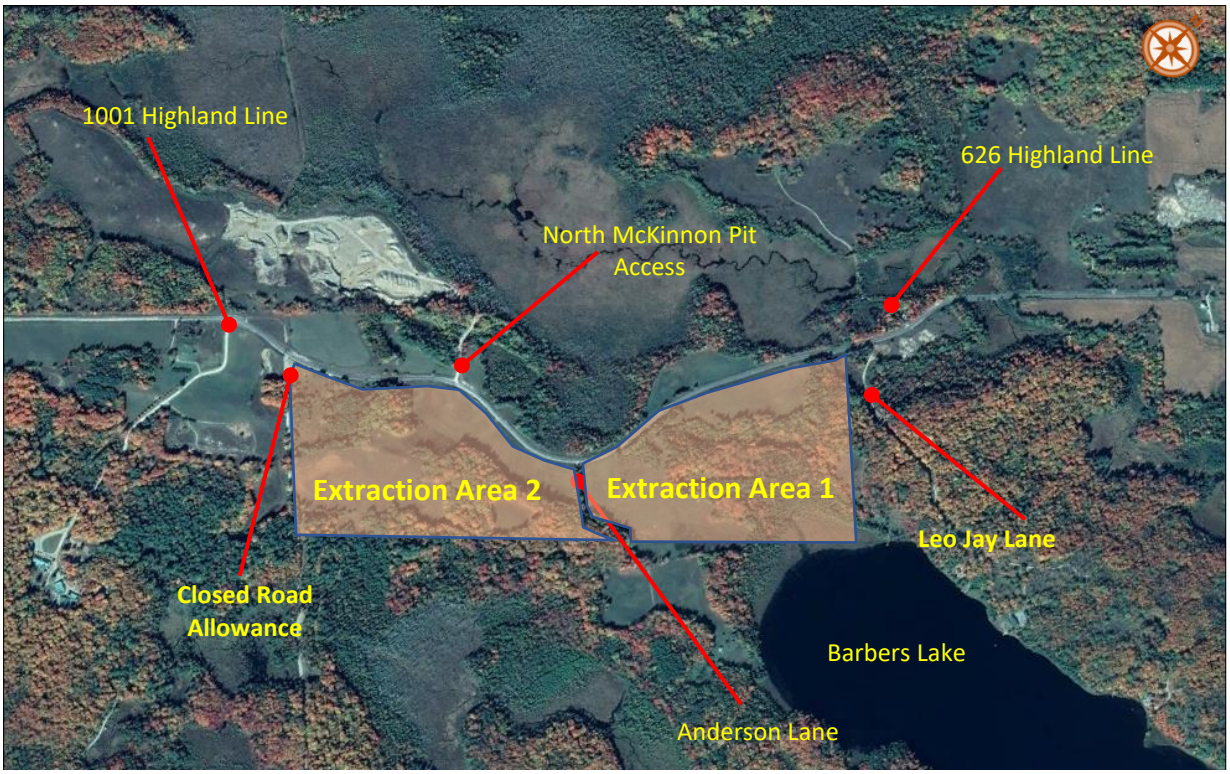


Exhibit 2-6: Adjacent Driveways

2.6 EXISTING TRAFFIC VOLUMES (2021)

Two manual traffic counts were conducted on December 1, 2021 at the following intersections:

- County Road 12 and Highland Line;
- Highland Line and North Pit Access.

The traffic counts were conducted during the morning (7-to-9 AM) and afternoon (3:30-to-5:30 PM) peak periods of travel demand. The traffic counts recorded the number of passenger and heavy vehicles as well as pedestrians/cyclists (of which there were none). Exhibit 2-7 illustrates existing (2021) balanced intersection traffic volumes for the morning and afternoon peak hours of travel demand.

The traffic counts were conducted in late Winter during the Covid-19 pandemic with some public health measures still in effect. Given the study area's remote location and insufficient historical traffic information for comparison purposes, identifying the impact of the public health measures upon summer peak traffic volumes remained a challenge. Section 4.4 highlights the efforts undertaken to address this challenge when developing traffic forecasts.

2.7 EXISTING TRAFFIC ANALYSIS

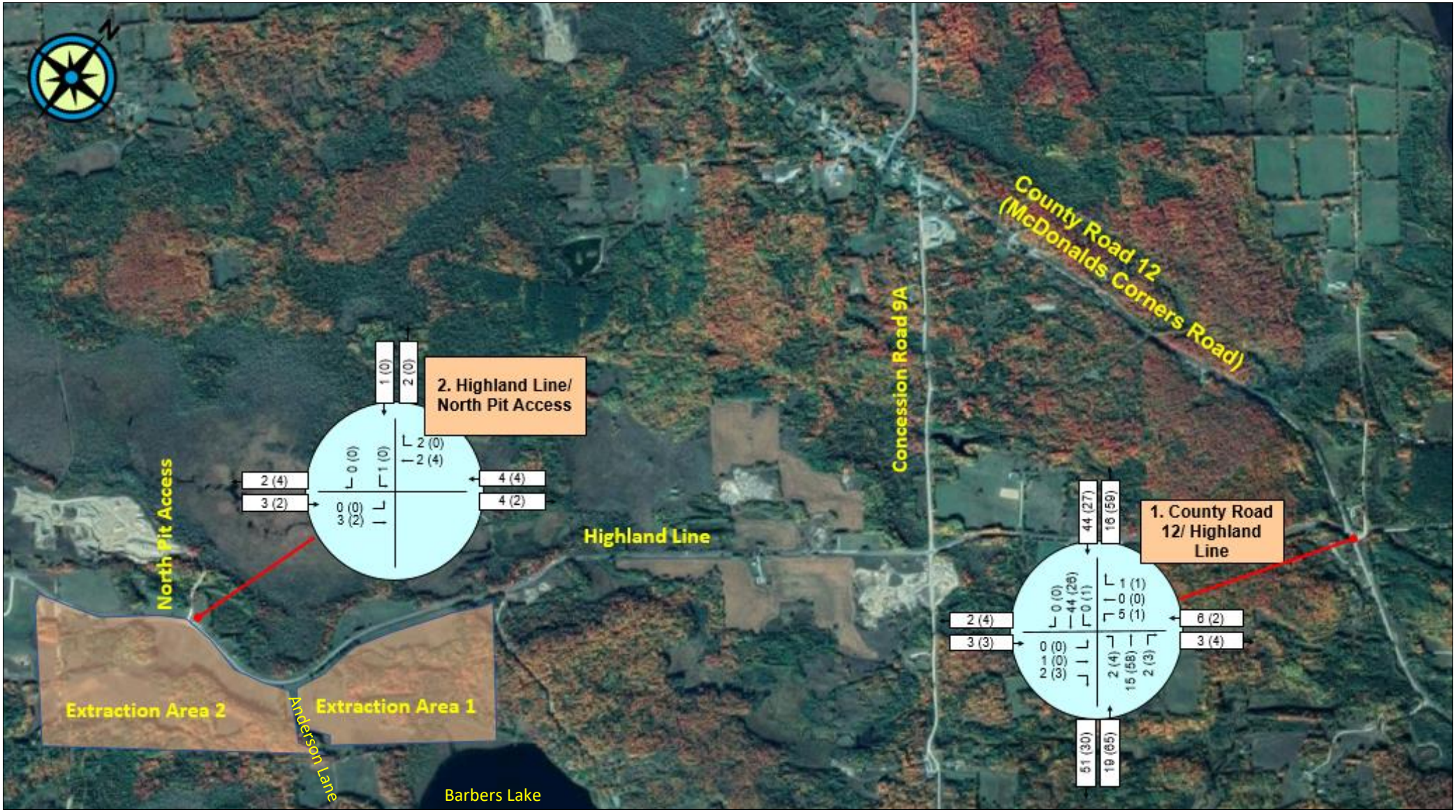
Intersection capacity analysis was undertaken utilizing Synchro™ 11 analysis software which incorporates Highway Capacity Manual (HCM) methodologies to determine level-of-service (delay-based) and volume-to-capacity (v/c) performance metrics. The analyses assumed a peak hour factor of 0.95 which simulates the busiest 15-minute-period of the overall peak hour. Appendix "C" documents the resulting Synchro output sheets indicating the existing operational performance.

Table 2-1 summarizes the intersection capacity analyses results that assume the existing traffic count information illustrated in Exhibit 2-7 and the existing intersection configurations. The table indicates that all the area intersections within the study area were found to operate at an excellent level of service "A" in all directions during the peak hours of travel demand.

Table 2-1: Existing Intersection Capacity Analysis

Intersection		Control Type	Critical Approach/ Movement	Weekday Morning Peak Hour (Afternoon Peak Hour)			
				Average Delay per Vehicle (seconds)	Level of Service	95th Percentile Queue (m)	Volume-to-Capacity Ratio (v/c)
1.	County Road 12 and Highland Line	Minor leg- STOP	Eastbound	9.0 (8.8)	A (A)	0.0 (0.0)	0.007 (0.003)
2.	Highland Line and North Pit Access	Minor leg- STOP	Southbound	9.4 (0.0*)	A (A)	0.0 (0.0)	0.001 (0.00*)

*No vehicles were recorded on the Southbound approach during the afternoon peak period traffic count



Morning (Afternoon)

Exhibit 2-7: Existing Intersection Traffic Volumes
(Vehicles-per-Hour)

3.0 THE DEVELOPMENT PROPOSAL

3.1 THE PROPOSED SITE & STUDY HORIZONS

Exhibit 3-1[1] illustrates the boundary of the proposed Highland extraction areas and the conceptual location of the mobile crushing operations within the sites. The site is sub-divided into two separate mineral extraction areas, referred to as "Extraction Area 1" and "Extraction Area 2". Both sites are both anticipated to be operational by the Spring of 2024.

Each of the individual extraction areas are proposed to be served by two accesses to provide a main and circulation secondary access. The exhibit illustrates the approximate conceptual location of the four access to the two extraction areas that were initially presented at the outset of this study.

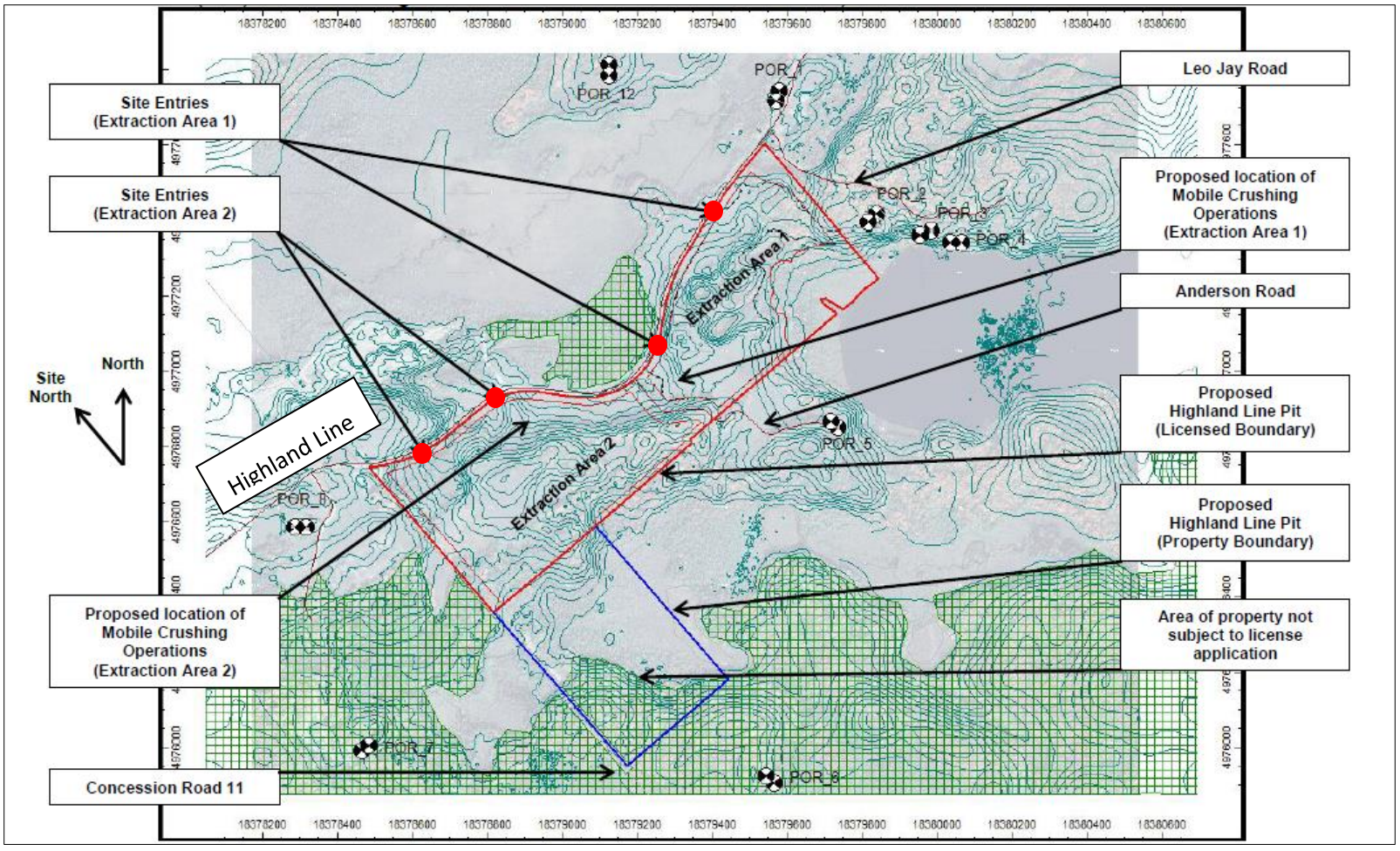


Exhibit 3-1: Proposed Extraction Pit Plan

1 Background image referenced from "*Acoustic Assessment for the Highland Line Pit, Lanark Highland Township, Lanark County, Ontario",* February, 2021 by Freefield Ltd.

4.0 TRAFFIC FORECASTING

4.1 BACKGROUND TRAFFIC GROWTH

A review of historical background traffic volumes provided by Lanark County (See Appendix "B") did not indicate a clear trend in background traffic growth. In the absence of such historical growth patterns, a 1 percent-per-year background growth rate was assumed to be applicable for the through movements along County Road 12.

However, recognizing that the traffic count undertaken for this study took place during the Winter season (December, 2021) when Covid restrictions were still in effect, and quarry operations along Highland Line would during the slow period, a worst-case scenario was developed which included:

- Significant adjustments to the through-traffic along Highland Line to account for the effect of peak summer volumes and active quarry operations; and
- adoption of a 2.5% annual background traffic growth rate.

Exhibit 4-1 illustrates the total traffic volumes for the 2024 first year of operation based upon the originally derived and "worst-case" summer estimates of traffic.

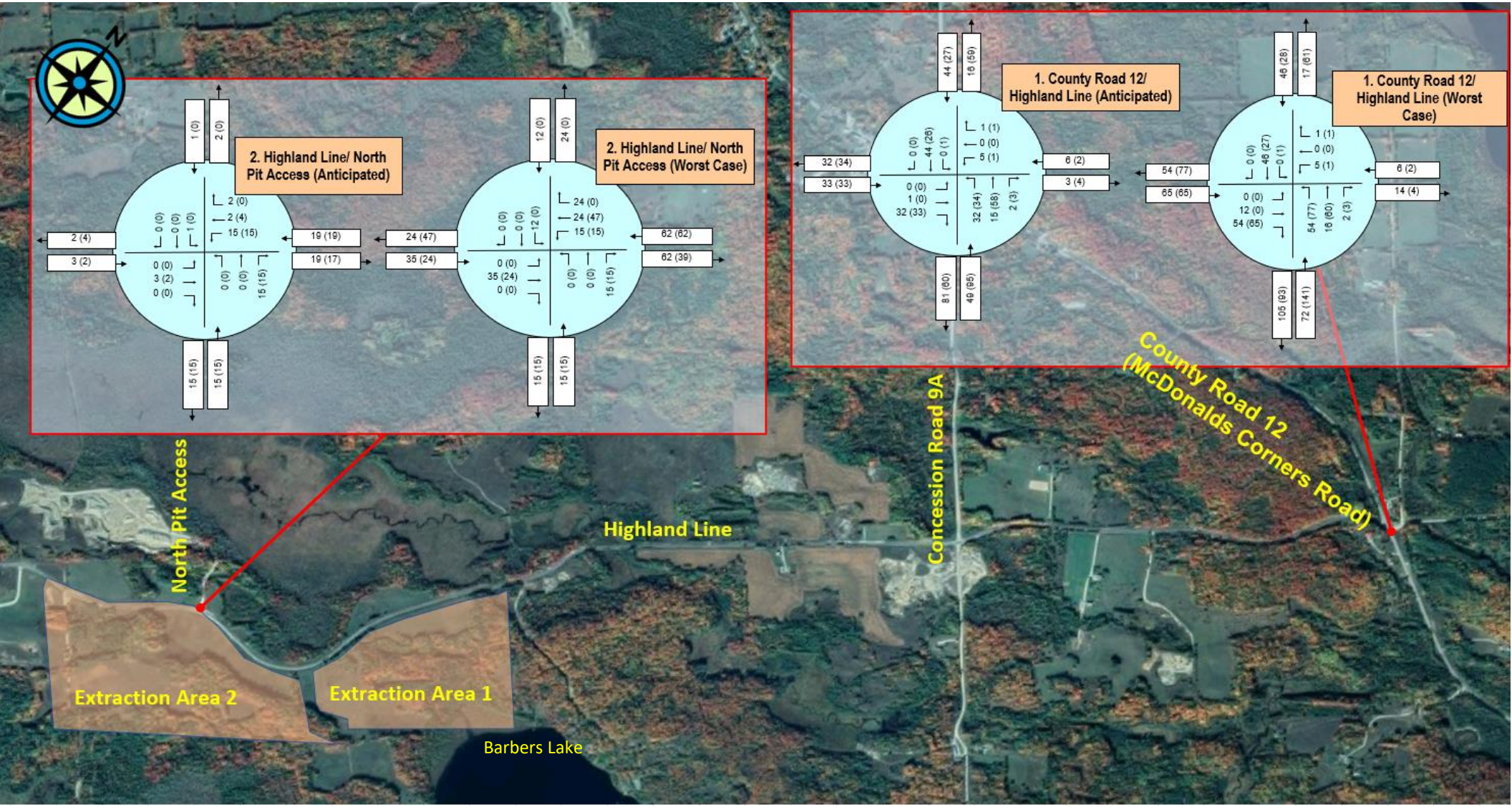
4.2 HAUL ROUTES

The primary haul route for the proposed mineral extraction sites would involve travelling eastward along Highland line to County Road 12 located to the east of the site..

Discussions with Thomas Cavanaugh Ltd, indicated that local deliveries coming from the west, would account for a maximum of only 2-loads-per-year. Given such low volume of trips, the traffic impacts of potential local delivery trips were negligible.

4.3 SITE TRAFFIC GENERATION

An Acoustic Assessment Report prepared by Freefield Ltd. was referenced to determine the appropriate traffic that would be generated by the proposed site. The report states that a **maximum** of 15 loads can be shipped out during the busiest hour of operations from each extraction area. Therefore, a total of 30 loads are expected to be shipped from the two areas as an absolute worst-case maximum traffic scenario permitted by the noise study. For the purposes of this document, it was conservatively assumed that the busiest hour of operations would coincide with both the morning and afternoon peak hours of travel demand. It is more likely that the traffic generated by the proposed extraction site during these periods would be significantly lower.



Morning (Afternoon)

Exhibit 4-1: Operational 2024 Forecast Traffic Volumes (Vehicles-per-Hour)

Table 4-1 summarizes the forecast traffic volumes that are anticipated to be generated by both individual extraction areas when in operation.

Table 4-1: Forecast Trip Generation: 2024 Horizon Year (Vehicles-per-Hour)
(Vehicles-per-Hour)

Extraction Area	*Morning Peak Hour*			*Afternoon Peak Hour*		
	In	Out	Total	In	Out	Total
Extraction Area 1	15	15	30	15	15	30
Extraction Area 2	15	15	30	15	15	30
Net New External Auto Trips	**30**	**30**	**60**	**30**	**30**	**60**

4.4 OPERATIONAL (2024) TRAFFIC ANALYSIS

Table 2-1 summarizes the intersection capacity analyses results assuming:

- the (2024) first year of operation traffic information illustrated in Exhibit 4-1; and
- the existing intersection lane configurations.

As indicated within Section 2.7, traffic operational analysis was undertaken utilizing Synchro™ 11 analysis software to simulate the busiest 15-minute-period of the overall morning and afternoon peak hours of travel demand. The Synchro output sheets for forecast 2024 operational traffic analysis are provided within Appendix "D".

Table 4-2 indicates that all the area intersections within the study area were found to continue to operate well below capacity at an excellent level of service (LOS "A" or "B") in all directions during the peak hours of travel demand assuming even the "worst-case" traffic forecast.

Table 4-2: Operational (2024) Intersection Capacity Analysis

	Intersection	Control Type	Critical Approach/ Movement	Weekday Morning Peak Hour (Afternoon Peak Hour)			
				Average Delay per Vehicle (seconds)	Level of Service	95th Percentile Queue (m)	Volume-to-Capacity Ratio (v/c)
1.	County Road 12 and Highland Line	Minor leg-STOP	Eastbound	9.7 (9.5)	A (A)	0.75 (0.75)	0.008 (0.041)
2.	All Access[1] (Worst-Case Scenario)	Minor leg-STOP	Northbound	9.9 (9.3)	A (A)	0.0 (0.75)	0.001 (0.018)
Worst Case Scenario Assuming 2.5% Background Traffic Growth and Summer Peak Adjustment along Highland Line							
3.	County Road 12 and Highland Line	Minor leg-STOP	Eastbound	10.0 (9.7)	B (A)	2.25 (2.25)	0.089 (0.081)
4.	All Access[1] (Worst-Case Scenario)	Minor leg-STOP	Northbound	10.6 (9.4)	B (A)	0.75 (0.75)	0.019 (0.019)

1. The analysis assumed a "worst-case" scenario where all traffic headed to each access would use a single access. The 2nd row represents the forecast operational parameters at each of the two extraction areas assuming a single access point where in reality two accesses were proposed.

5.0 ACCESS LOCATIONS REVIEW

As mentioned in Section 3.1, the initially planned mineral extraction areas are to be accessed via a total of 4 accesses, with 2 accesses in each extraction area[2]. Exhibit 5-1 illustrates the locations of each of the initially planned access locations where a visual sight line assessment was conducted.

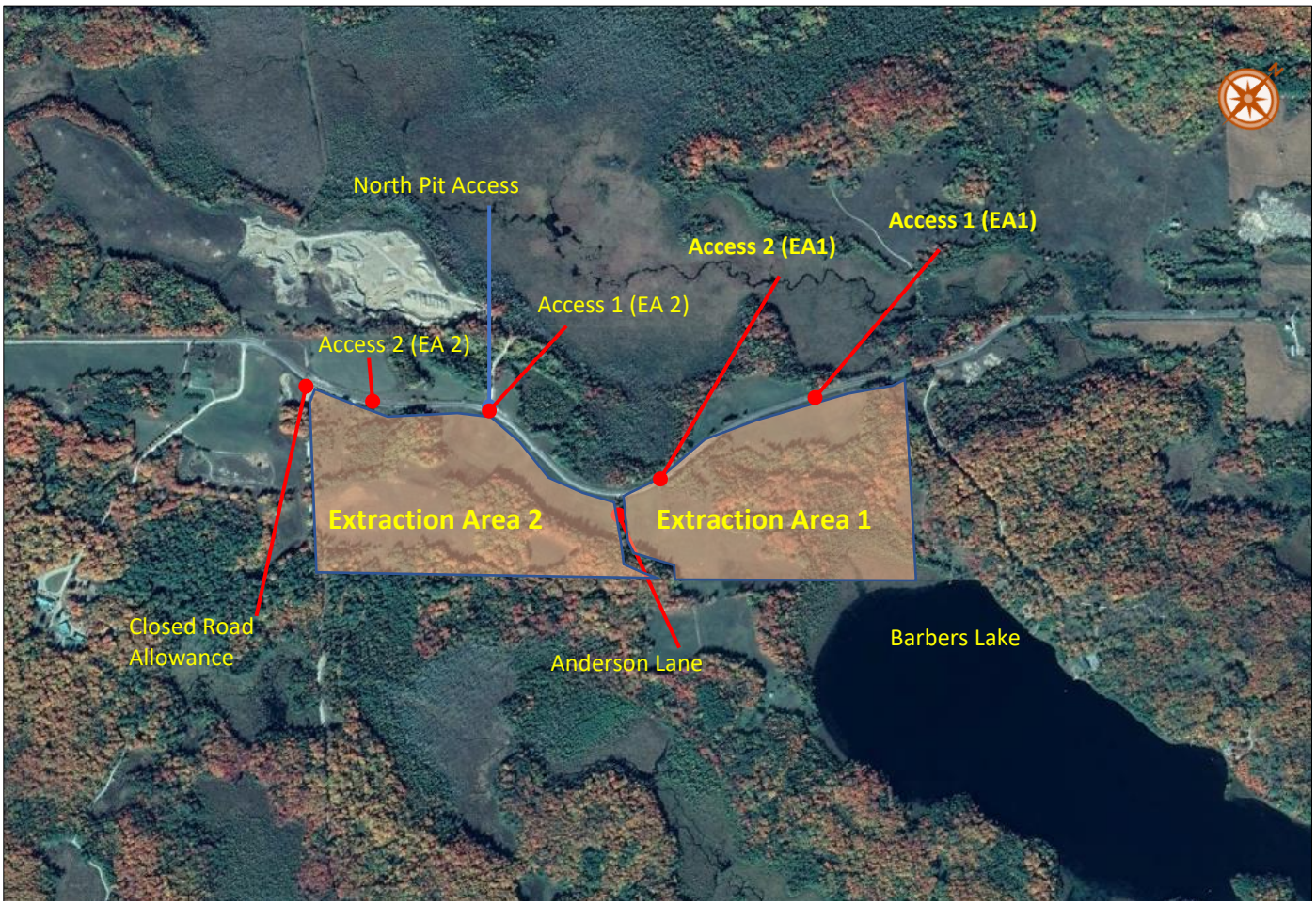


Exhibit 5-1: Highland Quarry – Initially Planned Access Locations

The following sub-sections illustrate the photographs taken on December 1, 2021 illustrating the available sight lines from each of the four planned access locations suggested at the outset of this study. The required sight distance was calculated as being 192 meters assuming a paved surface, a 3% grade, a 60kph operating speed along Highland Line, a truck driver view height of 2.33m at the access and a passenger vehicle approach height along Highland Line of 1.8m.

2 "Extraction Area" is abbreviated "EA" in the following sections of the report

5.1 ACCESS 1 (EXTRACTION AREA 1) - NOT RECOMMENDED

- In the east direction (looking right):

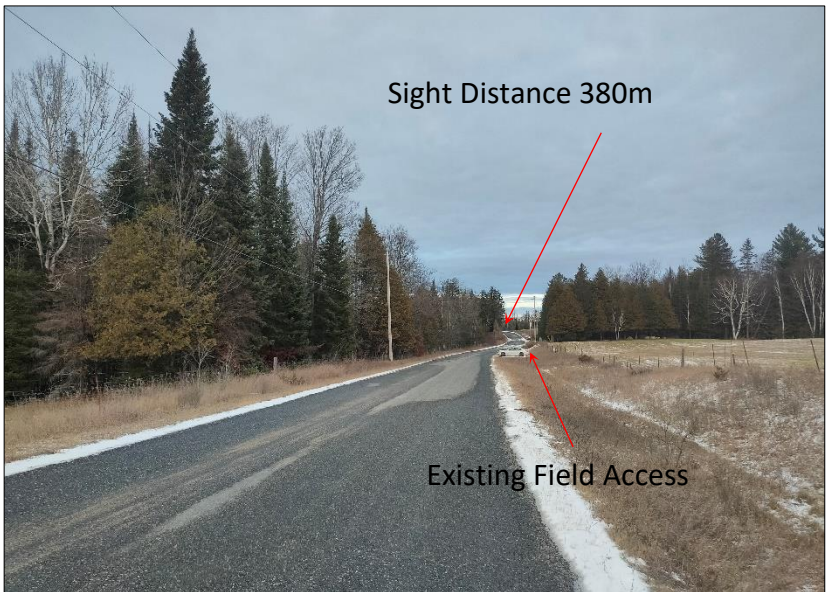


Exhibit 5-2: Access 1 (EA1) Looking East (380m SD)

- In the west direction (looking left):

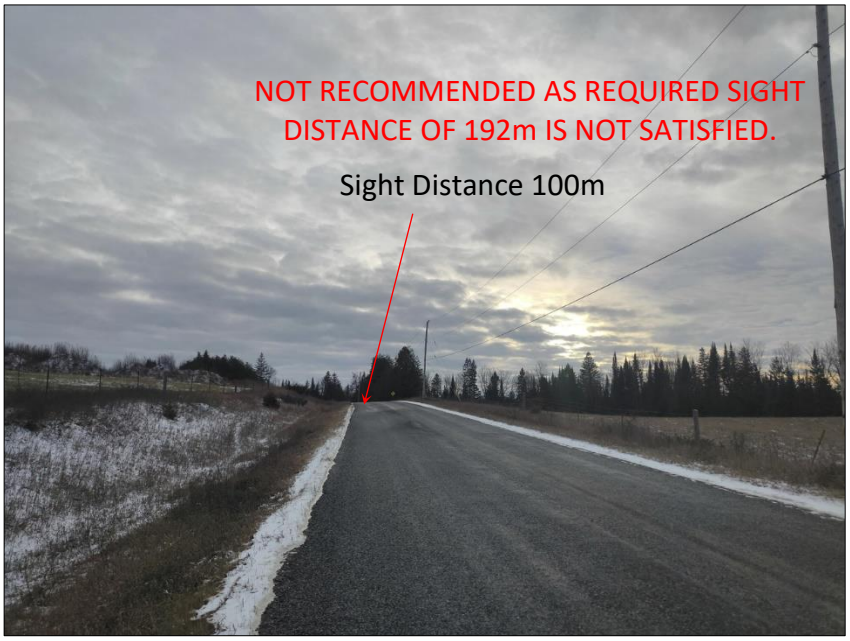


Exhibit 5-3: Access 1 (EA1) Looking West (100m SD)

5.2 ACCESS 2 (EXTRACTION AREA 1) – NOT RECOMMENDED

- In the east direction (looking right):

Exhibit 5-4: Access 2 (EA1) Looking East (130m SD)

- In the west direction (looking left):

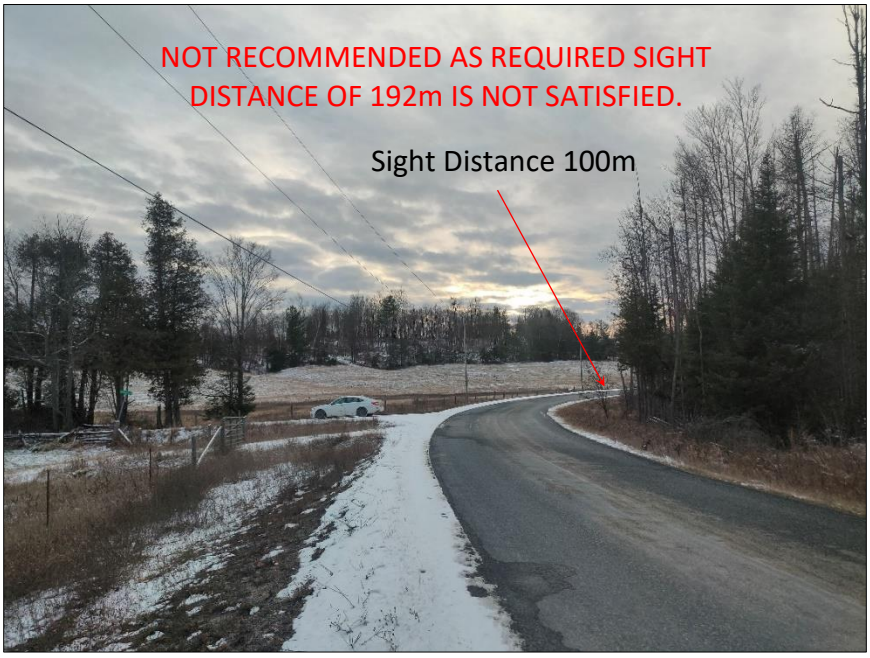


Exhibit 5-5: Access 2 (EA1) Looking West (100m SD)

5.3 ACCESS 1 (EXTRACTION AREA 2)

- In the east direction (looking right):

Exhibit 5-6: Access 1 (EA2) Looking East (75m SD)

- In the west direction (looking left):

Exhibit 5-7: Access 1 (EA2) Looking West (300m SD)

5.4 ACCESS 2 (EXTRACTION AREA 2) – NOT RECOMMENDED

- In the east direction (looking right):

Exhibit 5-8: Access 2 (EA2) Looking East (300 SD)

- In the west direction (looking left):

Exhibit 5-9: Access 2 (EA2) Looking West (110m SD)

5.5 SUMMARY OF ACCESS LOCATIONS

Table 5-1 provides a summary of the four initially planned access locations and the results of the sightline analysis. As noted within Section 5.0 the required sight distance to ensure safe access operations was determined to be 192 meters. Out of the four initially planned accesses, each were found to exhibit sightline deficiencies:

- *Access 1 (Extraction Area 1)* The sight distance deficiency could be addressed by considering an alternate location for the intesection further to the east (about 100 m) to the existing field access. This will ensure suitable sightlines to accommodate heavy vehicle operations. Section 5.7 describes this alternate location.
- *Access 2 (Extraction Area 1)*: The sight distance deficiency could be addressed by considering an alternate location for the intesection further to the east to ensure suitable sightlines to accommodate heavy vehicle operations. Section 5.7 describes this alternate location.
- *Access 1 (Extraction Area 2)*: The sight distance deficiency associated with this access can be significantly improved by the removal and sibsequent re-grading of the mound of earth on the south side of the roadway. This would greatly extend the available sight lines (from 75 metres to approximately 300 metres).
- *Access 2 (Extraction Area 2)*: The sight distance deficiency in the westerly direction would be unsuitable to accommodate heavy vehicle turning movements. No appropriate alternative location was found for this access. It was suggested that this access not be used by heavy vehicle traffic.

Table 5-1: Sight Distance Review at Existing Site Accesses

Extraction Access	Direction	SD Available (m)	SD Required[1] (m)	Satisfied/Deficient	Mitigation
Area 1 Access 1	Looking west	100	192	Deficient	Alternative Site Access Recommended
	Looking east	380		Satisfied	
Area 1 Access 2	Looking west	100		Deficient	Alternative Site Access Recommended
	Looking east	130		Deficient	
Area 2 Access 1	Looking west	300		Satisfied	Regrading of earth mound improves sight lines to resolve deficiency.
	Looking east	75 (300[2])		Deficient (Satisfied [2])	
Area 2 Access 2	Looking west	110		Deficient	Restriction of heavy vehicle movement at this access
	Looking east	300		Satisfied	

1. Required sight distance was calculated assuming a paved surface, 3% grade, a 60kph operating speed along Highland Line a truck driver view height of 2.33m at the access and a passenger vehicle approach height on Highland Line of 1.8m.
2. Sight Distance increases to 300m when mound of earth is removed.

5.6 ALTERNATIVE ACCESS 1 (EXTRACTION AREA 1) – RECOMMENDED

Exhibit 5-12 and Exhibit 5-13 illustrate the sightline distances assuming an alternative location for Access 1 to serve Extraction Area 1 which would be located approximately 100 meters east of the initially planned access, at the existing field access location. Below is the sightline summary for the alternative access:

- In the east direction (looking right):

Exhibit 5-10: Alternative Access 1 (EA1) Looking East (265m SD)

- In the west direction (looking left):

Exhibit 5-11: Alternative Access 1 (EA1) Looking West (210m SD)

5.7 ALTERNATIVE ACCESS 2 (EXTRACTION AREA 1) – RECOMMENDED

Exhibit 5-12 and Exhibit 5-13 illustrate the sightline distances assuming an alternative location for Access 2 to serve Extraction Area 1 which would be located approximately 250 meters east of the initially planned access. Table 5-2 summarizes the resulting sight line distances associated with this proposed access, which satisfies the 192m requirement in both directions.

- In the east direction (looking right):

Exhibit 5-12: Alternative Access 2 (EA1) Location Looking East (570m)

- In the west direction (looking left):

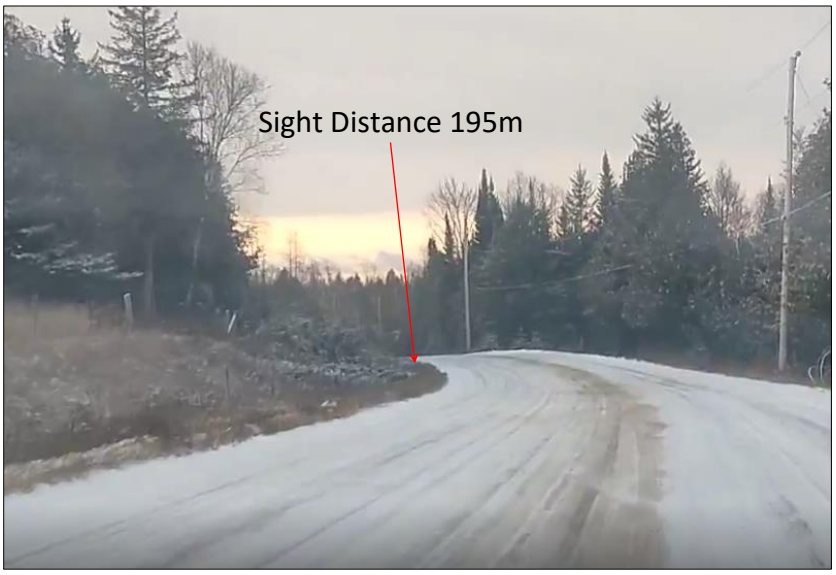


Exhibit 5-13: Alternative Access 2 (EA1) Location Looking West (195m)

Table 5-2: Sight Distance Review at Proposed Alternate Site Accesses

Access	Direction	SD Available (m)	SD Required[1] (m)	Satisfied/Deficient
Alternative EA1 Access 1	Looking west	210	192	Satisfied
	Looking east	265		Satisfied
Alternative EA1 Access 2	Looking East	570		Satisfied
	Looking West	195		Satisfied

1. The Required sight distance was calculated assuming a paved surface, 3% grade, a 60kph operating speed along Highland Line a truck driver view height of 2.33m at the access and a passenger vehicle approach height on Highland Line of 1.8m.

6.0 FINDINGS AND RECOMMENDATIONS

6.1 RECOMMENDATIONS: PROPOSED ACCESS LOCATIONS

Exhibit 6-1 illustrates the preferred positions of each accesses intended to serve the proposed Highland extraction sites.

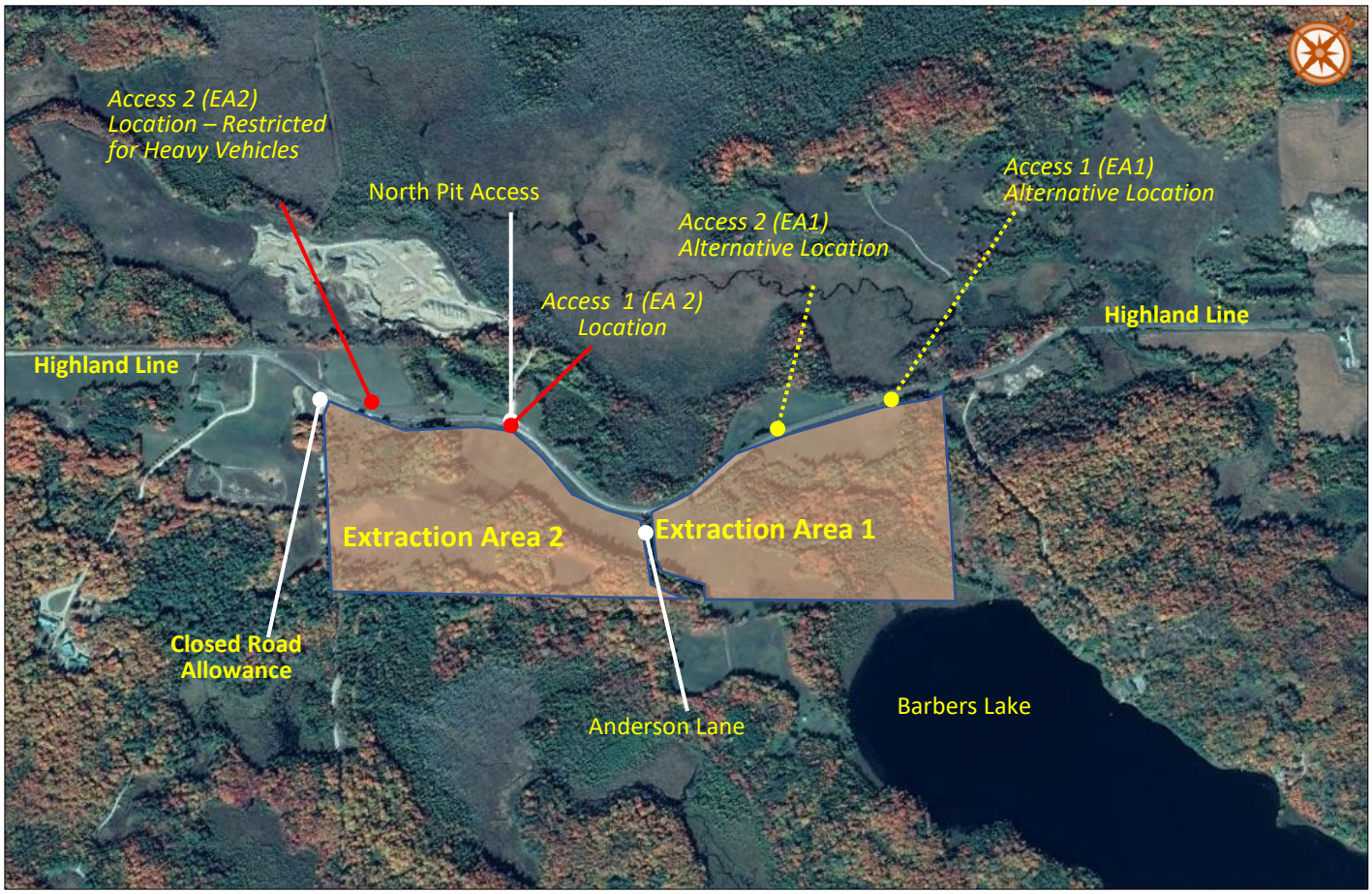


Exhibit 6-1: Proposed Access Locations

Note that…:

- An alternate Access1 (EA1) is to be considered that would be located approximately 100 meters to the east along Highland Road (at the existing field access) which offers better visibility;
- An alternate Access 2 (EA1) is to be considered that would be located approximately 250 meters to the east along Highland Road which offers better visibility;
- Access 1 (EA2) would remain in the same location as initially planned provided that the earth mound is removed and the access approach us regraded. This access would become the only heavy vehicle access to/from Extraction Area 2 due to deficient sight distance characteristics associated with Access 2.

- Access 2 (EA2) has no feasible relocation positions and would be unsuitable for heavy vehicle traffic.

6.2 SUMMARY OF FINDINGS

The Traffic Impact Study analysis resulted in the following findings:

- The expected traffic generated by the proposed mineral extraction site is as follows:
  - 30 two-way heavy vehicle trips during the morning peak hour; and
  - 30 two-way heavy vehicle trips during the afternoon peak hour;
  - The vehicle trips will be evenly split between the two extraction areas;
  - All trips will be destined to/from the east towards County Road 12.
- Based on the intersection capacity analysis, both study area intersections currently operate within acceptable traffic operational (levels-of-service, delay and volume-to-capacity) performance measures;
- Both intersections are forecast to continue to operate acceptably during the peak hours of travel demand during the 2024 operational forecast horizon year;
- A review of the extraction area accesses found that:
  - Access 1 (Extraction Area 1) has deficient sight lines for operation;
  - Access 2 (Extraction Area 1) has deficient sight lines for operation;
  - Access 1 (Extraction Area 2) has deficient sight lines for operation, however removal of the earth mound on the south side of the roadway, will address this deficiency;
  - Access 2 (Extraction Area 2) has deficient sight lines for operation and should not be used by heavy vehicle traffic.

6.3 SUMMARY OF RECOMMENDATIONS

It is recommended that Thomas Cavanagh Construction Ltd. consider:

- Relocating Access 1 (Extraction Area 1) approximately 100m to the east along Highland Line to provide sufficient sight lines at the entrance
- Relocating Access 2 (Extraction Area 1) approximately 250m to the east along Highland Line to provide sufficient sight lines at the entrance;
- Removing the earth mound near Access 1 (Extraction Area 2) to ensure sufficient sight distance at the entrance to the access is achieved; and
- Restrict heavy truck movement from using Area 2 (Extraction Area 2) as it has deficient sight distance characteristic and there does not appear to be any alternative viable location that can be considered for access relocation.

It is recommended that the Township of Lanark Highlands and Lanark County:

- Continue to monitor traffic conditions; and
- Permit the site application to proceed from a traffic analysis perspective.

APPENDIX A – BACKGROUND TRAFFIC COUNTS

Castleglenn Consultants

Engineers, Project Managers & Planners

County Road 12 / Highland Line

AM Peak

Movement		EB-LT		EB-TH		EB-RT		WB-LT		WB-TH		WB-RT		NB-LT		NB-TH		NB-RT		SB-LT		SB-TH		SB-RT	
Vehicles		Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy
7:00 AM	7:15 AM	0	0	0	0	0	1	2	1	0	1	0	0	0	0	1	1	0	0	0	1	11	0	0	0
7:15 AM	7:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	14	1	0	0
7:30 AM	7:45 AM	0	0	1	0	0	0	3	0	0	0	1	0	0	1	2	1	0	0	0	0	9	1	0	0
7:45 AM	8:00 AM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	8	0	0	0
8:00 AM	8:15 AM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5	2	1	1	0	0	10	0	0	0
8:15 AM	8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0		4	0	0	0
8:30 AM	8:45 AM	0	0	0	0	2	1	0	0	0	0	0	0	0	0	7	2	0	0	0	0	7	1	0	0
8:45 AM	9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	1	11	0	0	0
Peak		0	0	1	0	2	0	4	1	0	0	1	0	1	1	12	3	1	1	0	0	41	2	0	0

PM Peak

Movement		EB-LT		EB-TH		EB-RT		WB-LT		WB-TH		WB-RT		NB-LT		NB-TH		NB-RT		SB-LT		SB-TH		SB-RT	
Vehicles		Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy
3:30 PM	3:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	1	0	9	0	2	0	0	0	7	1	0	0
3:45 PM	4:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	2	1	7	0	3	0	0	0	2	1	0	0
4:00 PM	4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	9	1	0	0	1	0	8	0	0	0
4:15 PM	4:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	1	11	2	0	0	0	0	8	1	0	0
4:30 PM	4:45 PM	0	0	0	0	0	0	1	0	0	0	0	0	2	0	15	0	1	0	0	0	3	0	0	0
4:45 PM	5:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	12	1	1	0	0	0	4	2	0	0
5:00 PM	5:15 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	15	0	1	0	1	0	6	1	0	0
5:15 PM	5:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	1	0	8	1	1	0	1	0	3	1	0	0
Peak		0	0	0	0	3	0	1	0	0	0	1	0	3	1	53	3	3	0	1	0	21	4	0	0

North Pit Access

AM Peak

Movement		EB-LT		EB-TH		EB-RT		WB-LT		WB-TH		WB-RT		NB-LT		NB-TH		NB-RT		SB-LT		SB-TH		SB-RT	
Vehicles		Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy
7:00 AM	7:15 AM	0	0	1	0					1	0	0	0							0	0			0	0
7:15 AM	7:30 AM	0	0	0	0					0	1	0	0							0	0			0	0
7:30 AM	7:45 AM	0	0	0	1					0	1	0	0							0	0			0	0
7:45 AM	8:00 AM	0	0	0	0					0	1	0	0							0	0			0	0
8:00 AM	8:15 AM	0	0	0	0					0	0	0	0							0	0			0	0
8:15 AM	8:30 AM	0	0	0	0					0	1	0	2							0	0			0	0
8:30 AM	8:45 AM	0	0	2	1					0	0	0	0							0	1			0	0
8:45 AM	9:00 AM	0	0	0	0					0	0	0	0							0	0			0	0
Peak		0	0	2	1	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	1	0	0	0	0

PM Peak

Movement		EB-LT		EB-TH		EB-RT		WB-LT		WB-TH		WB-RT		NB-LT		NB-TH		NB-RT		SB-LT		SB-TH		SB-RT	
Vehicles		Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy	Cars	Heavy
3:30 PM	3:45 PM	0	0	0	0					0	0	0	0							0	0			0	0
3:45 PM	4:00 PM	0	0	0	0					1	0	0	0							0	0			0	0
4:00 PM	4:15 PM	0	0	0	0					0	0	0	0							0	0			0	0
4:15 PM	4:30 PM	0	0	1	0					0	0	0	0							0	0			0	0
4:30 PM	4:45 PM	0	0	0	1					1	1	0	0							0	0			0	0
4:45 PM	5:00 PM	0	0	0	0					0	0	0	0							0	0			0	0
5:00 PM	5:15 PM	0	0	0	0					0	0	0	0							0	0			0	0
5:15 PM	5:30 PM	0	0	0	0					0	0	0	0							0	0			0	0
Peak		0	0	1	1	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX B – LANARK COUNTY TRAFFIC INFORMATION

Castleglenn Consultants
Engineers, Project Managers & Planners

LANARK COUNTY
Working together to achieve greatness

Lanark County
99 Christie Lake Road, Perth Ontario, K7H 3C6
Tel: 613 267 1353 Fax: 613 267 2793

Traffic Summary

Station # - FP771PAC, Cr 12 012088 Watsons Crnrs. Rd. (Co. Rd. #8) to McDonalds Corners Hamlet Sign
Date - 0:00 Tuesday, June 02, 2015 to 0:00 Friday, June 05, 2015 (3 days of data)

Volume

	Total	Weekday	Weekend	ADT	AWDT	AWET
Combined	3250	3250	0	1083	1083	0
East	1628	1628	0	543	543	0
West	1622	1622	0	541	541	0
Days	3	3	-	3	3	-

Speed

	All Days	Weekdays	Weekend	
Mean speed	80.5	80.5	-	km/h
Median speed	80.3	80.3	-	km/h
85% speed	92.9	92.9	-	km/h

PSL = 60 km/h

Class

Class (*Scheme F3*)	All Days	%	Weekdays	Weekend
1 - CYCLE	35	1.1%	35	0
2 - PC	2120	65.2%	2120	0
3 - 2A-4T	859	26.4%	859	0
4 - BUS	68	2.1%	68	0
5 - 2A-6T	104	3.2%	104	0
6 - 3A-SU	33	1.0%	33	0
7 - 4A-SU	2	0.1%	2	0
8 - <5A DBL	1	0.0%	1	0
9 - 5A DBL	17	0.5%	17	0
10 - >6A DBL	7	0.2%	7	0
11 - <6A MULTI	0	0.0%	0	0
12 - 6A MULTI	0	0.0%	0	0
13 - >6A MULTI	4	0.1%	4	0

Average Daily Volume

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
East	0	522	548	558	0	0	0
West	0	494	555	573	0	0	0
Combined	0	1016	1103	1131	0	0	0
AM Pk East	-	54	53	57	-	-	-
PM Pk East	-	38	44	47	-	-	-
AM Pk West	-	28	32	27	-	-	-
PM Pk West	-	55	71	70	-	-	-
Days	-	1	1	1	-	-	-

Report created 10:54 Wednesday, February 17, 2016 using MTE version 4.0.6.0

Castleglenn Consultants
Engineers, Project Managers & Planners

Lanark County
99 Christie Lake Road, Perth Ontario K7H 3C6
Tel: 613 267 1353 Fax: 613 267 2793

LANARK COUNTY
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Traffic Summary

Station # - FJ36QF8X, 012088 - Watsons Crnrs. Rd. (Co. Rd. #8) to McDonalds Corners Hamlet Sign
Date - 0:00 Tuesday, May 30, 2017 to 0:00 Friday, June 02, 2017 (4 days of data)

Volume

	Total	Weekday	Weekend	ADT	AWDT	AWET
Combined	3596	3596	0	599	899	0
East	1845	1845	0	308	461	0
West	1751	1751	0	292	438	0
Days	6	4	2	6	4	2

Speed

	All Days	Weekdays	Weekend	
Mean speed	76.7	76.7	-	km/h
Median speed	76.7	76.7	-	km/h
85% speed	87.8	87.8	-	km/h

PSL = 60 km/h

Class

Class (*Scheme F3*)	All Days	%	Weekdays	Weekend
1 - CYCLE	24	0.7%	24	0
2 - PC	2407	66.9%	2407	0
3 - 2A-4T	996	27.7%	996	0
4 - BUS	45	1.3%	45	0
5 - 2A-6T	46	1.3%	46	0
6 - 3A-SU	64	1.8%	64	0
7 - 4A-SU	2	0.1%	2	0
8 - <5A DBL	0	0.0%	0	0
9 - 5A DBL	4	0.1%	4	0
10 - >6A DBL	5	0.1%	5	0
11 - <6A MULTI	0	0.0%	0	0
12 - 6A MULTI	0	0.0%	0	0
13 - >6A MULTI	3	0.1%	3	0

Average Daily Volume

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
East	0	514	521	572	238	0	0
West	0	509	538	600	104	0	0
Combined	0	1023	1059	1172	342	0	0
AM Pk East	-	54	54	57	56	-	-
PM Pk East	-	37	33	43	-	-	-
AM Pk West	-	29	37	41	29	-	-
PM Pk West	-	60	60	90	-	-	-
Days	-	1	1	1	1	1	1

Report created 14:01 Friday, January 26, 2018 using MTE version 4.0.6.0

Castleglenn Consultants
Engineers, Project Managers & Planners

Lanark County
99 Christie Lake Road, Perth Ontario K7H 3C6
Tel: 613 267 1353 Fax: 613 267 2793

LANARK COUNTY
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Traffic Summary

Station # - FJ42GN15, Cr 12 012088 Watsons Crnrs. Rd. (Co. Rd. #8) to McDonalds Corners Hamlet Sign
Date - Tuesday, June 18, 2019 to Friday, June 21, 2019 (3 days of data)

Volume

	Total	Weekday	Weekend	ADT	AWDT	AWET
Combined	3597	3597	0	1199	1199	0
East	1782	1782	0	594	594	0
West	1815	1815	0	605	605	0
Days	3	3	-	3	3	-

Speed

	All Days	Weekdays	Weekend	
Mean speed	75.3	75.3	-	km/h
Median speed	74.2	74.2	-	km/h
85% speed	92.2	92.2	-	km/h

PSL = 60 km/h

Class

Class (*Scheme F3*)	All Days	%	Weekdays	Weekend
1 - CYCLE	55	1.5%	55	0
2 - PC	2154	59.9%	2154	0
3 - 2A-4T	1071	29.8%	1071	0
4 - BUS	39	1.1%	39	0
5 - 2A-6T	216	6.0%	216	0
6 - 3A-SU	35	1.0%	35	0
7 - 4A-SU	4	0.1%	4	0
8 - <5A DBL	2	0.1%	2	0
9 - 5A DBL	2	0.1%	2	0
10 - >6A DBL	11	0.3%	11	0
11 - <6A MULTI	0	0.0%	0	0
12 - 6A MULTI	0	0.0%	0	0
13 - >6A MULTI	8	0.2%	8	0

Average Daily Volume

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
East	0	563	591	628	0	0	0
West	0	560	594	661	0	0	0
Combined	0	1123	1185	1289	0	0	0
AM Pk East	-	49	46	63	-	-	-
PM Pk East	-	40	42	50	-	-	-
AM Pk West	-	42	44	37	-	-	-
PM Pk West	-	66	70	92	-	-	-
Days	-	1	1	1	-	-	-

Report created 15:10 Wednesday, October 09, 2019 using MTE version 4.0.6.0

Castleglenn Consultants
Engineers, Project Managers & Planners

Lanark County
99 Christie Lake Road, Perth Ontario K7H 3C6
Tel: 613 267 1353 Fax: 613 267 2793

LANARK COUNTY
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Traffic Summary

Station # - HG46Z0J5, Cr12 012088 Watsons Crnrs. Rd. (Co. Rd. #8) to McDonalds Corners Hamlet Sign
Date - July 7, 2020 to July 10, 2020 (3 days of data)

Volume

	Total	Weekday	Weekend	ADT	AWDT	AWET
Combined	3208	3208	0	1069	1069	0
East	1588	1588	0	529	529	0
West	1620	1620	0	540	540	0
Days	3	3	-	3	3	-

Speed

	All Days	Weekdays	Weekend	
Mean speed	77.2	77.2	-	km/h
Median speed	77.4	77.4	-	km/h
85% speed	87.8	87.8	-	km/h

PSL = 60 km/h

Class

Class (*Scheme F3*)	All Days	%	Weekdays	Weekend
1 - CYCLE	60	1.9%	60	0
2 - PC	1985	61.9%	1985	0
3 - 2A-4T	912	28.4%	912	0
4 - BUS	26	0.8%	26	0
5 - 2A-6T	73	2.3%	73	0
6 - 3A-SU	86	2.7%	86	0
7 - 4A-SU	2	0.1%	2	0
8 - <5A DBL	0	0.0%	0	0
9 - 5A DBL	26	0.8%	26	0
10 - >6A DBL	21	0.7%	21	0
11 - <6A MULTI	0	0.0%	0	0
12 - 6A MULTI	0	0.0%	0	0
13 - >6A MULTI	17	0.5%	17	0

Average Daily Volume

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
East	0	520	488	580	0	0	0
West	0	505	508	607	0	0	0
Combined	0	1025	996	1187	0	0	0
AM Pk East	-	42	39	43	-	-	-
PM Pk East	-	39	43	70	-	-	-
AM Pk West	-	39	40	42	-	-	-
PM Pk West	-	48	49	93	-	-	-
Days	-	1	1	1	-	-	-

Report created 7:15 October 15, 2020 using MTE version 4.0.6.0

Castleglenn Consultants
Engineers, Project Managers & Planners

Traffic Summary

Station # - FJ199DQZ, Cr 12 012088 Watsons Crnrs. Rd. (Co. Rd. #8) to McDonalds Corners Hamlet Sign
Date June 8, 2021 to June 11, 2021 (3 days of data)

Volume

	Total	Weekday	Weekend	ADT	AWDT	AWET
Combined	3514	3514	0	1171	1171	0
East	1744	1744	0	581	581	0
West	1770	1770	0	590	590	0
Days	3	3	-	3	3	-

Speed

	All Days	Weekdays	Weekend	
Mean speed	81.5	81.5	-	km/h
Median speed	81.0	81.0	-	km/h
85% speed	94.7	94.7	-	km/h

PSL = 60 km/h

Class

Class (*Scheme F3*)	All Days	%	Weekdays	Weekend
1 - CYCLE	70	2.0%	70	0
2 - PC	1964	55.9%	1964	0
3 - 2A-4T	1198	34.1%	1198	0
4 - BUS	32	0.9%	32	0
5 - 2A-6T	156	4.4%	156	0
6 - 3A-SU	65	1.8%	65	0
7 - 4A-SU	1	0.0%	1	0
8 - <5A DBL	3	0.1%	3	0
9 - 5A DBL	10	0.3%	10	0
10 - >6A DBL	13	0.4%	13	0
11 - <6A MULTI	0	0.0%	0	0
12 - 6A MULTI	0	0.0%	0	0
13 - >6A MULTI	2	0.1%	2	0

Average Daily Volume

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
East	0	565	545	634	0	0	0
West	0	524	575	671	0	0	0
Combined	0	1089	1120	1305	0	0	0
AM Pk East	-	50	39	53	-	-	-
PM Pk East	-	45	41	51	-	-	-
AM Pk West	-	28	36	55	-	-	-
PM Pk West	-	71	63	78	-	-	-
Days	-	1	1	1	-	-	-

Report created 11:11 January 12, 2022 using MTE version 4.0.6.0

APPENDIX C – SYNCHRO TRAFFIC ANALYSIS EXISTING BACKGROUND 2021

HCM 6th TWSC
6: Highland Line & North Quarry Access

Highland Pit - Existing AM
04/12/2022

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3	2	2	1	0
Future Vol, veh/h	0	3	2	2	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	33	100	100	100	0
Mvmt Flow	0	3	2	2	1	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	4	0	-	0	6	3
Stage 1	-	-	-	-	3	-
Stage 2	-	-	-	-	3	-
Critical Hdwy	4.1	-	-	-	7.4	6.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	2.2	-	-	-	4.4	3.3
Pot Cap-1 Maneuver	1631	-	-	-	811	1087
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	815	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1631	-	-	-	811	1087
Mov Cap-2 Maneuver	-	-	-	-	811	-
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	815	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	9.4
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1631	-	-	-	811
HCM Lane V/C Ratio	-	-	-	-	0.001
HCM Control Delay (s)	0	-	-	-	9.4
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	44	0	2	15	2	0	1	2	5	0	1
Future Vol, veh/h	0	44	0	2	15	2	0	1	2	5	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	5	0	50	20	50	0	0	0	20	0	0
Mvmt Flow	0	46	0	2	16	2	0	1	2	5	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	18	0	0	46	0	0	68	68	46	69	67	17
Stage 1	-	-	-	-	-	-	46	46	-	21	21	-
Stage 2	-	-	-	-	-	-	22	22	-	48	46	-
Critical Hdwy	4.1	-	-	4.6	-	-	7.1	6.5	6.2	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.3	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.3	5.5	-
Follow-up Hdwy	2.2	-	-	2.65	-	-	3.5	4	3.3	3.68	4	3.3
Pot Cap-1 Maneuver	1612	-	-	1303	-	-	930	826	1029	881	828	1068
Stage 1	-	-	-	-	-	-	973	861	-	953	882	-
Stage 2	-	-	-	-	-	-	1002	881	-	922	861	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1612	-	-	1303	-	-	927	824	1029	877	826	1068
Mov Cap-2 Maneuver	-	-	-	-	-	-	927	824	-	877	826	-
Stage 1	-	-	-	-	-	-	973	861	-	953	880	-
Stage 2	-	-	-	-	-	-	999	879	-	919	861	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	0.8	8.8	9
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	950	1612	-	-	1303	-	-	904
HCM Lane V/C Ratio	0.003	-	-	-	0.002	-	-	0.007
HCM Control Delay (s)	8.8	0	-	-	7.8	0	-	9
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	2	4	0	0	0
Future Vol, veh/h	0	2	4	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	50	25	0	0	0
Mvmt Flow	0	2	4	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	4	0	-	0	6	4
Stage 1	-	-	-	-	4	-
Stage 2	-	-	-	-	2	-
Critical Hdwy	4.1	-	-	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1631	-	-	-	1021	1085
Stage 1	-	-	-	-	1024	-
Stage 2	-	-	-	-	1026	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	1631	-	-	-	1021	1085
Mov Cap-2 Maneuver	-	-	-	-	1021	-
Stage 1	-	-	-	-	1024	-
Stage 2	-	-	-	-	1026	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1631	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	26	0	4	58	3	0	0	3	1	0	1
Future Vol, veh/h	1	26	0	4	58	3	0	0	3	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	16	0	25	5	0	0	0	0	0	0	0
Mvmt Flow	1	27	0	4	61	3	0	0	3	1	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	64	0	0	27	0	0	100	101	27	102	100	63
Stage 1	-	-	-	-	-	-	29	29	-	71	71	-
Stage 2	-	-	-	-	-	-	71	72	-	31	29	-
Critical Hdwy	4.1	-	-	4.35	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.425	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1551	-	-	1450	-	-	886	793	1054	884	794	1007
Stage 1	-	-	-	-	-	-	993	875	-	944	840	-
Stage 2	-	-	-	-	-	-	944	839	-	991	875	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1551	-	-	1450	-	-	882	790	1054	879	791	1007
Mov Cap-2 Maneuver	-	-	-	-	-	-	882	790	-	879	791	-
Stage 1	-	-	-	-	-	-	992	874	-	943	837	-
Stage 2	-	-	-	-	-	-	940	836	-	987	874	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.3	0.5	8.4	8.8
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	1054	1551	-	-	1450	-	-	939
HCM Lane V/C Ratio	0.003	0.001	-	-	0.003	-	-	0.002
HCM Control Delay (s)	8.4	7.3	0	-	7.5	0	-	8.8
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

APPENDIX D - SYNCHRO TRAFFIC ANALYSIS
FORECAST OPERATIONS 2024

Intersection	
Int Delay, s/veh	7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	3	0	15	2	2	0	0	15	1	0	0
Future Vol, veh/h	0	3	0	15	2	2	0	0	15	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	33	0	100	100	100	0	0	100	100	0	0
Mvmt Flow	0	3	0	16	2	2	0	0	16	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	4	0	0	3	0	0	38	39	3	46	38	3
Stage 1	-	-	-	-	-	-	3	3	-	35	35	-
Stage 2	-	-	-	-	-	-	35	36	-	11	3	-
Critical Hdwy	4.1	-	-	5.1	-	-	7.1	6.5	7.2	8.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	7.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	7.1	5.5	-
Follow-up Hdwy	2.2	-	-	3.1	-	-	3.5	4	4.2	4.4	4	3.3
Pot Cap-1 Maneuver	1631	-	-	1158	-	-	972	857	854	759	858	1087
Stage 1	-	-	-	-	-	-	1025	897	-	780	870	-
Stage 2	-	-	-	-	-	-	986	869	-	806	897	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1631	-	-	1158	-	-	961	845	854	737	846	1087
Mov Cap-2 Maneuver	-	-	-	-	-	-	961	845	-	737	846	-
Stage 1	-	-	-	-	-	-	1025	897	-	780	858	-
Stage 2	-	-	-	-	-	-	972	857	-	791	897	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	6.4	9.3	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	854	1631	-	-	1158	-	-	737
HCM Lane V/C Ratio	0.018	-	-	-	0.014	-	-	0.001
HCM Control Delay (s)	9.3	0	-	-	8.2	0	-	9.9
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	44	0	32	15	2	0	1	32	5	0	1
Future Vol, veh/h	0	44	0	32	15	2	0	1	32	5	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	5	0	97	20	50	0	0	94	20	0	0
Mvmt Flow	0	46	0	34	16	2	0	1	34	5	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	18	0	0	46	0	0	132	132	46	149	131	17
Stage 1	-	-	-	-	-	-	46	46	-	85	85	-
Stage 2	-	-	-	-	-	-	86	86	-	64	46	-
Critical Hdwy	4.1	-	-	5.07	-	-	7.1	6.5	7.14	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.3	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.3	5.5	-
Follow-up Hdwy	2.2	-	-	3.073	-	-	3.5	4	4.146	3.68	4	3.3
Pot Cap-1 Maneuver	1612	-	-	1120	-	-	845	762	814	780	763	1068
Stage 1	-	-	-	-	-	-	973	861	-	880	828	-
Stage 2	-	-	-	-	-	-	927	827	-	904	861	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1612	-	-	1120	-	-	824	738	814	729	739	1068
Mov Cap-2 Maneuver	-	-	-	-	-	-	824	738	-	729	739	-
Stage 1	-	-	-	-	-	-	973	861	-	880	802	-
Stage 2	-	-	-	-	-	-	897	801	-	866	861	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	5.4	9.6	9.7
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	811	1612	-	-	1120	-	-	770
HCM Lane V/C Ratio	0.043	-	-	-	0.03	-	-	0.008
HCM Control Delay (s)	9.6	0	-	-	8.3	0	-	9.7
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

Intersection	
Int Delay, s/veh	7.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Vol, veh/h	0	2	0	15	4	0	0	0	15	0	0	0
Future Vol, veh/h	0	2	0	15	4	0	0	0	15	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	50	0	100	25	0	0	0	100	0	0	0
Mvmt Flow	0	2	0	16	4	0	0	0	16	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	4	0	0	2	0	0	38	38	2	46	38	4
Stage 1	-	-	-	-	-	-	2	2	-	36	36	-
Stage 2	-	-	-	-	-	-	36	36	-	10	2	-
Critical Hdwy	4.1	-	-	5.1	-	-	7.1	6.5	7.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	3.1	-	-	3.5	4	4.2	3.5	4	3.3
Pot Cap-1 Maneuver	1631	-	-	1159	-	-	972	858	855	961	858	1085
Stage 1	-	-	-	-	-	-	1026	898	-	985	869	-
Stage 2	-	-	-	-	-	-	985	869	-	1016	898	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1631	-	-	1159	-	-	961	846	855	933	846	1085
Mov Cap-2 Maneuver	-	-	-	-	-	-	961	846	-	933	846	-
Stage 1	-	-	-	-	-	-	1026	898	-	985	857	-
Stage 2	-	-	-	-	-	-	971	857	-	997	898	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	6.4	9.3	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	855	1631	-	-	1159	-	-	-
HCM Lane V/C Ratio	0.018	-	-	-	0.014	-	-	-
HCM Control Delay (s)	9.3	0	-	-	8.1	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	26	0	34	58	3	0	0	33	1	0	1
Future Vol, veh/h	1	26	0	34	58	3	0	0	33	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	16	0	91	5	0	0	0	91	0	0	0
Mvmt Flow	1	27	0	36	61	3	0	0	35	1	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	64	0	0	27	0	0	164	165	27	182	164	63
Stage 1	-	-	-	-	-	-	29	29	-	135	135	-
Stage 2	-	-	-	-	-	-	135	136	-	47	29	-
Critical Hdwy	4.1	-	-	5.01	-	-	7.1	6.5	7.11	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	3.019	-	-	3.5	4	4.119	3.5	4	3.3
Pot Cap-1 Maneuver	1551	-	-	1162	-	-	805	731	841	784	732	1007
Stage 1	-	-	-	-	-	-	993	875	-	873	789	-
Stage 2	-	-	-	-	-	-	873	788	-	972	875	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1551	-	-	1162	-	-	784	707	841	733	708	1007
Mov Cap-2 Maneuver	-	-	-	-	-	-	784	707	-	733	708	-
Stage 1	-	-	-	-	-	-	992	874	-	872	764	-
Stage 2	-	-	-	-	-	-	844	763	-	931	874	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.3	2.9	9.5	9.3
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	841	1551	-	-	1162	-	-	848
HCM Lane V/C Ratio	0.041	0.001	-	-	0.031	-	-	0.002
HCM Control Delay (s)	9.5	7.3	0	-	8.2	0	-	9.3
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0.1	-	-	0

HCM 6th TWSC
6: Highland Line & North Quarry Access

Highland Pit - Operational 2024 AM (Worst Case)
04/22/2022

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	35	0	15	24	24	0	0	15	12	0	0
Future Vol, veh/h	0	35	0	15	24	24	0	0	15	12	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	15	0	100	15	100	0	0	100	100	0	0
Mvmt Flow	0	37	0	16	25	25	0	0	16	13	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	50	0	0	37	0	0	107	119	37	115	107	38
Stage 1	-	-	-	-	-	-	37	37	-	70	70	-
Stage 2	-	-	-	-	-	-	70	82	-	45	37	-
Critical Hdwy	4.1	-	-	5.1	-	-	7.1	6.5	7.2	8.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	7.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	7.1	5.5	-
Follow-up Hdwy	2.2	-	-	3.1	-	-	3.5	4	4.2	4.4	4	3.3
Pot Cap-1 Maneuver	1570	-	-	1120	-	-	877	775	813	677	787	1040
Stage 1	-	-	-	-	-	-	984	868	-	744	841	-
Stage 2	-	-	-	-	-	-	945	831	-	769	868	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1570	-	-	1120	-	-	867	763	813	656	775	1040
Mov Cap-2 Maneuver	-	-	-	-	-	-	867	763	-	656	775	-
Stage 1	-	-	-	-	-	-	984	868	-	744	828	-
Stage 2	-	-	-	-	-	-	931	819	-	754	868	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2	9.5	10.6
HCM LOS			A	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	813	1570	-	-	1120	-	-	656
HCM Lane V/C Ratio	0.019	-	-	-	0.014	-	-	0.019
HCM Control Delay (s)	9.5	0	-	-	8.3	0	-	10.6
HCM Lane LOS	A	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

Intersection	
Int Delay, s/veh	6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	46	0	54	16	2	0	12	54	5	0	1
Future Vol, veh/h	0	46	0	54	16	2	0	12	54	5	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	5	0	97	20	50	0	0	94	20	0	0
Mvmt Flow	0	48	0	57	17	2	0	13	57	5	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	19	0	0	48	0	0	181	181	48	215	180	18
Stage 1	-	-	-	-	-	-	48	48	-	132	132	-
Stage 2	-	-	-	-	-	-	133	133	-	83	48	-
Critical Hdwy	4.1	-	-	5.07	-	-	7.1	6.5	7.14	7.3	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.3	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.3	5.5	-
Follow-up Hdwy	2.2	-	-	3.073	-	-	3.5	4	4.146	3.68	4	3.3
Pot Cap-1 Maneuver	1611	-	-	1118	-	-	785	717	811	705	717	1066
Stage 1	-	-	-	-	-	-	971	859	-	830	791	-
Stage 2	-	-	-	-	-	-	875	790	-	882	859	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1611	-	-	1118	-	-	753	680	811	620	680	1066
Mov Cap-2 Maneuver	-	-	-	-	-	-	753	680	-	620	680	-
Stage 1	-	-	-	-	-	-	971	859	-	830	750	-
Stage 2	-	-	-	-	-	-	829	749	-	808	859	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	6.3	10	10.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	784	1611	-	-	1118	-	-	666
HCM Lane V/C Ratio	0.089	-	-	-	0.051	-	-	0.009
HCM Control Delay (s)	10	0	-	-	8.4	0	-	10.5
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0

HCM 6th TWSC
6: Highland Line & North Quarry Access

Highland Pit - Operational 2024 PM (Worst Case)
04/22/2022

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	24	0	15	47	0	0	0	15	0	0	0
Future Vol, veh/h	0	24	0	15	47	0	0	0	15	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	15	0	100	15	0	0	0	100	0	0	0
Mvmt Flow	0	25	0	16	49	0	0	0	16	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	49	0	0	25	0	0	106	106	25	114	106	49
Stage 1	-	-	-	-	-	-	25	25	-	81	81	-
Stage 2	-	-	-	-	-	-	81	81	-	33	25	-
Critical Hdwy	4.1	-	-	5.1	-	-	7.1	6.5	7.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	3.1	-	-	3.5	4	4.2	3.5	4	3.3
Pot Cap-1 Maneuver	1571	-	-	1133	-	-	878	788	827	868	788	1025
Stage 1	-	-	-	-	-	-	998	878	-	932	832	-
Stage 2	-	-	-	-	-	-	932	832	-	988	878	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1571	-	-	1133	-	-	868	776	827	842	776	1025
Mov Cap-2 Maneuver	-	-	-	-	-	-	868	776	-	842	776	-
Stage 1	-	-	-	-	-	-	998	878	-	932	820	-
Stage 2	-	-	-	-	-	-	918	820	-	969	878	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2	9.4	0
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	827	1571	-	-	1133	-	-	-
HCM Lane V/C Ratio	0.019	-	-	-	0.014	-	-	-
HCM Control Delay (s)	9.4	0	-	-	8.2	0	-	0
HCM Lane LOS	A	A	-	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	-

Intersection	
Int Delay, s/veh	5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	27	0	77	60	3	0	0	65	1	0	1
Future Vol, veh/h	1	27	0	77	60	3	0	0	65	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	16	0	91	5	0	0	0	91	0	0	0
Mvmt Flow	1	28	0	81	63	3	0	0	68	1	0	1

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	66	0	0	28	0	0	257	258	28	291	257	65
Stage 1	-	-	-	-	-	-	30	30	-	227	227	-
Stage 2	-	-	-	-	-	-	227	228	-	64	30	-
Critical Hdwy	4.1	-	-	5.01	-	-	7.1	6.5	7.11	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	3.019	-	-	3.5	4	4.119	3.5	4	3.3
Pot Cap-1 Maneuver	1549	-	-	1160	-	-	700	650	840	665	651	1005
Stage 1	-	-	-	-	-	-	992	874	-	780	720	-
Stage 2	-	-	-	-	-	-	780	719	-	952	874	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1549	-	-	1160	-	-	659	602	840	577	603	1005
Mov Cap-2 Maneuver	-	-	-	-	-	-	659	602	-	577	603	-
Stage 1	-	-	-	-	-	-	991	873	-	779	667	-
Stage 2	-	-	-	-	-	-	722	667	-	874	873	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.3	4.6	9.7	9.9
HCM LOS			A	A

Minor Lane/Major Mvmt	NELn1	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	840	1549	-	-	1160	-	-	733
HCM Lane V/C Ratio	0.081	0.001	-	-	0.07	-	-	0.003
HCM Control Delay (s)	9.7	7.3	0	-	8.3	0	-	9.9
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.3	0	-	-	0.2	-	-	0

APPENDIX E – SITE PHOTOS


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APPENDIX C – / h b { ¦ [¢ ! b ¢ { ¶ / ± {

Castleglenn Consultants
Engineers, Project Managers & Planners

Arthur Gordon

B.A., B.Eng., P. Eng.

Principal

Recently Completed Projects, Education and Memberships

Mr. Gordon is President of CastleGlenn Consultants Inc. He has served in the capacity as Director and Manager of Transportation Planning within major Canadian consulting engineering firms.

He has been responsible for numerous transportation planning and engineering design studies throughout Canada requiring detailed analysis, establishment of existing and forecast travel patterns and the development of sound rationale and justification for transportation/transit related infrastructure solutions.

Mr. Gordon has recently led the Highway 43 (Fox Creek) Major FPS and Highway 16-Highway 21 Major FPS to successful completion. In each case, he led a multi-disciplinary team of engineers to deliver a high-quality transportation solution to meet the needs of local residents and the Province. He worked with Alberta Transportation in the coordination and conduct of three Multiple Account Evaluation Sessions that saw more then 3-dozen interchange concepts presented, analyzed and evaluated from a variety of factors.

Mr. Gordon recently received the (2019) Minister's Award for Transportation Innovation by the Alberta Provincial government. This evidences his extensive experience with the development of transportation infrastructure within urbanized environments involving criteria and approaches that assess mobility, accessibility, level of service, parking circulation, operations and transit/pedestrian circulation measures within nationally significant campus environments. As well, his background includes life cycle analysis, road inventory, asset inventory, environmental assessment, transportation and transit economics, cost estimating and transportation implementation systems.

Mr. Gordon provides extensive consulting management expertise in major transportation functional planning and transit engineering studies and projects. He has managed and directed large interchange, freeway, highway and municipal transportation infrastructure initiatives inclusive of master planning studies addressing river and rail crossings. He offers multi-modal experience incorporating truck, airport, light rail as well as cycling, pedestrian design, traffic management, traffic impact, parking, site evaluation, traffic forecasting and transportation safety projects.

Mr. Gordon offers substantial functional planning experience having completed over 55 major functional planning and design assignments throughout his career.

Mr. Gordon is experienced with the development of transportation infrastructure within an urbanized environment involving criteria and approaches to assess mobility, accessibility, level of service, parking circulation, tourism operations and pedestrian circulation patterns within nationally significant campus environments.

Mr. Gordon has been retained by the Province of Alberta on several occasions to provide a peer review of other consultants functional planning submissions to address issues related to functionality, design adherence, cost, economic development impacts and provide added innovation. In many cases these assignments required political endorsement of the constituent municipalities.

Mr. Gordon also offers significant expertise in addressing the impacts of heavy vehicle traffic. He was a co-project manager responsible for the City of Edmonton's "*Truck Route and Regulation Study*" and has undertaken the "*National Capital Area Goods Movement Study*" and the "*Oakville Truck Route and Regulation Study*".

Mr. Gordon has developed a reputation of excellence in the area of communication and presentation skills. This has been displayed through numerous public consultation/ outreach exercises, providing expert witness testimony and prepared presentations to municipal councils, tribunals, executive committees and has testified to the Alberta Land Compensation Board and the Ontario Municipal Board. Most recently, Mr. Gordon was involved with the Hwy 63 Atmore Land Compensation Board. Mr. Gordon is known for incorporating public participation within the engineering process having coordinated technical review committee and public focus groups aimed at developing solutions that are community driven. He has participated in numerous exercises involving peer review and value engineering aimed at undertaking reviews of infrastructure proposals and preliminary design plans on behalf of municipalities, Alberta Transportation and the Ministry of Transportation of Ontario.

For the Province of Newfoundland and Environment Canada, he undertook the "*Trans-Canada Highway Improvements in the Vicinity of Terra Nova National Park*" (Newfoundland) that was used to assess alternative

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Recently Completed Projects, Education and Memberships

corridors and their impacts upon a provincially significant national park and the adjacent communities.

Within the field of transportation planning within a municipal setting Mr. Gordon's experience is diverse and multi-faceted. He co-authored the "*Implementing Employer Based Transportation Demand Management (TDM) Programs"* on behalf of the City of Ottawa. He is currently working with the Edmonton International Airport (EIA) to assess their infrastructure requirements. Moreover, he provided transportation planning expertise on the "*Parliamentary Precinct Study*" in the National Capital.

In addition, he is thoroughly familiar with various evaluation frameworks which address infrastructure upgrading, safety, road-user benefit / cost analysis, level of service, socio-economic impact analysis, economic justification, and the requirements necessary to meet Federal EA processes.

Mr. Gordon's experience includes rigorous technical analysis involving surveys of all heavy registered commercial vehicles, comprehensive community involvement, and a thorough operational comparative impact evaluation and assessment. Variables such as the adjacent area land uses, roadway classification, the number of lanes, geometric features, intensity of pedestrian activity, level of congestion, access density, origin-destination demand, alternate route viability, route continuity and consistency economic simulation. He has developed numerous methodologies for determining forecast travel patterns and the requirements for producing sound justifications for proposed improvements within an urban setting.

Transportation Engineering/Planning – Alberta -

- Highway 16 Clover Bar Road Functional Planning Study
- Highway 43 Fox Creek Functional Planning Study
- Coal Loading Facility Functional Planning: Integration with Hwy 3/3X Provincial Plans Detailed Design (Blairmore)
- Detailed Roadway Design - Airport Road East from Sparrow Dr to 5th St (Leduc County)
- East Ramp Terminal Detailed Design - Hwy 2:32 Interchange at Airport Road (Leduc County)
- EIA Commercial Development TIS (Edmonton International Airport)
- Leduc County Annexation Review (Leduc County)
- Highway 2 Corridor Improvement Study CIS (Calgary to Edmonton)
- City of Leduc Transportation Master Plan (Leduc)
- Airport Road Interchange Functional Planning Study (Edmonton International Airport)
- QE II - 65th Ave Interchange FPS (Leduc)
- Highway 63:01 FPS (Boyle)
- Highway 1 FPS (Old Banff Coach Road) & Hwy 563
- Athabasca Truck Route Study
- Highway 43 FPS (Hwy 33 to Hwy 16)
- Hwy 22X FPS (Calgary to Indus)
- QE II/Hwy 27 FPS (Olds)
- Bypass Discussion Paper
- Safety Rest Area Discussion Paper
- Highway 63 Median Vehicle Inspection Station Design
- Highway 63 FPS
- Highway 28A/28 FPS (Gibbons)
- Highway 1-RR33 Interchange Design FPS
- Highway 855 Corridor FPS
- Highway 27 (Olds & Sundre) FPS
- QE II (Bowden) FPS
- QE II &Township Road 265 Partial Interchange (Airdrie)
- Highway 3 & 6 Interchange FPS (Pincher Creek)
- Highway 14 FPS (Wainwright)
- Lacombe/Blackfalds Traffic Impact Assessment (Lacombe County)
- Highway 2A FPS (Ponoka)
- Highway 27 & Olds FPS (Olds)
- Highway 2A Transportation Planning Study (Blackfalds to Lacombe)
- QE II Corridor Management Study (Calgary to Innisfail)
- Highway 2A Transportation Planning Study (Red Deer to Blackfalds)
- Highway 1 Dunmore FPS
- Highway 3 & 36 Taber Access Management Planning Study
- QE II & Hwy 3 FPS, Fort Macleod, Alberta Transportation
- Highway 1 FPS, Brooks, Alberta Transportation
- Highway Vicinity Access Management Agreement, Highway 11 East of Red Deer FPS
- Highway 11 Realignment Study, East of Red Deer
- Highway 34 & Highway 2 Interchange, Grand Prairie, Functional Design
- QE II & Hwy 11 Interchange Upgrades Red Deer
- Highway 11 Twinning
- Review of Ontario Access Management Policies
- Review of Interstate Highway (FHWA) Access Management Policies

Castleglenn Consultants
Engineers, Project Managers & Planners

Arthur Gordon

B.A., B.Eng., P. Eng.

Principal

Recently Completed Projects, Education and Memberships

- Edmonton Transportation Master Plan: Truck Route Study

In addition, Mr. Gordon has undertaken numerous studies within Ontario as well as work in British Columbia and Newfoundland. A few of the relevant design projects are listed below:

- Woodroffe Avenue Reconstruction Traffic Management Plan
- Ottawa Civic Hospital Parking Garage Evaluation
- Ottawa General Hospital Smyth Road Intersection Modifications Detailed Design
- 1450 & 1454 Merivale Road Detailed Design, Tender Document and Construction Administration
- Craig Henry and Greenbank Road Intersection Improvement - Detailed Design
- Silver Seven Road Median Preliminary and Detailed Design
- Hunt Club Road - New Proposed Development Access and Right-In/Right-Out Access East of Hawthorne Road
- Moodie Drive and Dibble Road Intersection Modifications
- Mer Bleue Roundabout Design
- Strandherd Drive Pavement Markings and Signage Plan
- 350 Cresthaven Retail Development Design

Memberships

- Association of Professional Engineers, Geologists and Geophysicists of Alberta
- Professional Engineers, Ontario
- Institute of Transportation Engineers, Past President, National Capital Section
- Transportation Association of Canada, Transportation Planning Committee

Education

- B.Eng. Civil Engineering, Carleton University, 1984
- B.A. Economics and Law, Carleton University, 1980
- Masters Courses
- Accredited Health and Safety Auditor – Alberta Construction Safety Association

Castleglenn Consultants
Engineers, Project Managers & Planners

Andrey Kirillov

B.Eng

Transportation Planner

Mr. Andrey Kirillov is a *Transportation Planner* with CastleGlenn Consultants Inc.

Mr. Kirillov offers extensive training within the field of transportation planning, traffic analysis and functional planning. He has developed a diverse set of skills in the fields related to transportation traffic engineering, infrastructure planning and engineering.

Mr. Kirillov has knowledge of analyzing multi-modal traffic streams with both macro-and-micro modelling techniques, having been involved in numerous traffic operations studies, and transportation impact assessments (TIA), as well as major functional planning studies (FPS), and Transportation Master Plans.

Major Planning Projects (Ongoing)

- *Leduc County Transportation Master Plan (TMP) (Leduc County, Alberta):* Mr. Kirillov assisted with traffic analysis, communications and public engagement aspects of the project. His duties included helping with organization of in-person public houses, production of GIS exhibits and report review. A component of the TMP process involved identifying intersection upgrade requirements over the next 10 and 20-year time horizons throughout the entire county as well as addressing deficiencies in adherence to municipal design standards.

Transportation Impact Assessments

- *36B Harris Street Residential Development, (Perth, Ontario);* Mr. Kirillov lead the traffic analysis component of the traffic study in Town of Perth (about 7,500 residents). The study involved traffic forecasting, assignment and distribution for proposed new residential developments, and the analysis of 8 signalized and unsignalized intersections for existing, interim and future conditions. The findings were summarized to determine the traffic impact of the proposed residential development on the community and the timing and impacts to adjacent intersections.
- *IHA Seniors' Residence Development (Alexandria, Ontario)* Mr. Kirillov assisted with traffic analysis on the senior housing development within a community of 3,000 persons. The impact of the 500-unit development upon the community was evaluated from a traffic perspective inclusive of pedestrian connectivity within the surrounding area. The development was phased to determine the timing/staging of infrastructure/ new accesses upon the community.
- *Westhaven Subdivision (Arnprior, Ontario);* Mr. Kirillov was the lead traffic analyst for the Westhaven Subdivision Traffic Impact Study in the Town of Arnprior, ON (9,000 residents). The objective of the study was to evaluate the impact of the proposed residential subdivision on the adjacent road network. The analysis dealt with existing, future background and future design conditions using Synchro.
- *150 Kanata Avenue-1200 Maritime Way Residential Development (Ottawa, Ontario);* Mr. Kirillov was the lead traffic analyst for this study, which involved an analysis of nine intersections accounting for existing, interim, and future design horizons. The study included screening of mitigation strategies, such as roadway widening, signal timing and traffic signal phase adjustments, and implementation of a roundabout configuration. Analysis of mitigated conditions was conducted using both Synchro™ and Sidra™ softwares.
- *5329 Boundary Road Commercial Development (Ottawa, Ontario)*: Mr. Kirillov was the senior traffic analyst for this TIA in support of the proposed major fuel/commercial development. The study was required to follow both municipal and Provincial requirements, and dealt with a review of existing traffic, site traffic, site circulation and access management effecting the design of both municipal and provincial infrastructure.

Key skills

- Excellent verbal communication skills;
- Experienced in planning and problem solving;
- Experienced in engaging with public and stakeholders;
- Proficient in technical writing;
- Strong analytical capacity; and
- Proficient with…
  - Synchro versions 8/10;
  - Sidra Roundabout Analysis;
  - Microsimulation analysis using SimTraffic™ to model real-time vehicle conflicts and safety elements;
  - HCM 2000/HCM 2010/HCM 6 Traffic Analysis; and
  - ArcGIS and QGIS platforms.
  - Google Earth and similar GIS platforms
  - Microsoft Word Suite (Word, Excel, PowerPoint, Outlook, etc.)

Education

- B. Eng. Civil Engineering with Cooperative Education, Carleton University, 2021

Castleglenn Consultants
Engineers, Project Managers & Planners

Konstantin Joulanov

B. ASc, M. Eng.

Transportation Planner

Mr. Konstantin Joulanov has recently joined Castleglenn Consultants Inc. as a *Transportation Planner* with

Mr. Joulanov joined Castleglenn Consultants Inc. in October 2021, and since then he has undergone an extensive training on transportation planning and analysis.

Mr. Joulanov has developed a diverse set of skills in the fields related to transportation planning and engineering. Mr. Joulanov has knowledge of analyzing multi-modal traffic streams with both macro-and-micro modelling techniques, having been involved primarily in traffic operations studies, and transportation impact assessments (TIA), as well as having had some exposure to functional planning studies (FPS), and Transportation Master Plans.

Major Planning Projects (Ongoing)

- *Leduc County Transportation Master Plan (TMP) (Leduc County, Alberta, 2021):* Mr. Joulanov assisted with public engagement aspects and report preparation of the project. His duties included summarization of various findings as well as report review.
- *Highway 40 Network Review (Alberta, 2021):* Konstantin conducted a thorough traffic analysis involving at least 10 highway intersections and 8 roundabouts along the Highway 40 corridor south of Grande Prairie for both 10-year and 20-year time horizons. The analysis was used to determine intersection configurations and staging leading to functional design and costing. Minimum level of services thresholds was established at the outset to assure acceptable traffic operations.

Transportation Impact Assessments

- *777 Silver Seven Commercial Development, (Ottawa, Ontario);* Mr. Joulanov conducted the traffic analysis component of this TIA which involved a 9-story building housing medial and general offices and a multi-story self-storage centre. The study involved traffic forecasting, assignment and distribution for the proposed development, as well analysis of 5 signalized and unsignalized intersections which required determination of existing traffic and ultimate traffic conditions. The findings were summarized to judge traffic impact of the proposed development upon the surrounding residential community.
- *150 Kanata Avenue-1200 Maritime Way Residential Development (Ottawa, Ontario);* Konstantin assisted in the traffic analysis of this study, which involved a 350-unit 7/8/9-storey multi-use residential-commercial-retail complex. The project saw an evaluation of 9 intersections within the study area including ramp terminal intersections with the major 417 freeway corridor. Existing and ultimate time horizons were evaluated both with and without the development in place to determine the necessary infrastructure upgrades. The study also included screening of mitigation strategies, such as roadway widening, signal timing/phasing, and operational assessment of a roundabout configured intersection. Analysis of mitigated conditions was conducted using Synchro™ and Sidra™.
- *Proposed Storyland Quarry (Renfrew, Ontario);* This project involved securing the necessary approvals to establish a quarry operation near a major Provincial highway corridor. Mr. Joulanov conducted the traffic analysis component of this project which required an assessment of alternative access locations and configurations taking into account sight line requirement and heavy vehicle operational characteristics. A total of 3 alternative access arrangements were considered taking into account the traffic impact of the proposed development upon the surrounding roadways.

Key skills

- Excellent verbal communication skills;
- Experienced in planning and problem solving;
- Proficient in technical writing;
- Strong analytical capacity; and
- Proficient with…
  - Synchro versions 8/10;
  - Sidra Roundabout Analysis;
  - HCM 2000/HCM 2010/HCM 6 Traffic Analysis;
  - ArcGIS and QGIS platforms.
  - Google Earth and similar GIS platforms; and
  - Microsoft Word Suite (Word, Excel, PowerPoint, Outlook, etc.)

Education

- Bachelor of Applied Science in Civil Engineering, University of Ottawa,
- Masters of Engineering, Carleton University