

December 7, 2021

Project No. 1899975

Phil White, Quality Control

Thomas Cavanagh Construction Limited
9094 Cavanagh Road
Ashton, Ontario
K0A 1B0

**STORMWATER MANAGEMENT BRIEF AND SEDIMENT AND EROSION CONTROL PLAN
PROPOSED WEST CARLETON QUARRY EXTENSION
CITY OF OTTAWA, ONTARIO**

Mr. White,

This letter summarizes the stormwater management (SWM) plan for the proposed West Carleton Quarry Extension, as described in the Water Report Level 1 and Level 2 Hydrogeological and Hydrological Assessments in Support of an Aggregate Resource Act Application for the Proposed West Carleton Quarry Extension, Ottawa, Ontario (Golder 2021a).

Thomas Cavanagh Construction Limited (Cavanagh) operates a number of pits and quarries in eastern Ontario. The materials extracted from these sites are used for local construction projects. Cavanagh operates the existing West Carleton Quarry in accordance with License No. 4085 issued by the Ministry of Northern Development, Mining, Natural Resources and Forestry (NDMNRF). The licensed area and extraction area under the current NDMNRF license for the West Carleton Quarry are 141.6 hectares (ha) and 90.2 ha, respectively. The general location of the existing West Carleton Quarry is shown on Figure 1. Golder Associates Ltd. (Golder) was retained by Cavanagh to complete the necessary hydrogeological and hydrological assessments in support an application under the *Aggregate Resources Act* (ARA) and the Planning Act for the proposed extension of the West Carleton Quarry (referred to herein as the “Extension Lands” or “extension”), located on Part Lot 15, Concession 11, Former Geographic Township of Huntley, City of Ottawa, Ontario.

The Extension Lands are located directly adjacent to the northwestern portion of the existing West Carleton Quarry. The proposed license boundary for the Extension Lands is shown on Figure 1. As shown on Figure 2, the existing West Carleton Quarry and Extension Lands are bounded to the northeast by Upper Dwyer Hill Road, to the northwest by March Road, to the south by a forested area and to the southeast by the Manion Corners Long Swamp Wetland Complex.

Local Surface Water Drainage

The existing West Carleton Quarry and proposed Extension Lands drain east to the Manion Corners Long Swamp Wetland Complex, which forms part of the Cody Creek Watershed. Cody Creek has a watershed area of approximately 104 square kilometres (km²) with primary land uses including agriculture, coniferous forest and wetland. Cody Creek flows northwards to its confluence with the Mississippi River near Pakenham. The Mississippi River has a watershed area of approximately 3,734 km² and contributes to the Ottawa River near Arnprior, Ontario.

No significant surface water features are identified on the existing West Carleton Quarry or the Extension Lands. Surface water features within the Extension Lands are limited to ditches along access roads, flooding in disturbed areas, and unevaluated wetlands (discussed below). Water pools and/or flows through these features during freshet, but based on observations during the 2018 field surveys, they were almost dried up with no flow by the end of April. The nearest surface water receptor is the Manion Corners Long Swamp Wetland Complex located east and southeast of the existing West Carleton Quarry (see location on Figure 2).

The surface water receptor for both the existing West Carleton Quarry and the proposed Extension Lands is the Manion Corners Long Swamp Wetland Complex. The proposed extension is within the catchment of the wetland and does not change the drainage area contributing to it. The nearby Burnt Lands Quarry (refer to Figure 1) is located in an adjacent subcatchment of Cody Creek and drainage from it does not interact with drainage from the West Carleton Quarry until it reaches the main channel of Cody Creek north of the site. The on-site wetlands were investigated by Golder's certified OWES evaluators, who concluded that the wetlands should not be complexed with the Manion Corners Long Swamp PSW and that they provide limited and seasonal hydrological function (Golder 2021b).

Quarry Design & Operations

The development of the Extension Lands is anticipated to occur simultaneously with the operation of the existing West Carleton Quarry and will ultimately be operated as one combined extraction area. To remain consistent with the development plan for the existing West Carleton Quarry, the Extension Lands would be extracted in a series of five lifts to a final base elevation of 107 metres above sea level (m ASL). The various lifts may be operated simultaneously depending on rock quality and market demand. It is anticipated that any water collecting within the excavation on the Extension Lands will flow by gravity into the existing West Carleton Quarry. The existing West Carleton Quarry has a Permit to Take Water (PTTW) Number 4175-AB4RS4 that authorizes dewatering of the extraction area and an Environmental Compliance Approval (ECA) Number 5863-6TSPZ3 that authorizes discharge of water off-site.

Following the completion of site operations, the proposed rehabilitation of the Extension Lands involves backfilling to existing ground surface. As per the ARA site plans, the existing West Carleton Quarry to the east and south of the Extension Lands will be rehabilitated as a lake. Along these boundaries, 2:1 (horizontal:vertical) slopes down to the lake will be constructed and some shallow littoral zones will be created along the lake edge.

Site Drainage

The drainage area associated with the existing West Carleton Quarry and the proposed Extension Lands was delineated using the Ontario Flow Assessment Tool (OFAT) and ground-truthed in the field (refer to Figure 2). The drainage area in which the study area is located is approximately 6.8 km² (681 ha). Surface drainage is generally to the east, following topography, under baseline conditions. The study area includes the land within the property boundary of the existing licensed quarry and the proposed Extension Lands. The total study area is approximately 157.2 ha. The proposed extension is within the same catchment as the existing quarry area. Therefore, the catchment area and drainage direction will be preserved with the extraction of the proposed Extension Lands. The Extension Lands boundary is approximately 18.2 ha with 16.5 ha being proposed for extraction. The entire site is within the baseline drainage area. Runoff from a small area west of the proposed extension will be within the setback and will primarily flow into the excavation with some areas being diverted around the excavation using perimeter berms. All stripped/disturbed areas of the site will drain through the existing West Carleton Quarry water management system prior to being discharged to the natural environment.

Under rehabilitated conditions, the Extension Lands will be backfilled, and the ultimate drainage directions and catchment areas are expected to closely resemble existing pre-development conditions.

Quarry and Stormwater Management

Precipitation falling on the quarry footprint, stormwater runoff from surrounding disturbed areas and groundwater seepage to the quarry, will be collected on the quarry floor and/or conveyed to the quarry sump. The quarry sump is designed to settle suspended solids from the water before discharging offsite and is subject to an ECA under Section 53 of the Ontario Water Resources Act. The ECA provides a site effluent limit for total suspended solids (25 milligrams per litre). The ECA also recognizes the dynamic nature of the quarrying operation and allows the sump to be relocated from time to time to facilitate aggregate extraction operations.

At the time of this report, the quarry floor elevation is at approximately the same elevation as the receiving waterbody east of the quarry and, as such, quarry drainage to date has been by gravity flow. As the quarry continues to expand as approved under the existing ARA License and the proposed extension, the quarry floor will gradually move below the surrounding grade and require that water is pumped from the sump up to the surrounding grade, before draining east to the receiving waterbody by gravity as approved by the ECA. Any future expansion or modification of the water management works required as part of the proposed license extension, will be completed in compliance with the provisions of the existing ECA, or an amendment application will be submitted to MECP for review and approval.

In addition to the quarry dewatering system, Cavanagh operates an aggregate washing operation on the site. The washing operation recycles water through a series of offline ponds to separate fine particles from the aggregate. The wash plant operates at a small water deficit and is not designed to discharge water from the site.

Effects of Quarry Discharge

Any water collecting within the Extension Lands will be directed to the existing West Carleton Quarry sump. Discharge from the West Carleton Quarry is currently regulated by the Ministry of the Environment, Conservation and Parks (MECP) ECA No. 5863-6TSPZ3 (dated October 31, 2006). The ECA specifies a compliance limit on the quarry sump discharge water for total suspended solids of 25 milligrams per Litre (mg/L) or less which is typical for quarries in Ontario. During periods of discharge, the ECA requires monthly sampling of the water being discharged and sampling within the receiving watercourse.

Surface Water Impacts

Ultimately, there will be no change in catchment area contributing to the Manion Corners Long Swamp or Cody Creek because all site runoff from baseline, operational, and rehabilitated conditions will continue to flow east via the existing West Carleton Quarry water management infrastructure. Quarry discharge rates are specified by the existing ECA for the site. During the initial phases of the proposed extension, the existing water management system is expected to have sufficient capacity to handle the gradually increasing surplus from the Extension Lands. If/when required to manage increased capacity or water quality, the site industrial sewage works capacity will be redesigned and Cavanagh will apply for an amendment to the ECA.

While the existing West Carleton Quarry and the Extension Lands are operational, the combined excavation will act as a large extended detention pond during storms due to the collection of water in the excavation and the limited pump rate from the sump specified on ECA No. 5863-6TSPZ3 (0.248 m³/sec). Therefore, peak storm flow rates during large events are expected to be lower during operations than under existing pre-quarry development conditions, and the existing West Carleton Quarry and proposed Extension Lands are not expected to negatively contribute to flooding or water quality issues within the receiving watercourse.

Operation of the existing West Carleton Quarry and proposed Extension Lands are not expected to contribute to erosion problems in the receiving watercourse because detention of drainage in the quarry excavation offers some degree of attenuation of large erosive peak flows associated with storm events.

Sediment and Erosion Control Plan

Topsoil and/or overburden stripped in the operation of the site will be stored in berms within the setback along the western and northern boundaries of the site and will be used in the rehabilitation of the site. The locations of the storage berms are shown on the Operations Plan provided in Attachment 1. Existing vegetation north and west of the storage berms would be retained where feasible and unvegetated areas where vegetation was removed for berm creation should be replanted where feasible. Existing and proposed berms will be kept back at least 3 metres from the licensed boundary and will have an approximate slope of 2:1. The berm slopes will be seeded to ensure that adequate vegetation is established and maintained to control erosion.

During construction and earth-moving operations (including the construction of berms), sediment control measures will be put in place to prevent runoff of suspended solids from leaving the site. These measures will be in place prior to the onset of site preparation and remain in place until rehabilitation is complete. Sediment fencing will be constructed of heavy material and solid posts and be properly installed (trenched in) to maintain its integrity during inclement weather events.

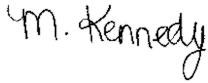
The Operations Site Plan provided in Attachment 1 has been revised to identify the areas requiring sediment and erosion control measures (i.e., beyond the storage berms along the north and west boundaries). The east and south boundary of the Extension Lands are common boundaries with the existing West Carleton Quarry. As such, sediment control measures are not required along these boundaries.

Closure

If you have any questions, please contact the undersigned.

Yours truly,

Golder Associates Ltd.



Melanie Kennedy, P.Eng.
Senior Water Resources Engineer



Kevin MacKenzie, M.Sc., P.Eng.
Senior Water Resources Engineer/Principal



MK/KMM/JPAO/KAM/sg

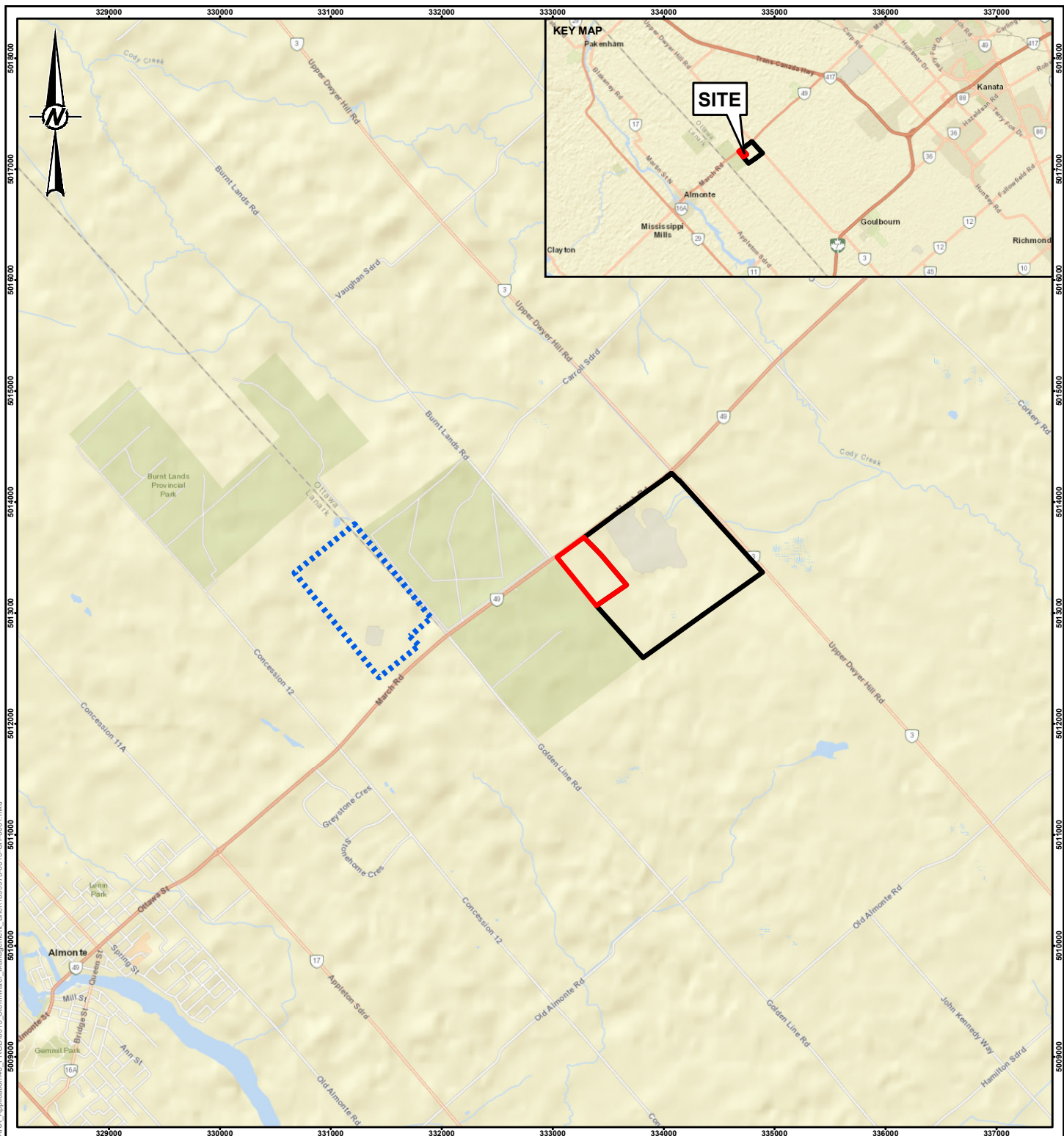
[https://golderassociates.sharepoint.com/sites/25725g/deliverables/swm letter/1899975 stormwater management brief \(dec 7, 2021\).docx](https://golderassociates.sharepoint.com/sites/25725g/deliverables/swm%20letter/1899975%20stormwater%20management%20brief%20(dec%207,%202021).docx)

Attachments: Figure 1 – Key Plan
Figure 2 – Site Plan
Attachment 1 – Operations Site Plan (revised November 2021)




References

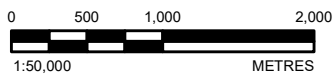
Golder Associates Ltd. 2021a. Water Report Level 1 and Level 2, Hydrogeological and Hydrological Assessments in Support of and Aggregate Resources Act Application for the Proposed West Carleton Quarry Extension, City of Ottawa, Ontario. July 2021.

Golder Associates Ltd. 2021b. Natural Environment Report, Proposed West Carleton Quarry Extension, City of Ottawa, Ontario. July 2021.



LEGEND

-  PROPOSED WEST CARLETON QUARRY EXTENSION LANDS LICENSE BOUNDARY
-  EXISTING WEST CARLETON QUARRY LICENSE BOUNDARY
-  BURNT LANDS QUARRY LICENSE BOUNDARY



NOTE(S)

1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)

1. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
 2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
 COORDINATE SYSTEM: MTM ZONE 9 VERTICAL DATUM: CGVD28

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
STORMWATER MANAGEMENT BRIEF – PROPOSED WEST CARLETON QUARRY EXTENSION

TITLE
KEY PLAN

CONSULTANT



YYYY-MM-DD 2021-11-16

DESIGNED ----

PREPARED BR

REVIEWED JPAO

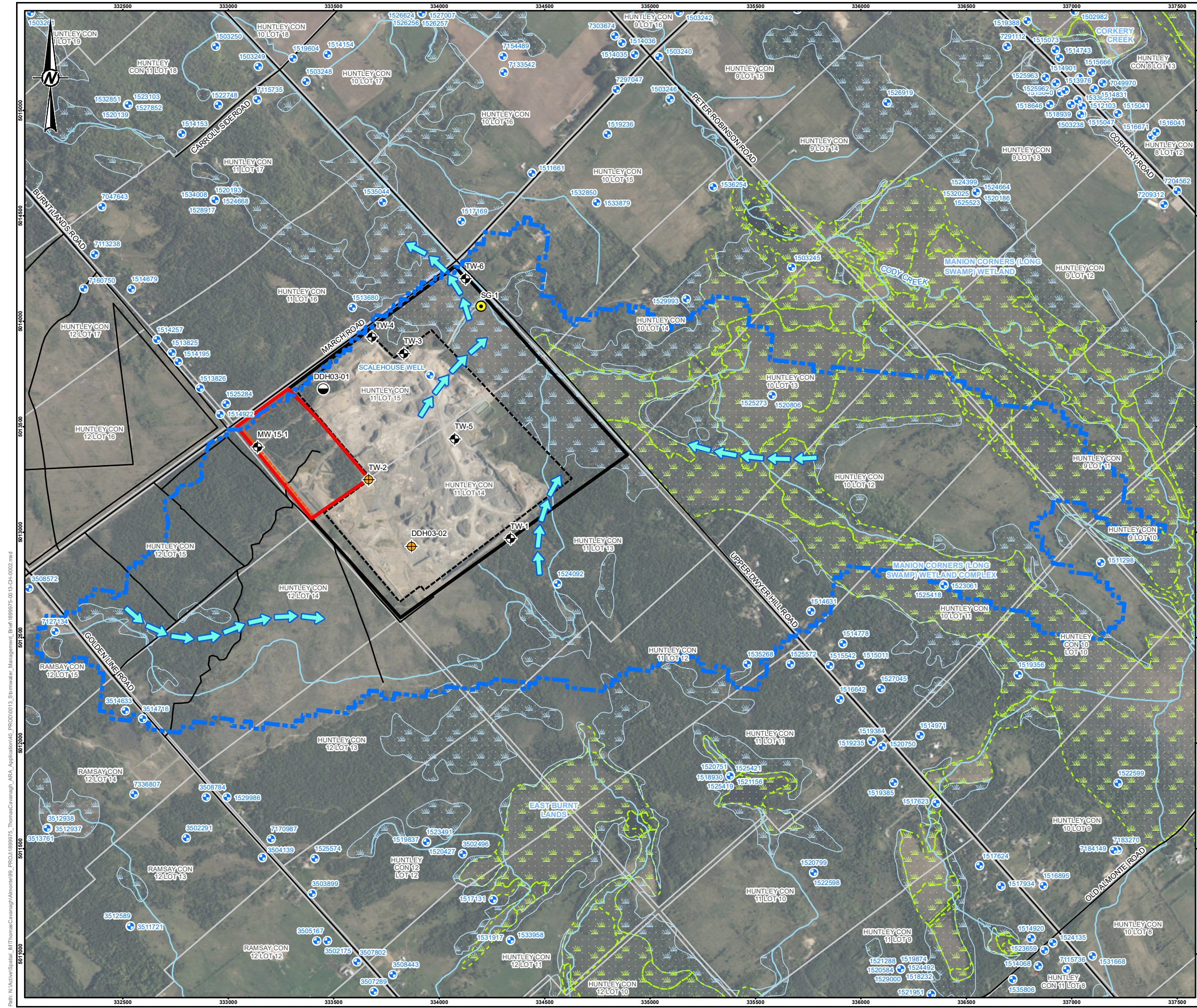
APPROVED KAM

PROJECT NO.
 1899975

CONTROL
 0013

REV.
 0

MAP
1

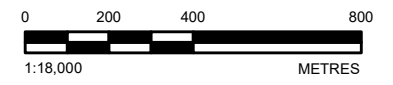


LEGEND

- WATER WELL LOCATION (AS PER MECP WWIS)
- STAFF GAUGE LOCATION
- TEST WELL
- DIAMOND DRILLHOLE (2003 GOLDER ASSOCIATES INVESTIGATION)
- TEST WELL OR DIAMOND DRILLHOLE REMOVED BY QUARRY DEVELOPMENT
- PROPOSED WEST CARLETON QUARRY EXTENSION LANDS LICENSE BOUNDARY
- PROPOSED WEST CARLETON QUARRY EXTENSION LANDS LIMIT OF EXTRACTION
- EXISTING WEST CARLETON QUARRY LICENSE BOUNDARY
- EXISTING WEST CARLETON QUARRY LIMIT OF EXTRACTION
- FLOW DIRECTION
- LOCAL CATCHMENT BOUNDARY
- ROADWAY
- WATERCOURSE
- WETLAND
- SIGNIFICANT WETLAND
- LOT FABRIC

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 2014
 2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
 COORDINATE SYSTEM: MTM ZONE 9 VERTICAL DATUM: CGVD28

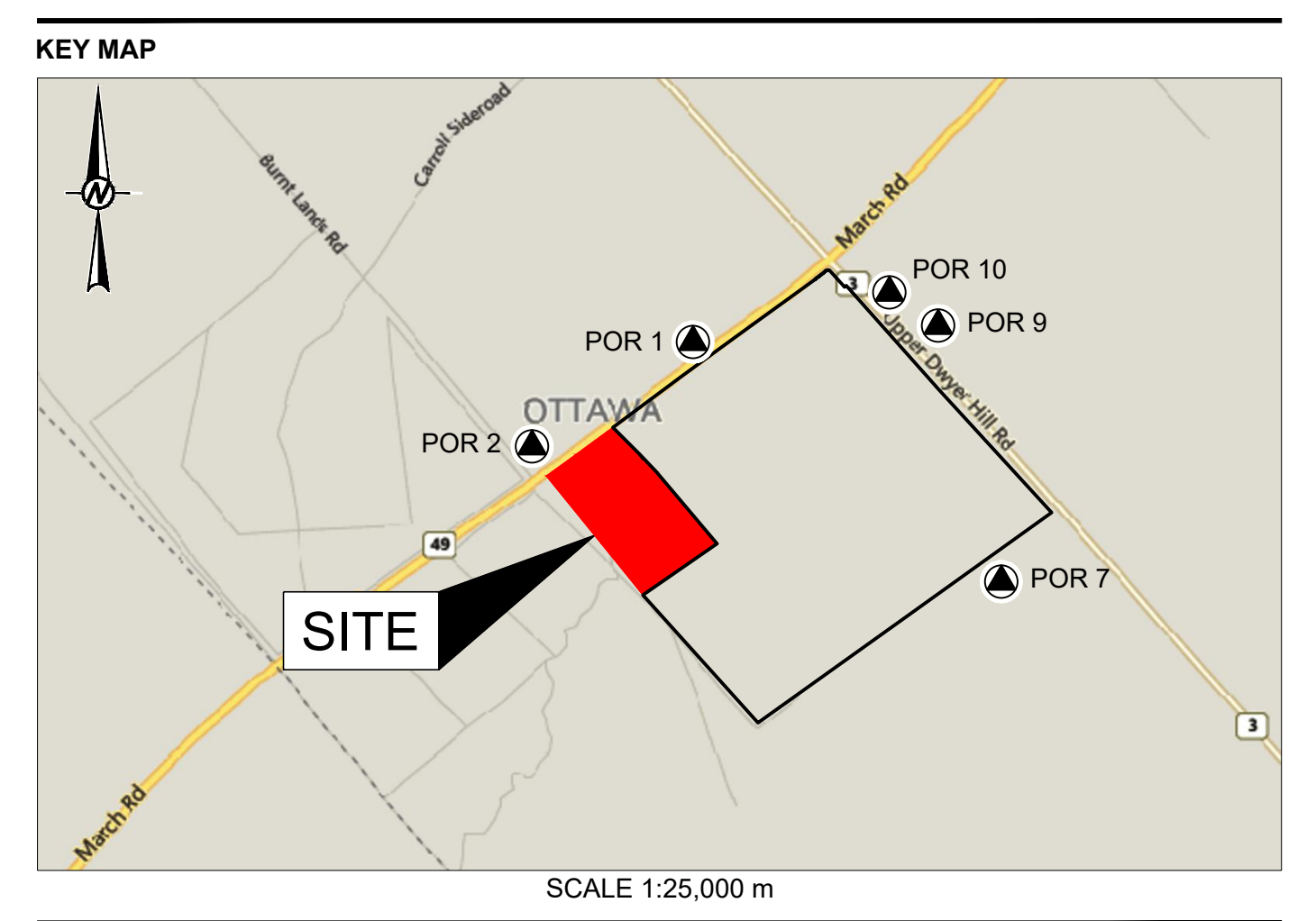
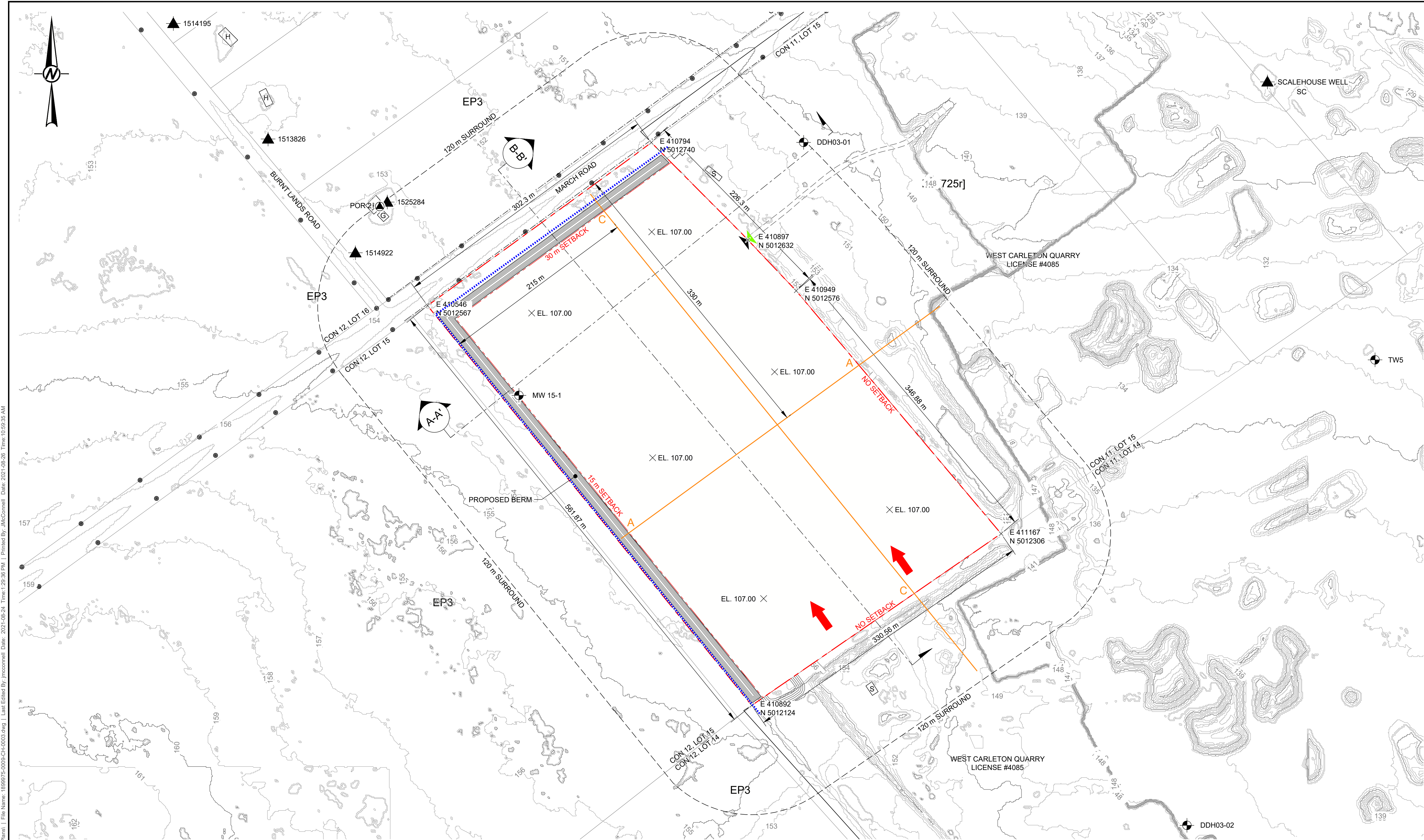


CLIENT		
THOMAS CAVANAGH CONSTRUCTION LIMITED		
PROJECT		
STORMWATER MANAGEMENT BRIEF – PROPOSED WEST CARLETON QUARRY EXTENSION		
TITLE		
SITE PLAN		
CONSULTANT	YYYY-MM-DD	2021-11-16
	DESIGNED	---
	PREPARED	BR
	REVIEWED	JPAO
	APPROVED	KAM
PROJECT NO.	CONTROL	REV.
189975	0013	0
		FIGURE
		2

Path: N:\Active\Spatial_MIT\ThomasCavanagh\Aerial_ARA_Application\40_PRCO\0013_Stormwater_Management_Brief_189975-0013_CU-0002.mxd
 25mm
 IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:

ATTACHMENT 1

**Operations Site Plan
(revised November 2021)**



WEST CARLETON QUARRY EXTENSION
PART OF LOT 15, CONCESSION 11
FORMER GEOGRAPHIC TOWNSHIP OF HUNTLEY,
CITY OF OTTAWA

APPLICANT:
THOMAS CAVANAGH CONSTRUCTION LIMITED
9094 CAVANAGH ROAD
ASHTON, ONTARIO
K0A 1B0

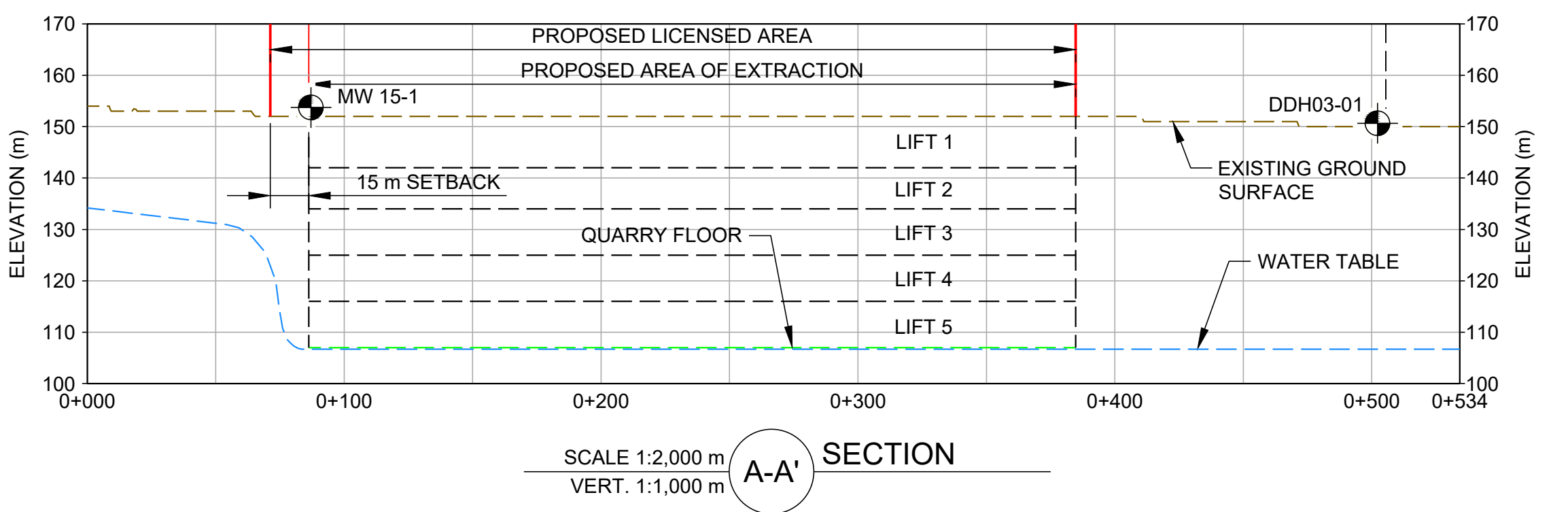
QUARRY LICENSE NO. _____

- NOTE(S)**
- LICENCED AREA, WEST CARLETON QUARRY EXTENSION 18.2 HECTARES.
 - AREA OF OPERATION, WEST CARLETON QUARRY EXTENSION 16.5 HECTARES.
 - THIS SITE PLAN IS PREPARED FOR SUBMISSION TO THE MINISTRY OF NATURAL RESOURCES AND FORESTRY IN CONJUNCTION WITH AN APPLICATION FOR A CLASS 'A', CATEGORY 2 QUARRY BELOW WATER UNDER THE AGGREGATE RESOURCES ACT AND REGULATIONS.
 - THIS PLAN WAS PREPARED USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS.
 - LOT, CONCESSION AND BOUNDARY LINES ON THIS PLAN ARE APPROXIMATE.
 - 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 12, LOT 15
CON 12, LOT 14
LOTS AND CONCESSION LINES
 - BUILDING; S-SILO, H-HOUSE, G-GARAGE, B-BARN, S-SHED, O-OFFICE, SC-SCALE HOUSE, A-AUTO
 - PAGE WIRE FENCE/GATE
 - UTILITY POLE
 - ROADSIDE DITCH
 - WOODED AREA
 - 137 - CONTOURS/INDEX CONTOURS
 - CROSS-SECTIONS
 - PRIMARY ENTRANCE
 - PRIMARY EXIT
 - GENERAL DIRECTION OF EXCAVATION FOR LIFTS 1 AND 2
 - PROPOSED QUARRY FLOOR SPOT ELEVATION, mASL
 - POINTS OF RECEPTION (PORs)

Path: \\gdrive\gdrive\cavanagh\cavanagh\proj\1899975-000-CH-4003-Aep1 | File Name: 1899975-000-CH-4003-Aep1 | Last Edited By: jacobson | Date: 2021-08-24 | Time: 10:39:35 AM

OPERATIONS PLAN
SCALE 1:2,000 m



TYPICAL BERM DETAIL
SCALE NTS

THOMAS CAVANAGH CONSTRUCTION LIMITED

SIGNATURE OF APPLICANT/LICENSEE _____ DATE _____
 PREPARED UNDER THE DIRECTION OF: JAIME OXTOBEE DATE 2021-08-26

OPERATIONS PLAN - DRAWING (PAGE 3 OF 5)

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

69 LOCATION OF CROSS-SECTIONS
REFER TO DRAWING (THIS PLAN) 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
TWO OPERATIONS CROSS-SECTIONS ARE PROVIDED ON THE OPERATIONS PLAN (PAGE 3 OF 5).

72 PREDICTED WATER TABLE UNDER OPERATIONAL CONDITIONS
DURING OPERATIONS, THE WATER TABLE WITHIN THE DEWATERED SITE AND THE ADJACENT WEST CARLETON QUARRY WILL BE SLIGHTLY BELOW THE QUARRY FLOOR. THE PREDICTED WATER TABLE DURING OPERATIONS IS SHOWN ON THE 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).

ITEM/OPERATIONAL STANDARD	VARIATION TO OPERATIONAL STANDARDS	RATIONALE
SETBACKS/ 0.13 (1) 10.1	NO SETBACK ALONG THE EASTERN AND SOUTHERN EDGES OF THE SITE WHERE COMMON BOUNDARIES EXIST WITH THE ADJACENT QUARRY (LICENSE #4085)	REDUCTION OF SETBACK ALONG COMMON BOUNDARY TO ALLOW FOR CONTINUOUS EXTRACTION OF THE EXISTING QUARRY (LICENSE #4085) AND THIS LICENSE.
STOCKPILES OF AGGREGATE, TOPSOIL, OVERBURDEN AND PROCESSING PLANTS/0.13 (1) 13.1	STOCKPILES OF AGGREGATE, TOPSOIL AND OVERBURDEN AND PROCESSING PLANTS MAY BE LOCATED WITHIN 30 METRES OF THE COMMON BOUNDARY (LICENSE #4085).	THIS WILL ALLOW FOR STOCKPILES AND PROCESSING WITH 30 m OF THE COMMON BOUNDARY AREAS.
TRANSFER OF MATERIAL/0.13 (1) 17 AND 0.13 (1) 18	TOPSOIL AND/OR OVERBURDEN AND/OR AGGREGATE MAY BE TRANSFERRED BETWEEN THIS LICENSE AND EXISTING LICENSE #4085.	THIS WILL ALLOW STRIPPED MATERIAL FROM SITE PREPARATION TO BE USED FOR BERM CONSTRUCTION AND/OR PROGRESSIVE REHABILITATION.
FENCING/ 0.13 (3) (e)	NO FENCING ALONG THE EASTERN AND SOUTHERN BOUNDARIES OF THE SITE WHERE COMMON BOUNDARIES EXIST WITH THE ADJACENT QUARRY LICENSE #4085. NO FENCING ALONG THE WESTERN SITE BOUNDARY WHERE THERE IS AN EXISTING BERM.	FENCING ALONG THE COMMON BOUNDARY WOULD INTERFERE IN THE OPERATION OF THE SITE. THE BERM CURRENTLY PRESENT ALONG THE WESTERN BOUNDARY IS HIGH ENOUGH TO IMPEDE ACCESS TO THE SITE.

- REFERENCE(S)**
- 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.
 - LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDBER ASSOCIATES LTD. UNDER LICENSE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2016.
 - CITY OF OTTAWA 2012 TOPO LIDAR TILES.
 - MAPPING AND GROUND CONTROL FOR THE SITE PLAN COMES FROM LAND INFORMATION ONTARIO (LIO) DATA AVAILABLE FROM THE MINISTRY OF NATURAL RESOURCES AND FORESTRY, CITY OF OTTAWA 2012 TOPO LIDAR TILES AND A GROUND SURVEY CONDUCTED BY CAVANAGH IN NOVEMBER 2019.
 - PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28.

CLIENT
THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
WEST CARLETON QUARRY EXTENSION

TITLE
OPERATIONS PLAN

APPLICANT
THOMAS CAVANAGH CONSTRUCTION LIMITED

DESIGNED: JPAO
PREPARED: JM
REVIEWED: JPAO
APPROVED: KAM

DATE: 2021-02-17

PROJECT NO. 1899975 CONTROL 0009 REV. 0 FIGURE 3 OF 5

AMENDMENTS	DATE	APPROVAL DATE

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

SIGNATURE _____ DATE _____

