STORMWATER MANAGEMENT BRIEF

JABULANI WINERY

8005 JOCK TRAIL

PREPARED FOR

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PREPARED BY

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OCTOBER 2022
REVISED APRIL 2023

EXECUTIVE SUMMARY

Shade Group Inc. (SGI) was retained by Jabulani Winery to provide civil engineering design services to address comments received from the City of Ottawa on August 25, 2022. Additional comments have since been received with respect to a previous submission made (October 2022), and this report has been revised to address the latest City comments. We understand that the owner/applicant (Jabulani Winery) has submitted a Site Plan Control application to the City and as part of the process, the City of Ottawa has requested that a Stormwater Management Brief be prepared, along with a Grading and Drainage Plan.

The subject property is located at 8005 Jock Trail in the City of Ottawa. The property is already developed, and it is our understanding that the Site Plan Control Application is a retroactive approval process. No new development is planned at this time.

The primary objective of this report is to provide stormwater management details in accordance with the recommendations and guidelines provided by the Ministry of the Environment, Conservation and Parks (MECP) and the Rideau Valley Conservation Authority (RVCA).

As the proposed development is located in a rural setting, the proposed stormwater management design has focussed on generally accepted rural stormwater management design practices. This includes a focus on Best Management Practices (BMPs) for conveying, controlling and treating runoff.

The proposed stormwater management plan is to include minor regrading around the perimeter of the existing on-site retention area. This will offer stormwater retention to restrict post-development peak flow rates to pre-development levels through the implementation of an outlet control structure.

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APPENDICES

REVISIONS & SUBMISSIONS

Revision #	Comments	Date
00	Issued for Review	October 7, 2022
01	Revised per City Comments	March 8, 2023
02	Incorporated updated LGD + SWM Plan No changes to report main body or calculations.	April 18, 2023

1.0 INTRODUCTION

Shade Group Inc. (SGI) was retained by Jabulani Winery to provide civil engineering design services to address comments received from the City of Ottawa on August 25, 2022. Additional comments were received following the design submission in October 2022 and this report has been revised to further address those comments. We understand that the owner/applicant (Jabulani Winery) has submitted a Site Plan Control application to the City and as part of the process, the City of Ottawa has requested that a Stormwater Management Brief be prepared, along with a Grading and Drainage Plan.

The subject property is located at 8005 Jock Trail in the City of Ottawa. The property is already developed, and it is our understanding that the Site Plan Control Application is a retroactive approval process. No new development is planned at this time.

2.0 OBJECTIVE

SGI was retained to prepare the civil engineering design works associated with the subject property. That included the preparation of a Grading and Drainage Plan for the subject property, as well as preparation of this Stormwater Management Brief.

The primary objective of this report is to provide stormwater management details in accordance with the recommendations and guidelines provided by the Ministry of the Environment, Conservation and Parks (MECP), the City of Ottawa and the Rideau Valley Conservation Authority (RVCA).

As the proposed development is located in a rural setting, the proposed stormwater management design has focussed on generally accepted rural stormwater management design practices. This includes a focus on Best Management Practices (BMPs) for conveying, controlling and treating runoff and a focus on natural features (outdoor ponding areas) for stormwater management, rather than piped systems like storm sewers and catchbasins.

3.0 PROJECT DESCRIPTION

The subject property is located at 8005 Jock Trail, which is approximately 5km south of the village of Munster, and about 10km west of the village of Richmond. The property is located approximately 800m east of the intersection of Wood’s Road and Jock Trail.

The property is bounded by Jock River to the north, active farmland to the west, vacant lands to the south, and a rural residential property to the east. This study has been prepared with a primary focus on the area directly fronting on Jock Trail; up to the start of the vineyards. The study area extends approximately 140m back; and represents about 45,000 m^2 (~11 acres) of the 152,490 m^2 (~38 acres) property. The limits of the study area were determined in consultation with City staff (Travis Smith, P. Eng.) per a phone conversation with the author of this report on

September 15, 2022. A photograph of the study area has been provided in Figure 1, while a Location Plan is available in **Appendix A**.

Figure 1: Study Area (highlighted in orange)

3.1 SITE TOPOGRAPHY

Initial topographic information was supplied by Gemtec (Site Plan, July 2022) while supplemental information was collected by the author of this report. Topographic information collected by SGI was generally limited to the study area; although additional information was collected as needed to better understand the drainage area limits associated with the study area.

Topography generally ranges from 108 m at the high point of the property; to approximately 106m at the low points. The ridge of the land is located approximately 200m back from Jock Trail; where runoff from the front of the site is directed to the roadside ditch on Jock Trail; while the lands beyond the 200m flow towards Jock River. At its closest point along the eastern property line, Jock River is located approximately 325m north of Jock Trail. As Jock River meanders across the northern limits of the property, it is nearly 650m north of Jock Trail on the west property line. The development subject to this project is located over 200m from Jock River and runoff leaving the site would travel over 375m northeast within grass lined roadside ditches before entering Jock River.

3.2 SOIL CONDITIONS

A desktop review of the soil conditions was performed in reference to *The Soils of the Regional Municipality of Ottawa-Carleton (excluding the Ottawa urban fringe)* (Report No. 58 of the Institute of Pedology, 1987). The soils are defined as Oka (gravelly to very gravelly loamy sand, sandy loam or loam) that is excessive to good draining (O1) and Grenville (sandy loam, loam or silt loam) that is poor draining (G3). Figure 2 has been taken from Map 3.

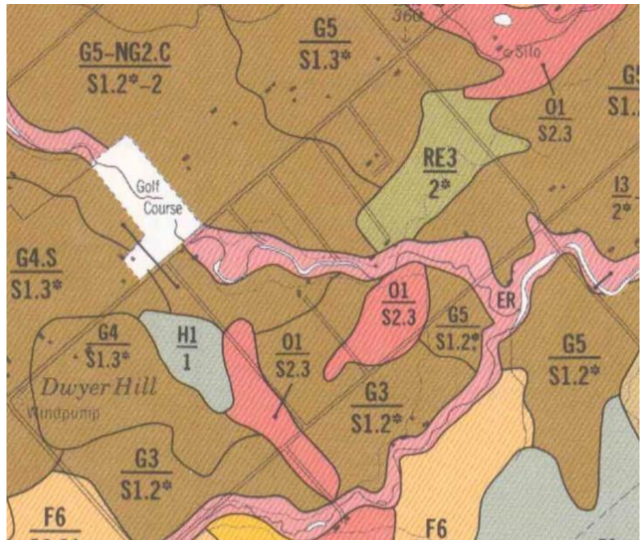

Figure 2: Soils of the Regional Municipality of Ottawa-Carleton - Sheet 3 - Soil Survey Report No. 58

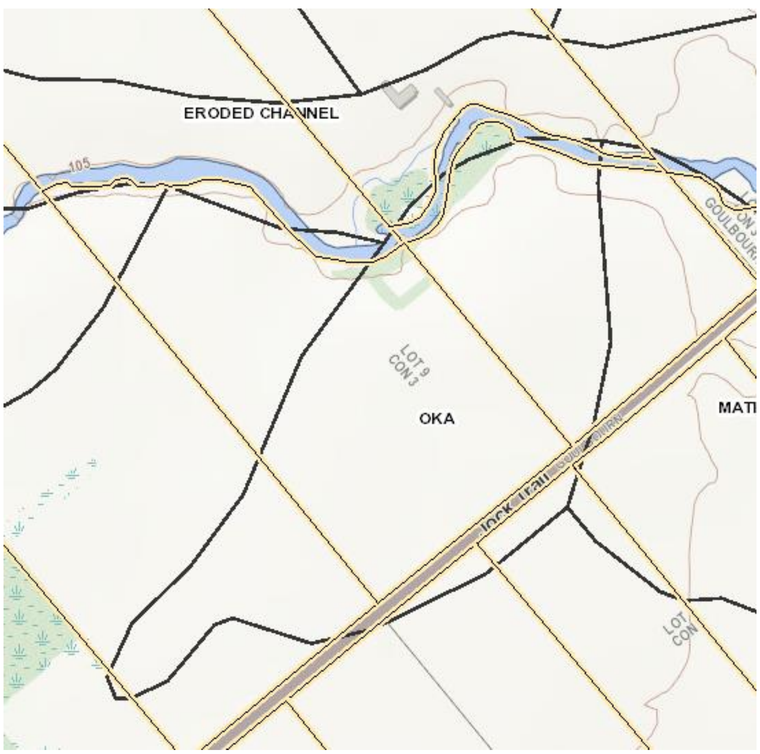

Figure 3: Soil data from OMAFRA's AgMaps (accessed September 20, 2022)

As another source of information, the Ontario Ministry of Agriculture, Food and Rural Affairs 'AgMaps' was also referenced for soil conditions. The study area is entirely within Oka soil conditions, which is consistent with the findings of the 1987 report referenced above. Figure 3 provides a visual of the findings from 'AgMaps' (as accessed September 20, 2022).

Finally, the "Assessment of Parking Lot Subsurface Conditions" report prepared by Gemtec dated July 26, 2022 was also reviewed as part of the preparation of this report. Test pit samples taken as part of the preparation of that report indicate that native soils appear to be sandy silt with cobbles (glacial till) which is consistent with the references noted above.

These soil conditions were referenced in determining appropriate runoff coefficients for the peak flow calculations.

4.0 STORMWATER MANAGEMENT DESIGN

4.1 METHODOLOGY

The stormwater peak flow calculations were completed using the Rational Method.

$$Q = 2.78CIA$$

Where

Q	=	Flow Rate (L/s)
C	=	Runoff coefficient
I	=	Rainfall intensity (mm/hr)
A	=	Drainage area (ha)

The use of the Rational Method is consistent with the City of Ottawa Sewer Design Guidelines – as the subject development is less than 40 hectares (City Guidelines - Section 3.5.1.1).

4.1.1 RUNOFF COEFFICIENTS

The following coefficients were used to develop a weighted runoff coefficient for each area:

Paved and Roof Areas	0.90
Grass	0.10
Gravel Surfaces	0.60

These values were chosen in reference to the soil conditions as described in Section 3.2 of this report and per the City of Ottawa Sewer Design Guidelines (City Guidelines – Table 5.7).

Per requirements from the City, runoff coefficients for the 100-year storm event have been increased by 25%, up to a maximum value of 1.0.

4.1.2 RAINFALL INTENSITY

Rainfall intensities were derived from City of Ottawa Sewer Design Guidelines (City Guidelines - Section 5.4.2), where

$$\text{2-Year Intensity} = 732.951 / (\text{Time in min} + 6.199)^{0.810}$$

$$\text{5-Year Intensity} = 998.071 / (\text{Time in min} + 6.053)^{0.814}$$

$$\text{100-Year intensity} = 1735.688 / (\text{Time in min} + 6.014)^{0.820}$$

4.1.3 TIME OF CONCENTRATION

The overland travel time of concentration was calculated using the Airport Formula.

$$t_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}$$

Where

t_c	=	Time of concentration (min)
C	=	Runoff coefficient
L	=	Catchment length (m)
S_w	=	Catchment slope (%)

A maximum value of 30m (100ft) was used in calculating overland sheet flow time of concentration. The remaining overland sheet flow is assumed to form shallow concentrated flows after these conditions, and was calculated as such. The velocity for shallow concentrated flow was calculated using the following formula:

$$V = k(s)^{0.5} \text{ (m/s)}$$

Where

V	=	Velocity (m/s)
k	=	Constant (from National Engineering Handbook, Table 15-3)
s	=	Average watershed slope (%)

The above referenced equation was also used to calculate the time of concentration for channelized flow (i.e. within ditches/swales). The following k-values were used:

K = 16.135 – for grassed waterways (swales)
K = 6.962 – for short-grass pasture (meadow/undeveloped areas)

These values were taken from the National Engineering Handbook Table 15-3 (converting the velocity equation from imperial to metric units). The resulting time of concentration was then determined using the velocity method which “assumes the time of concentration is the sum of the travel times for segments along the hydraulically most distance flow path” (National Engineering Handbook, Page 15-6).

4.2 PRE-DEVELOPMENT DRAINAGE PATTERNS

For the purposes of this application, pre-development conditions have been defined as approximately 2011; which refers to prior to the construction of the post-and-beam construction and associated parking lot. Pre-development conditions include the existing gravel laneway that extends to the residential dwelling – which was constructed in 2006.

Prior to 2011, runoff from the southern limits of the property would sheet flow over meadow before entering the roadside ditch on Jock Trail. The pre-development drainage area is estimated to be approximately 6.9ha and has estimated peak flow rates of 70L/s, 94 L/s and 202 L/s for the 2-, 5- and 100-year storm events respectively.

4.3 POST-DEVELOPMENT DRAINAGE PATTERNS

Under post-development conditions the area has been subdivided into 3 sub-catchments.

Sub-catchment B1 encompasses lands that would continue to free drain to the Jock Trail roadside ditch via overland sheet flow. The area encompasses portions of the vineyard (with grassed lands below the vines); a portion of the southwestern hay field (meadow); and the majority of the existing Jabulani Winery development (post-and-beam structure, pea stone patio, gravel parking lot, etc.). While the area also includes stormwater management measures previously implemented by the owner for the purposes of conveyance of surface water; these measures have not been quantified. The area is estimated at approximately 3.2 ha, and has estimated uncontrolled peak flow rates of 52 L/s, 70 L/s and 149 L/s for the 2-, 5- and 100-year storm events respectively.

Sub-catchment B2 refers to lands that are anticipated to be intercepted by the stormwater retention area. Runoff from this area would sheet flow over grassed (meadow) lands before entering the retention area. The stormwater retention area has an existing permanent pool capacity that is anticipated to be used for the purposes of supporting fire retention needs (design of fire retention by others). For further details pertaining to the stormwater retention area, refer to Section 4.5. Area B2 is estimated to encompass approximately 2.3 ha and has estimated uncontrolled peak flow rates of approximately 29 L/s, 38 L/s and 82 L/s for the 2-, 5- and 100-year storm events respectively. This uncontrolled peak flow rate does not quantify storage within the permanent pool area of the existing stormwater retention area as it does not have gravity outflow.

Sub-catchment B3 represents the northeast limits of the catchment and accounts for runoff that would be blocked by the site's fully raised septic system and a hill of native material located on the northeast side of the parking lot. Runoff from this sub-catchment would overland sheet flow over grassed (meadow) lands from north to south (over the meadow/hay fields); and from south to north (down the hill of native material); and be conveyed via a natural swale at the toe of slope out to Jock Trail. The area measures approximately 1.4 ha and has estimated uncontrolled peak flow rates of approximately 17 L/s, 22 L/s and 48 L/s for the 2-, 5- and 100-year storm events respectively.

A Drainage Area Plan delineating the pre- and post-development sub-catchments has been enclosed in Appendix B.

4.4 PEAK FLOW RESULTS

Peak flow results for the pre- and post-development conditions have been summarized in the tables below. For a detailed breakdown of the calculations, refer to **Appendix C**.

Table 1: Pre-Development Peak Flow Results

	A1
Peak Flow (L/s) - 2-Year	70
Peak Flow (L/s) - 5-Year	94
Peak Flow (L/s) - 100-Year	202

Table 2: Post-Development Peak Flow Results

	B1	B2	B3
Peak Flow (L/s) - 2-Year	52	29	17
Peak Flow (L/s) - 5-Year	70	38	22
Peak Flow (L/s) - 100-Year	149	82	48

Table 3: Peak Flow Comparison

	PRE	POST	Δ
Pre-Development Peak Flow (L/s) - 2-Year	70	97	**27**
Pre-Development Peak Flow (L/s) - 5-Year	94	130	**36**
Pre-Development Peak Flow (L/s) - 100-Year	202	279	**76**

The addition of the post-and-beam structure and the surrounding impervious surfaces results in an increase in peak flow rates of 27 L/s, 36 L/s and 76 L/s for the 2-, 5- and 100-year storm events respectively.

4.5 QUANTITY CONTROL

We understand that the City has requested that the development be designed to restrict post-development peak flow rates to pre-development levels. Based on the information provided in Table 3, this would require restriction of approximately 27 L/s, 36 L/s and 76 L/s for the 2-, 5- and 100-year storm events respectively.

As noted in the description of area B2, the site has a retention area that was excavated by the property owners. A detailed survey of the retention area has not been conducted as the retention area was full from a recent rainfall at the time of the original report (October 2022), and filled with snow and ice at the time of this revised report. Through discussions with the property owner, they advised that the retention area is approximately 2 feet deep at the northwest end; and up to 4 feet deep at the southeast end.

By way of aerial photography from the owner that shows the approximately bottom of the retention area during the summer months; and using the information provided by the owner with respect to approximate depths; the total volume of the existing retention area has been estimated by way of interpolating contours in AutoCAD. The total volume has been calculated using 3D surfaces in AutoCAD Civil3D. The approximate bottom of retention area is estimated as 105.25m, with a total available storage volume of approximately 660m^3 up to a maximum elevation of 106.40m. This elevation (106.40m) has been used as the top of the permanent pool elevation; and the start of the active storage.

The start of the active storage elevation was chosen to allow for a gravity outflow from the retention area. Given the elevation of the entrance culvert under the farm laneway is set at an elevation of +/- 106.43, it was deemed impractical to gravity drain to the roadside ditch along the southeast side of the property without needing to import significant amounts of fill material to build the area up. Instead, it is proposed that the area between 106.40 and 106.55 will gravity drain to the existing drainage swale along the west side of the parking lot by way of a low water crossing proposed over the existing farm laneway. For more details on this low water crossing, refer to Section 4.7.

In order to accommodate additional storage volumes to restrict runoff rates to pre-development levels, an area beyond the existing top of pond will need to be excavated by approximately 4-8 inches (0.10-0.20m), offering a total footprint of approximately 2000m^2. This will allow runoff to temporarily pool within this new retention area before infiltrating through the fractured bedrock; or flowing out through the proposed rip-rap outlet control structure. For the purposes of the design calculations associated with this report, we have assumed that runoff will flow out; however it is acknowledged that the owner may not observe water with the retention area if runoff is able to infiltrate through the fractured bedrock. Design details pertaining to the rip-rap outlet can be found on the Stormwater Management Details Plan.

For the purposes of this design document, the area below 106.40m has not been accounted for as available storage during a rainfall event, as it is not able to gravity drain, and is assumed to be a permanent elevation of water.

Through the implementation of the proposed rip-rap outlet control structure, the outflow from the retention area is proposed to ensure that the total outflow from the site (as directed to Jock Trail) is restricted to pre-development levels. This equates to the following outflow and corresponding elevations of ponding:

Table 4: Peak Flow Rates – Controlled + Ponding Depths

	Retention Area Outflow (L/s)	Ponding Elevation (m)	Depth of Ponding (m)
2-Year	1	106.44	0.04
5-Year	2	106.45	0.05
100-Year	5	106.50	0.10

In Table 5, please find a summary of the total peak flow rates comparing pre-development to post-development controlled for the site's runoff as directed to Jock Trail.

Table 5: Peak Flow Comparison - Controlled

	PRE	POST (CONTROLLED)	Δ
2-Year	70	69	-1
5-Year	94	94	0
100-Year	202	202	0

With the addition of the outlet control structure on the retention area, and the regrading of the retention area to expand the available storage area, the proposed retention area is expected to provide the required stormwater restriction for the site to control post-development peak flow rates to pre-development levels for the 2-, 5- and 100-year storm events.

It is further acknowledged that other stormwater management features have been installed by the owner over the years however these measures have not been quantified.

4.6 CAPACITY REVIEW – ROADSIDE DITCH JOCK TRAIL

A capacity review has been performed of to the immediate downstream receiver – the Jock Trail roadside ditch. Capacity calculations have been enclosed in Appendix D.

The drainage area contributing to the roadside ditch on Jock Trail has been estimated based on a visual assessment conducted by the author of this report, in conjunction with a review of the watershed mapping completed by Rideau Valley Conservation Authority for the Jock River. The approximate watershed limits have been reflected on the map enclosed in Appendix D.

Comparing the total anticipated peak flow rate from the sub-watershed area contributing to the roadside ditch along the area downstream of Jock Trail to the total available capacity within the ditch cross-section, it has been concluded that the immediate downstream ditch (Jock Trail) appears to have adequate capacity to convey the 100-year storm event. A review of Jock River and the associated backwater effects has *not* been completed as part of this review and would be considered beyond the scope of this report. The Jock River would be considered as legal and sufficient outlet.

4.7 CAPACITY REVIEW – LOW WATER CROSSING

Given that the existing lands are quite flat, there is limited opportunity to gravity drain without requiring significant (cost prohibitive) fill. With that, the implementation of a low water crossing has been proposed across the existing farm laneway. As the proposed active storage for the retention area is quite shallow (~0.15m; +/- 6 inches), implementation of a culvert as a means for crossing the laneway was deemed impractical as it would require the laneway to be built up to ensure sufficient cover could be achieved to accommodate large farming equipment typically used for hay field harvesting. Instead, it is proposed that the laneway be lowered to allow runoff to flow overtop of the laneway and continue to swale towards the existing drainage swale located adjacent the existing parking lot. A capacity review was performed of the proposed low water crossing to verify that the proposed level of flow does not exceed 0.30m during a 100-year storm event. While City design criteria allows for a maximum of 0.30m of overtopping, the proposed design would not allow for more than 0.20m of ponding, as ponding in excess of 0.20m would no longer be contained within the low water crossing.

Based on a review of the anticipated peak flow from the outlet control structure (including allowance for a small area south of the retention area that is anticipated to flow uncontrolled through the low water crossing), the ponding volumes are expected to be minimal, and certainly less than 0.20m. The low water crossing has a total capacity of ~1.7m^3/s, while the anticipated flow during the 100-year storm event is anticipated to be ~11 L/s (0.011 m^3/s). With that, there is not anticipated to be any measurable impact to vehicle passage due to the low water crossing.

Capacity calculations have been enclosed in Appendix C.

4.8 QUALITY CONTROL

The employment of Best Management Practices (BMPs) serves as the primary method of quality control for the site. Stormwater BMPs are present at the lot, conveyance and end of pipe level.

Lot level BMPs focus on directing runoff towards grassed surfaces and maintaining lands in their natural vegetated state, wherever possible. The site consists of primarily grassed fields; and runoff from developed areas is generally directed out to grass lined ditches/swales.

The grassed swales offer quality control means through conveyance. The grassed swales serve to slow down the rate of flow, offer groundwater recharge through infiltration, and offer particle filtration.

The proposed stormwater management facility, though not in direct line with the development, will still serve to offer particle filtration and groundwater recharge for runoff from the site and serves as an end-of-pipe means primarily for quality control; but will offer quality control through retention.

The areas of concern for the development with respect to water quality would primarily be limited to the gravel parking lot. As the parking lot is directed to either the clear stone ditch/infiltration trench on the northeast side; or towards the grass lined swale along the southwest side; runoff is generally subject to interception by a means of conveyance control. Furthermore, runoff leaving the site would be still subject to an additional 375m (or more) of conveyance within the grass lined roadside ditches before entering Jock River; once again offering significant opportunity for particle settlement.

5.0 SUMMARY

- The development in question was constructed in 2013 and included the construction of an approximately 600 m^2 post and beam structure, a pea stone patio, and a gravel parking lot.
- The City has requested that the existing development be demonstrated to limit post-development peak flow rates to pre-development levels for the 2-, 5- and 100-year storm events.
- Through minor regrading to the stormwater retention area on-site, and implementation of an outlet control structure, it is expected that the site will be limited to pre-development levels.
- The Jock Trail roadside ditch has been reviewed for capacity and confirmed to have adequate capacity to handle greater than the 100-year storm event.
- Stormwater management quality concerns are addressed through Best Management Practices. Given the rural nature of the development (i.e. significant amounts of grass lands within the catchment), quality of runoff is not expected to be a concern.

6.0 CLOSING

This report is submitted for consideration in support of the proposed Site Plan Control Application for the subject property noted herein.

Should you have any questions or concerns, please do not hesitate to contact the undersigned at your earliest convenience.

Monica Shade, P. Eng.
Shade Group Inc.
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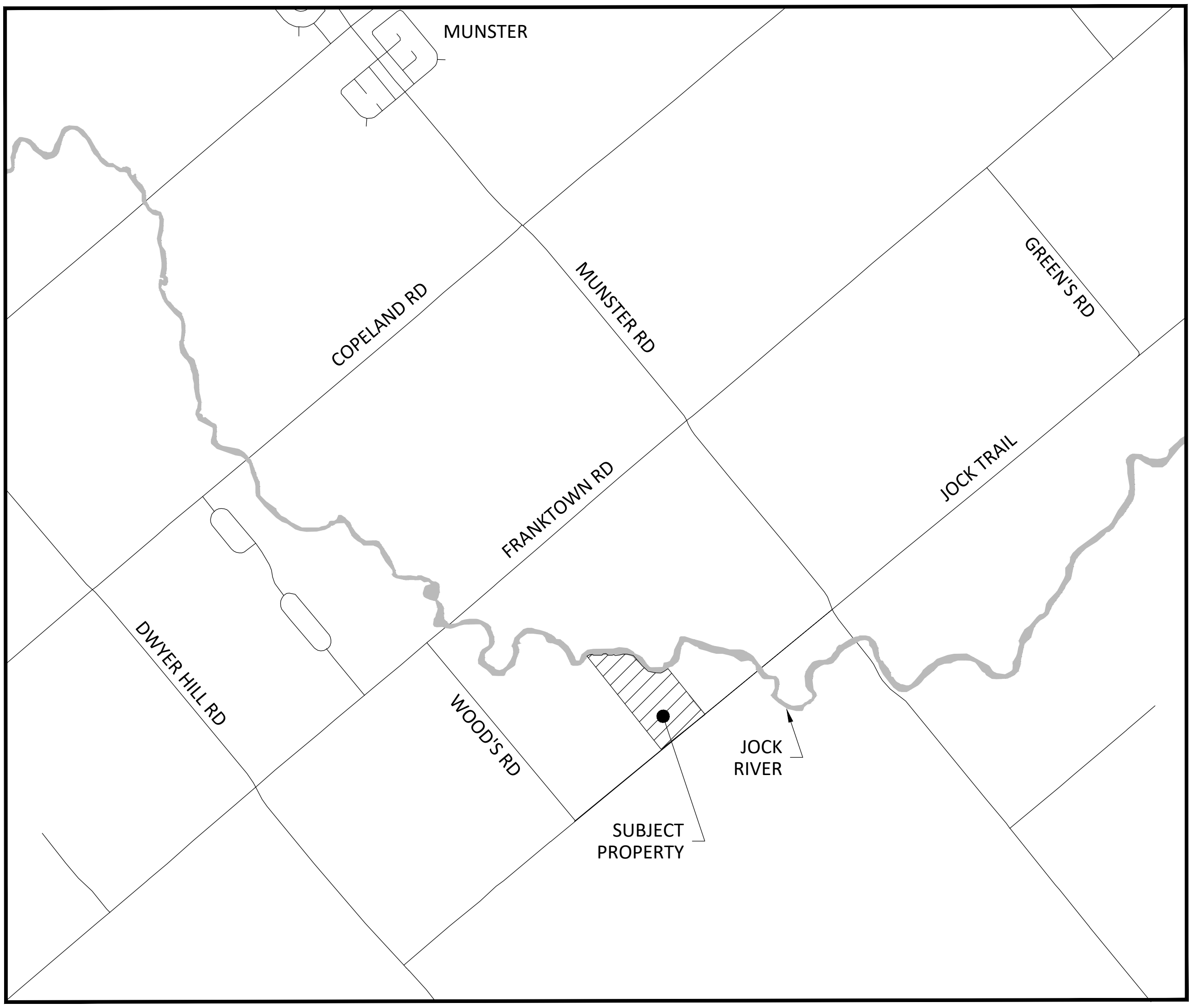
APPENDIX A

LOCATION PLAN



LOCATION PLAN
N.T.S.

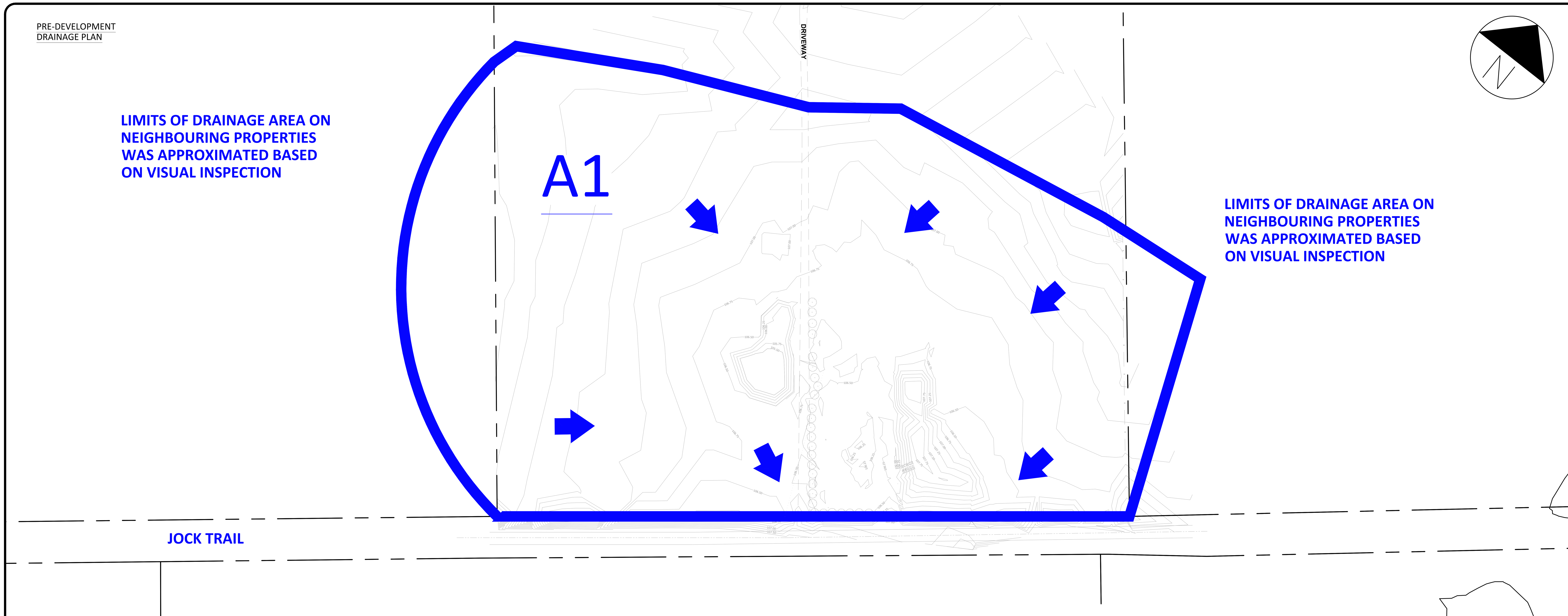
JABULANI WINERY
2022

SHADE GROUP INC

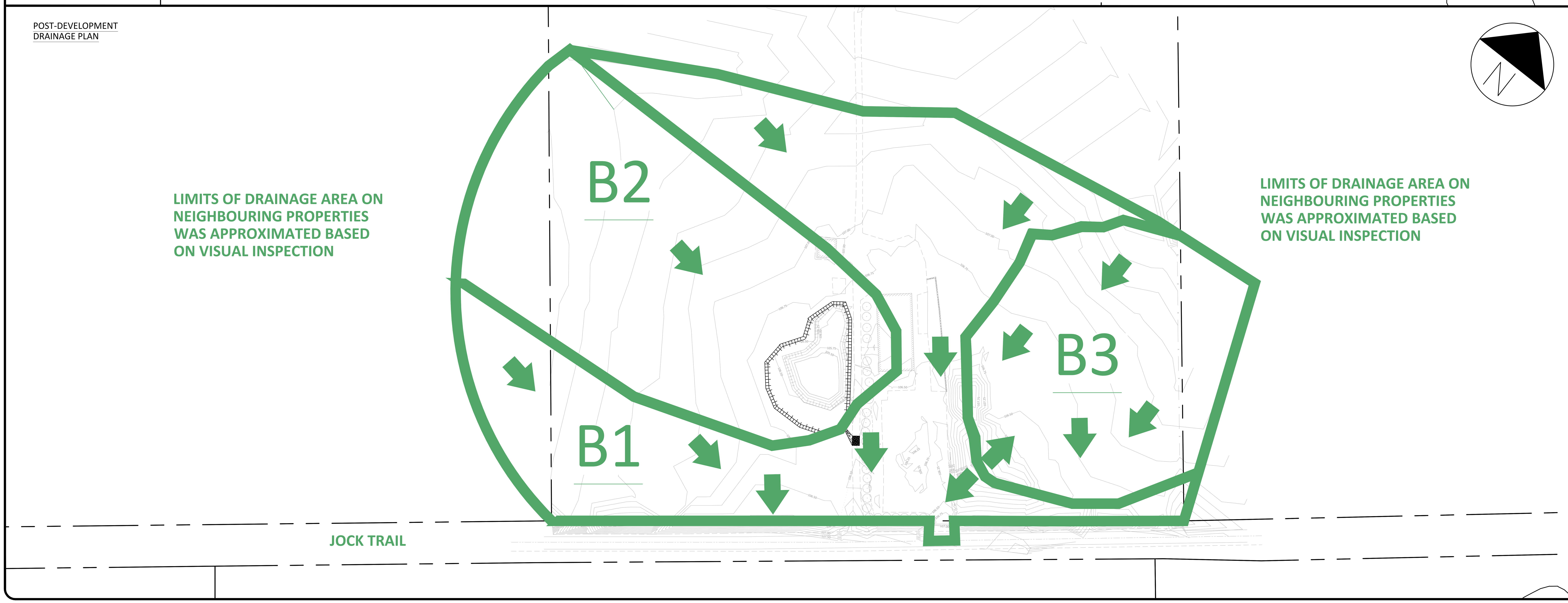
APPENDIX B

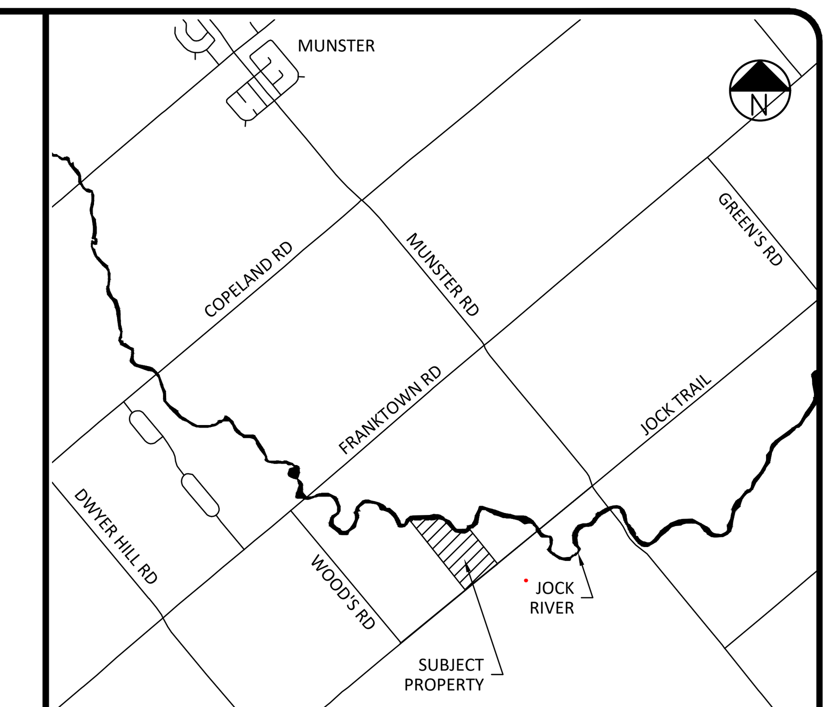
PRE- AND POST-DEVELOPMENT DRAINAGE PLAN

PRE-DEVELOPMENT DRAINAGE PLAN



POST-DEVELOPMENT DRAINAGE PLAN





SITE LOCATION MAP

N.T.S.

SCALE BAR

DO NOT SCALE DRAWING

0 25 50 75 100m

ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE MARKED.

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REV. #	REVISION DESCRIPTION	DATE
01	REVISED PER CITY COMMENTS	MAR 8, 2023
00	ISSUED FOR REVIEW	OCT 7, 2022

PROJECT TITLE: JABULANI WINERY

DRAWING TITLE: PRE- AND POST-DEVELOPMENT DRAINAGE PLAN

DRAWING NO.: 1 OF 1

APPENDIX C

STORMWATER MANAGEMENT CALCULATIONS

Stormwater Management Calculations
Pre-Development - Jabulani Winery

Pre-Development - Runoff Coefficient

	Area ID	
	A1	
	2-5 Year	100-Year
Total Area (m^2)	69000	
Gravel Laneway (m^2)	1158	
Runoff Coefficient (C)	0.60	0.75
Undeveloped Area (m^2)	67841	
Runoff Coefficient (C)	0.10	0.13
Weighted Runoff Coefficient (C)	**0.11**	**0.14**

Pre-Development - Time of Concentration

	Area ID	
	A1	
	2-5 Year	100-Year
Total Overland Flow Length (m)	295	
Slope of Land (%)	1.00	
Sheet Flow Length (m)	30	
Sheet Flow Tc (min)	**18**	**17**
Shallow Concentrated Flow Length (m)	265	
Shallow Concentrated Flow Velocity (m/s)	0.21	
Shallow Concentrated Flow Tc (min)	**21**	
Total Tc (min)	**39**	**38**

Pre-Development - Peak Flow

	Area ID	
	A1	
	2-5 Year	100-Year
Weighted Runoff Coefficient (C)	0.11	0.14
Total Area (ha)	6.90	
Time of Concentration (min)	39	38
Intensity (mm/hr) - 2-Year	34	
Intensity (mm/hr) - 5-Year	45	
Intensity (mm/hr) - 100-Year	78	

Peak Flow (L/s) - 2-Year	70
Peak Flow (L/s) - 5-Year	94
Peak Flow (L/s) - 100-Year	202

Stormwater Management Calculations
Post-Development - Jabulani Winery

Post-Development - Runoff Coefficient

	Area ID					
	B1		B2		B3	
	2-5 Year	100-Year	2-5 Year	100-Year	2-5 Year	100-Year
Total Area (m^2)	31885		23016		14229	
Gravel / Peastone (m^2)	3775		404		0	
Runoff Coefficient (C)	0.60	0.75	0.60	0.75	0.60	0.75
Impervious Area (m^2)	392		248		0	
Runoff Coefficient (C)	0.90	1.00	0.90	1.00	0.90	1.00
Undeveloped Area (m^2)	27718		22364		14229	
Runoff Coefficient (C)	0.10	0.13	0.10	0.13	0.10	0.13
Weighted Runoff Coefficient (C)	**0.17**	**0.21**	**0.12**	**0.15**	**0.10**	**0.13**

Post-Development - Time of Concentration

	Area ID					
	B1		B2		B3	
	2-5 Year	100-Year	2-5 Year	100-Year	2-5 Year	100-Year
Total Overland Flow Length (m)	195		220		165	
Slope of Land (%)	1.00		1.00		1.00	
Sheet Flow Length (m)	30		30		30	
Sheet Flow Tc (min)	**17**	**16**	**18**	**17**	**18**	**17**
Shallow Concentrated Flow Length (m)	165		190		135	
Shallow Concentrated Flow Velocity (m/s)	0.21		0.21		0.21	
Shallow Concentrated Flow Tc (min)	**13**		**15**		**11**	
Swale/Ditch Flow Length (m)	120		0		0	
Swale/Ditch Slope (%)	0.30		0.00		0.30	
Swale/Ditch Flow Velocity (m/s)	0.27		0.00		0.27	
Swale/Ditch Flow Tc (min)	**7**		**0**		**0**	
Total Tc (min)	**37**	**36**	**32**	**32**	**28**	**28**

Stormwater Management Calculations
Post-Development - Jabulani Winery

Post-Development - Peak Flow

	Area ID					
	B1		**B2**		**B3**	
	2-5 Year	**100-Year**	**2-5 Year**	**100-Year**	**2-5 Year**	**100-Year**
Weighted Runoff Coefficient (C)*	0.17	0.21	0.12	0.15	0.10	0.13
Total Area (ha)	3.19		2.30		1.42	
Time of Concentration (min)	37	36	32	32	28	28
Intensity (mm/hr) - 2-Year	35		38		41	
Intensity (mm/hr) - 5-Year	47		51		56	
Intensity (mm/hr) - 100-Year	81		88		96	
Peak Flow (L/s) - 2-Year	**52**		**29**		**16**	
Peak Flow (L/s) - 5-Year	**70**		**38**		**22**	
Peak Flow (L/s) - 100-Year	**150**		**82**		**48**	

Stormwater Management Calculations
Peak Flows Summary

Peak Flow Calculations Comparison

	Area ID	
	PRE	POST
Peak Flow (L/s) - 2-Year	70	97
Peak Flow (L/s) - 5-Year	94	130
Peak Flow (L/s) - 100-Year	202	279
Δ (L/s)- 2-Year	27	
Δ (L/s)- 5-Year	36	
Δ (L/s)- 100-Year	77	

Peak Flow Calculations Comparison - Controlled

	Area ID	
	PRE	POST
Peak Flow (L/s) - 2-Year	70	70
Peak Flow (L/s) - 5-Year	94	94
Peak Flow (L/s) - 100-Year	202	202
Δ (L/s)- 2-Year	0	
Δ (L/s)- 5-Year	0	
Δ (L/s)- 100-Year	0	
% Δ (%)- 2-Year	0%	
% Δ (%)- 5-Year	0%	
% Δ (%)- 100-Year	0%	

Stormwater Retention Area - Active
Estimated Storage Available

Area ID B2

Elevation (m)	Volume of Storage (m^3)	
106.40	0	
106.44	77	
106.45	99	
106.50	185	
106.55	274	*

*Calculations for total storage calculated in AutoCAD using Volume Surfaces

Stormwater Management Calculations
Storage Requirements

Area ID B2

Storage Requirements

2-Year Storm Event

Tc (min)	Intensity (mm/hr)	Flow (L/s)	Allowable Outflow (L/s)	Peak Flow to be Stored (L/s)	Volume of Storage Required (m^3)
32	38	29	1	27.3	53.2
92	18	13	1	12.2	67.5
152	12	9	1	7.9	72.3
212	9	7	1	5.8	74.3
272	8	6	1	4.6	74.8
332	7	5	1	3.7	74.5
392	6	4	1	3.1	73.7
452	5	4	1	2.7	72.4
512	5	3	1	2.3	70.8
572	4	3	1	2.0	68.9

Peak Storage Requirement - 2-Year (m^3)	74.8

5-Year Storm Event

Tc (min)	Intensity (mm/hr)	Flow (L/s)	Allowable Outflow (L/s)	Peak Flow to be Stored (L/s)	Volume of Storage Required (m^3)
32	51	38	2	36.6	71.3
92	24	18	2	16.1	89.2
152	16	12	2	10.3	94.6
212	12	9	2	7.6	96.3
272	10	8	2	5.9	96.1
332	9	7	2	4.8	94.8
392	8	6	2	3.9	92.7
452	7	5	2	3.3	90.1
512	6	5	2	2.8	87.1
572	6	4	2	2.4	83.7

Peak Storage Requirement - 5-Year (m^3)	96.3

Stormwater Management Calculations
Storage Requirements

100-Year Storm Event

Tc (min)	Intensity (mm/hr)	Flow (L/s)	Allowable Outflow (L/s)	Peak Flow to be Stored (L/s)	Volume of Storage Required (m^3)
32	88	82	5	76.7	147.1
92	40	38	5	32.5	179.2
152	27	25	5	20.3	185.0
212	21	20	5	14.4	183.0
272	17	16	5	10.9	177.2
332	15	14	5	8.5	169.2
392	13	12	5	6.8	159.6
452	11	11	5	5.5	148.8
512	10	10	5	4.5	137.2
572	9	9	5	3.6	125.0

Peak Storage Requirement - 100-Year (m^3)	185.0

SHADE GROUP INC

Stormwater Management Calculations
Outlet Control Structure - Rip-Rap Check Dam

Area ID B2

Flow Through A Check Dam:

$$Q = \frac{h^{2/3} W}{[(L/D)+25+L2]0.5}$$

Ref: "Site Erosion and Sediment Controls" by Robert Pitt, Shirey Clark, Donald W. Lake

where: Q = outflow (cfs)
h = ponding depth (ft)
W = width of check dam (ft) - see equation below
L = horizontal flow path through check dam (ft)
D = average rock diameter (ft)

W = (ss x h) + w

where: ss = side slopes
w = bottom width of opening (ft)

Input Data

Bottom Width	0	m
Side Slope	10	:1

L =	1.30	m
D =	0.04	m

Flow Through Rock Check Dam

Elevation (m)	h (m)	h (ft)	W (ft)	L (ft)	D (ft)	$Q_{C.D.}$ (ft^3/s)	$Q_{C.D.}$ (L/s)	
106.40	0.00	0.00	0.00	4.27	0.12	0.00	0	
106.44	0.04	0.14	1.38	4.27	0.12	0.04	1	2-Year
106.45	0.05	0.18	1.77	4.27	0.12	0.06	2	5-Year
106.50	0.10	0.33	3.33	4.27	0.12	0.18	5	100-Year
106.55	0.15	0.49	4.92	4.27	0.12	0.35	10	

Stage-Storage-Discharge

Elevation (m)	Volume of Storage (m3)	Discharge (L/s)	
106.40	0	0	
106.44	77	1	2-Year
106.45	99	2	5-Year
106.50	185	5	100-Year
106.55	274	10	

Low Water Crossing - Ponding Level Review
8005 Jock Trail

Runoff Coefficient - Area South of Pond that Drains to Low Water Crossing

Total Area (m^2)	500	
Gravel Laneway (m^2)	123	*35m x 3.5m wide
Runoff Coefficient (C)	0.75	
Undeveloped Lands (m^2)	378	
Runoff Coefficient (C)	0.13	
Weighted Runoff Coefficient (C)*	**0.28**	

Time of Concentration - Area South of Pond that Drains to Low Water Crossing

Overland Flow Length	30	m	
Overland Slope	1	%	
Time of Concentration (Tc)	15	min	(Airport Formula)

Shallow Concentrated Flow Length	10	m
Shallow Concentrated Flow Velocity	0.21	m/s
Shallow Concentrated Flow Tc	1	min

Ditch Flow Length	0	m	
Ditch Slope	0	%	(Assumed)
Velocity	0.00	m/s	
Time of Concentration (Tc)	0	min	

Cumulative Tc	**15**	**min**

Peak Flow - Area South of Pond that Drains to Low Water Crossing + Pond Outflow

Weighted Runoff Coefficient (C)	0.28	
Total Area (ha)	0.05	
Time of Concentration (min)	15	
Intensity (mm/hr) - 100-Year	141	
Peak Flow (L/s) - 100-Year	**11**	*Includes restricted runoff from outflow of pond

Low Water Crossing - Ponding Level Review
8005 Jock Trail

Low Water Crossing Capacity

Low Water Crossing Invert =	106.35	m
Max Ponding Elevation =	106.55	m
Max available ponding =	0.2	m
Fore Slope =	3	%
Back Slope =	3	%

Rougness Coeff	0.02	
Channel Slope	0.50	%
Area	2.25	m^2
Wetted Perimeter	17.94	m
R	0.13	m
Q	1737.04	L/s

Given the relatively shallow 'side slopes' of the low water crossing (3%), and as the total peak flow crossing the laneway is expected to be relatively limited (~11 L/s - 100-year storm); the level of ponding experienced, even during the 100-year storm event, is expected to be minimal; and certainly less than 0.2m. As the permissible level of overtopping during a 100-year storm event is typically designed up to a maximum of 0.3m, the proposed low water crossing design is within the allowable design criteria.

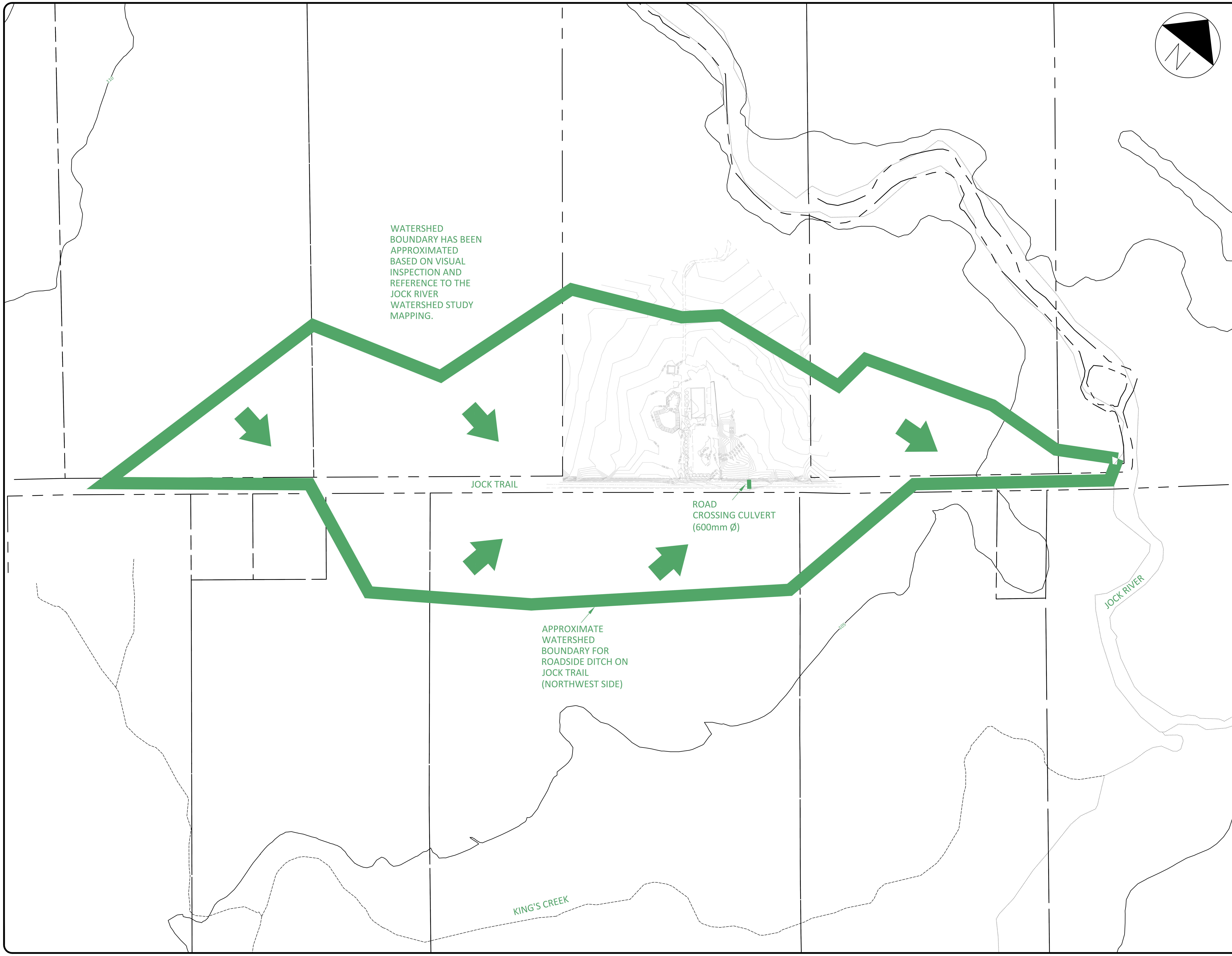
Stormwater Retention Area - Permanent Pool
Estimated Storage Available

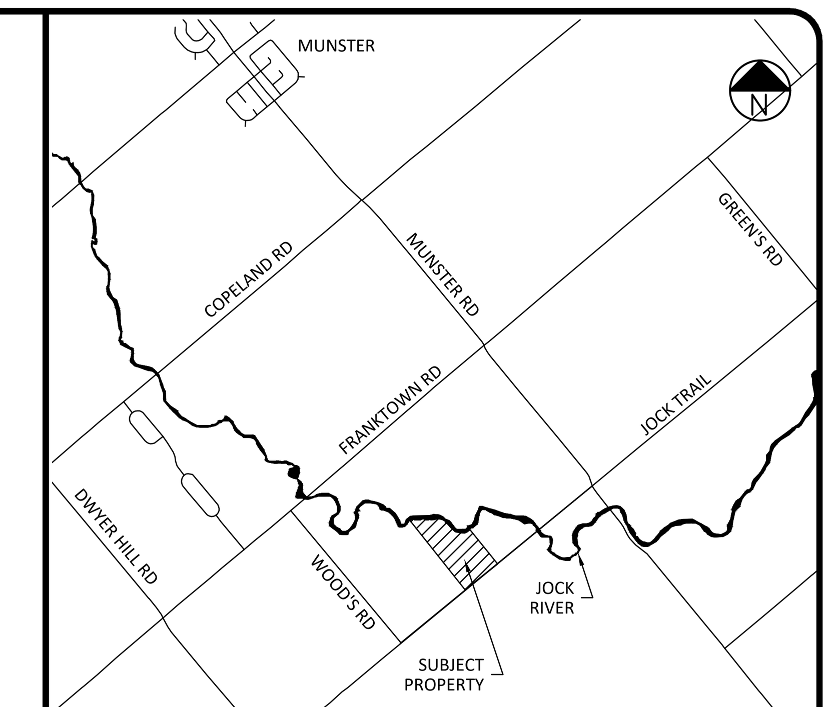
Elevation (m)	Volume of Storage (m^3)
105.25	0
105.40	44
105.50	77
105.80	203
105.90	254
106.10	394
106.30	565
106.40	661

*Calculations for storage determined in AutoCAD based on depth information provided by the owner.
*Design of the permanent pool to ensure it's suitability for fire retention is to be by others.

APPENDIX D

ROADSIDE DITCH CONTRIBUTING DRAINAGE PLAN AND CALCULATIONS





SITE LOCATION MAP N.T.S.

SCALE BAR

DO NOT SCALE DRAWING

0 50 100 150 200m

ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE MARKED.

PAGE SIZE	24" x 36"	SCALE	1:2000

SHADE GROUP INC.
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SHADE GROUP INC

REV. #	REVISION DESCRIPTION	DATE
00	REVISED PER CITY COMMENTS	MAR 10, 2023

PROJECT TITLE
JABULANI WINERY

DRAWING TITLE
ROADSIDE DITCH CONTRIBUTING DRAINAGE PLAN

DRAWING NO.
1 OF 1

Downstream Ditch Capacity Review
8005 Jock Trail

Runoff Coefficient - 100-Year

Total Area (m^2)	263336	
Road (m^2)	5000	*1250m x 4m wide
Runoff Coefficient (C)	1.00	
Gravel Shoulder (m^2)	1875	*1250m x 1.5m wide
Runoff Coefficient (C)	0.75	
Undeveloped Lands (m^2)	256461	
Runoff Coefficient (C)	0.13	
Weighted Runoff Coefficient (C)*	**0.15**	

Time of Concentration

Overland Flow Length	30	m	
Overland Slope	0.5	%	(Assumed)
Time of Concentration (Tc)	21	min	(Airport Formula)

Shallow Concentrated Flow Length	215	m
Shallow Concentrated Flow Velocity	0.15	m/s
Shallow Concentrated Flow Tc	24	min

Ditch Flow Length	1000	m	
Ditch Slope	0.5	%	(Assumed)
Velocity	0.35	m/s	
Time of Concentration (Tc)	48	min	

Cumulative Tc	**93**	**min**

Peak Flow

Weighted Runoff Coefficient (C)	0.15	
Total Area (ha)	26.33	
Time of Concentration (min)	93	
Intensity (mm/hr) - 100-Year	40	
Peak Flow (L/s) - 100-Year	**645**	*Includes restricted runoff rate for 8005 Jock Trail

Downstream Ditch Capacity Review
8005 Jock Trail

Ditch Capacity - Front of 8005 Jock Trail

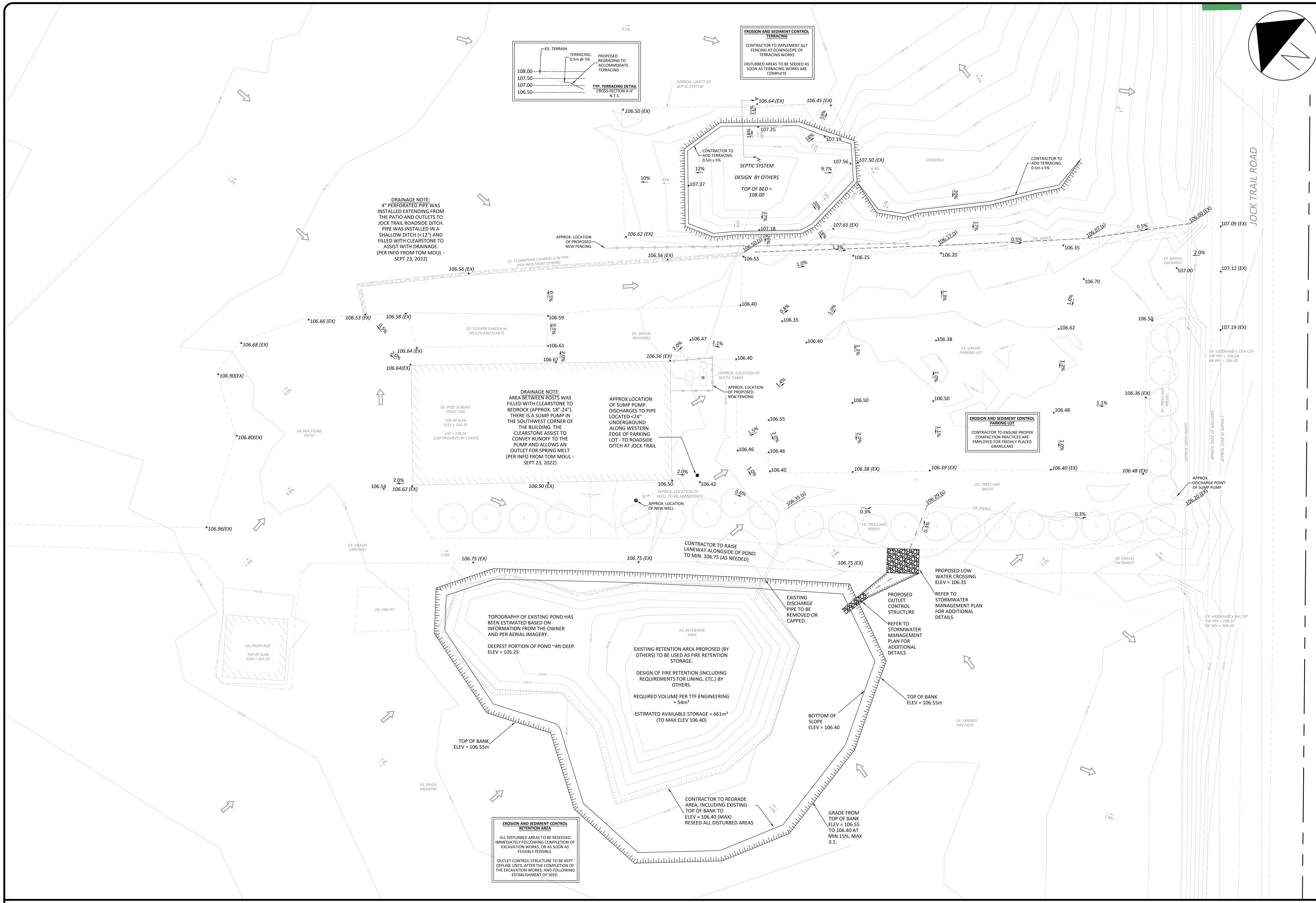
Ditch Invert =	105.54	m	
Edge of Shoulder Elev =	106.86	m	
Top of Slope Elev =	106.75	m	*backslope at fence line
Max available ponding =	1.21	m	
Fore Slope =	50	%	
Back Slope =	50	%	

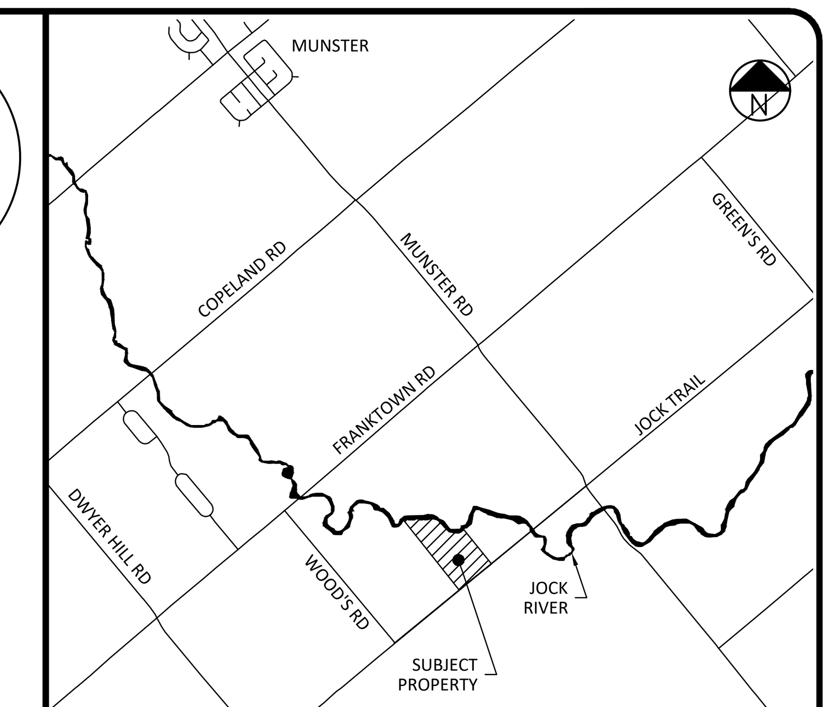
Rougness Coeff	0.03	
Channel Slope	0.82	%
Area	3.15	m^2
Wetted Perimeter	5.74	m
R	0.55	m
Q	6362.74	L/s

As the maximum available capacity of the ditch in front of 8005 Jock Trail is greater than the anticipated 100-year peak flow, capacity of the immediate downstream system is not anticipated to be a concern

APPENDIX E

GRADING AND DRAINAGE PLAN





SITE LOCATION MAP N.T.S.

SCALE BAR — DO NOT SCALE DRAWING

0 5 10 25m

ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE MARKED.

PAGE SIZE	24" x 36"	SCALE	1:250

SHADE GROUP INC.
PO BOX 1716
ALMONTE, ON
K0A 1A0

SHADE GROUP INC

LEGEND
(IF APPLICABLE)

- PROPERTY BOUNDARY
- EX. ROAD CENTRE LINE
- EX. EDGE OF ASPHALT
- EX. EDGE OF SHOULDER
- EX. DITCH
- 100.00 — EX. CONTOUR AND ELEVATION
- APPROX. LOCATION OF EXISTING UNDERGROUND UTILITIES
- EX. BUILDING
- EX. OVERLAND FLOW ROUTE
- 2.0% — EX. OVERLAND FLOW SLOPE AND DIRECTION OF FLOW
- EX. TREES + BRUSH
- 0.3% — SWALE SLOPE AND DIRECTION OF FLOW
- 106.17 (s) — SWALE DESIGN ELEVATION
- 106.20 (EX) — EX. DITCH ELEVATION
- PR. TOP OF SLOPE
- PR. FENCING
- 106.50 (EX) — DESIGN ELEVATION - MATCH EXISTING
- 106.50 — PR. DESIGN ELEVATION
- 2.0% — PR. DRAINAGE DIRECTION & SLOPE

REV. #	REVISION DESCRIPTION	DATE
02	REVISED PER CITY COMMENTS	APR 18, 2023
01	REVISED PER CITY COMMENTS	MAR 8, 2023
00	ISSUED FOR REVIEW	OCT 7, 2022

STAMP

LICENSED PROFESSIONAL ENGINEER
M. K. SHADE
100170995
APR 18, 2023
PROVINCE OF ONTARIO

GENERAL NOTES

1. ALL TOPOGRAPHY, GROUND ELEVATIONS AND SURVEY DATA ARE SHOWN FOR INFORMATION PURPOSES ONLY AND IMPLY NO GUARANTEE OF ACCURACY. ALL DIMENSIONS AND ELEVATIONS TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. THIS PLAN HAS BEEN PREPARED IN REFERENCE TO A SITE PLANS PREPARED BY GEMTEC, DATED JULY 2022
3. THIS PLAN IS NOT A CADASTRAL SURVEY SHOWING LEGAL PROPERTY BOUNDARIES OR EASEMENTS. THE PROPERTY BOUNDARIES SHOWN HAVE BEEN DERIVED DATA SUPPLIED BY GEMTEC.
4. THE OWNER IS RESPONSIBLE FOR ALL PERMITS AND APPROVALS FROM THE APPLICABLE AGENCIES PRIOR TO CONSTRUCTION.
5. CONTRACTOR RESPONSIBLE FOR ACQUIRING LOCATES PRIOR TO CONSTRUCTION. APPROXIMATE LOCATION OF UNDERGROUND UTILITIES IS FOR INFORMATION PURPOSES ONLY AND IS PER INFORMATION SUPPLIED BY THE OWNER. THERE IS NO IMPLIED GUARANTEE OF ACCURACY.
6. LAYOUT BY OTHERS.
7. ALL DISTURBED AREAS ARE TO BE SEEDED AS SOON AS FEASIBLE. NO BARE TOPSOIL SHALL REMAIN. ALL DISTURBED AREAS INTENDED TO BE FINISHED AS GRASS ARE TO BE TREATED WITH A MIN. 75mm TOPSOIL AND SEED (OR SOD).
8. ALL DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION OR BETTER UNLESS OTHERWISE SPECIFIED.
9. DISTURBED AREAS WITHIN THE ROAD ALLOWANCE ARE TO BE RESTORED TO THE SATISFACTION OF THE APPLICABLE AUTHORITY.
10. GRADING NOT TO EXTEND BEYOND PROPERTY LINES.
11. ALL PARKING LOT AND GRADING WORKS ARE TO BE COMPLETED IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS. THE CONTRACTOR IS TO ENSURE POSITIVE DRAINAGE AWAY FROM ALL BUILDINGS.
12. ALL WORKS ARE TO BE PERFORMED IN ACCORDANCE WITH CURRENT CODES AND STANDARDS.
13. ANY CHANGES MADE TO THIS PLAN ARE TO BE VERIFIED AND APPROVED BY SHADE GROUP INC. AND ARE SUBJECT TO APPROVAL FROM THE APPROPRIATE APPROVAL AGENCIES.
14. UNDERSIDE OF FOOTING ELEVATION WAS PROVIDED BY CLIENT. SHADE GROUP HAS PREPARED THE ENCLOSED PLAN BY VISUAL INSPECTION AND THROUGH INPUT FROM OTHERS. SHADE GROUP DID NOT DESTRUCTIVE OR NON DESTRUCTIVE TESTING, NOR WAS SHADE GROUP RETAINED TO COMPLETE ANY EXCAVATION OR DRILLING TO VERIFY SUBSURFACE FEATURES OR CONDITIONS.
15. TOPOGRAPHY OF EXISTING RETENTION AREA IS APPROXIMATE ONLY AND HAS BEEN ESTIMATED BASED ON INFORMATION PROVIDED BY THE OWNER.
16. ENGINEER TO CONFIRM PERMANENT POOL AND ACTIVE STORAGE AREAS POST-CONSTRUCTION.

PARKING LOT CROSS-SECTION

REFER TO THE "ASSESSMENT OF PARKING LOT SUBSURFACE CONDITIONS" REPORT PREPARED BY GEMTEC, DATED JULY 26, 2022 FOR DETAILS PERTAINING TO THE PARKING LOT CROSS-SECTION.

EROSION AND SEDIMENT CONTROL NOTES

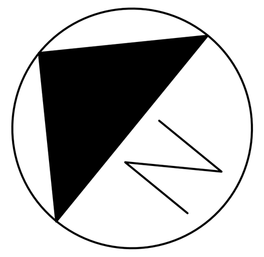
1. BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED BY THE CONTRACTOR/OWNER TO PROTECT THE SITE AND SURROUNDING PROPERTIES DURING ANY CONSTRUCTION ACTIVITIES. THIS INCLUDES PRACTICES SUCH AS LIMITING THE AMOUNT OF DISTURBED LANDS, AND INSTALLATION OF SILT FENCE BARRIERS.
2. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED AT THE DISCRETION OF THE PROJECT MANAGER, OWNER, CONSERVATION AUTHORITY, MECP, MUNICIPALITY OR OTHER APPLICABLE REGULATORY AGENCY.
3. DISTURBED AREAS ARE TO BE TOPSOILED, SEEDED AND/OR STABILIZED UPON COMPLETION, OR THROUGH LONG PERIODS OF WORK STOP (E.G. DURING WINTER MONTHS).
4. REGROWTH OF VEGETATION SHALL BE A PRIORITY UPON SITE COMPLETION. VEGETATION OF THE SITE SERVES AS A KEY EROSION AND SEDIMENT CONTROL PRACTICE FOR THE LONG TERM PERFORMANCE OF THE SITE.
5. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO THE START OF CONSTRUCTION. ALL MEASURES ARE TO BE MONITORED AND MAINTAINED THROUGHOUT THE DURATION OF CONSTRUCTION, INCLUDING UPON COMPLETION, UP UNTIL THE SITE IS DEEMED STABLE.
6. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED AS PER MANUFACTURER SPECIFICATIONS. WHERE NO SUCH SPECIFICATION IS AVAILABLE, REFERENCE SHALL BE MADE TO THE APPROPRIATE OPSD OR OPSS.
7. THE CONTRACTOR IS RESPONSIBLE FOR DEVELOPING A MAINTENANCE AND MONITORING PLAN FOR EROSION AND SEDIMENT CONTROL. THIS SHALL INCLUDE CONSIDERATION FOR INSPECTION, AND DUE CONSIDERATION FOR MAINTENANCE, INCLUDING REMOVAL OF ACCUMULATED SEDIMENT AND REMOVAL IN SUCH A MANNER THAT SEDIMENT IS NOT DISCHARGED DOWNSTREAM.
8. REFER TO THE MTO EROSION AND SEDIMENT CONTROL GUIDE ON PROPER PRACTICE IN MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES.

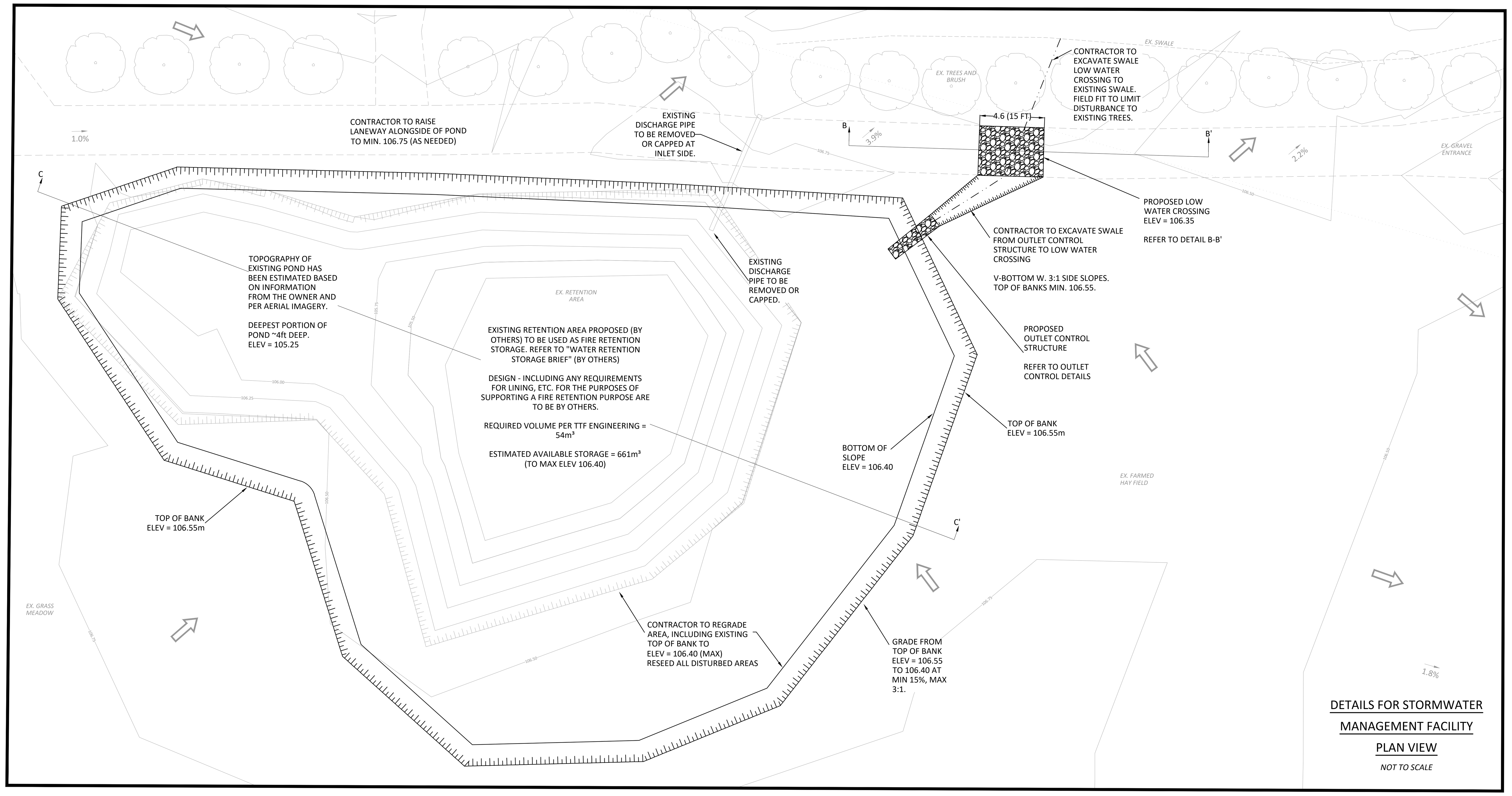
LIMITATIONS

THIS GRADING AND DRAINAGE PLAN HAS BEEN PREPARED BASED ON EXISTING SITE CONDITIONS AND PROVIDES IMPROVEMENTS WHERE FEASIBLE TO DIRECT RUNOFF TO THE APPROPRIATE OUTLETS. IT IS ACKNOWLEDGED THAT THIS PLAN MAY NOT COMPLY WITH ALL OF THE CITY OF OTTAWA GRADING GUIDELINES HOWEVER GIVEN THE DEVELOPMENT HAS BEEN IN EXISTENCE FOR ~10 YEARS, A COMPLETE RE-GRADE WOULD BE COST PROHIBITIVE. INSTEAD, BEST EFFORTS HAVE BEEN MADE WHERE EVER FEASIBLE.

PROJECT TITLE	**JABULANI WINERY**
DRAWING TITLE	**GRADING AND DRAINAGE PLAN**
DRAWING NO.	**1 OF 2**

CITY DEVELOPMENT APPLICATION NO. D07-12-22-0113. PLAN NUMBER 18922



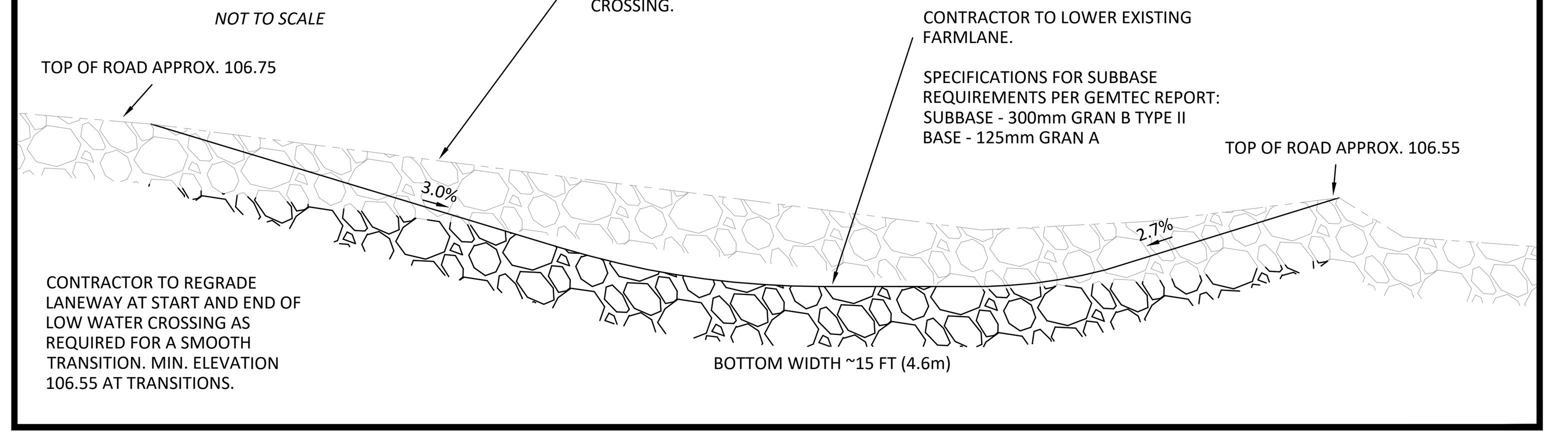


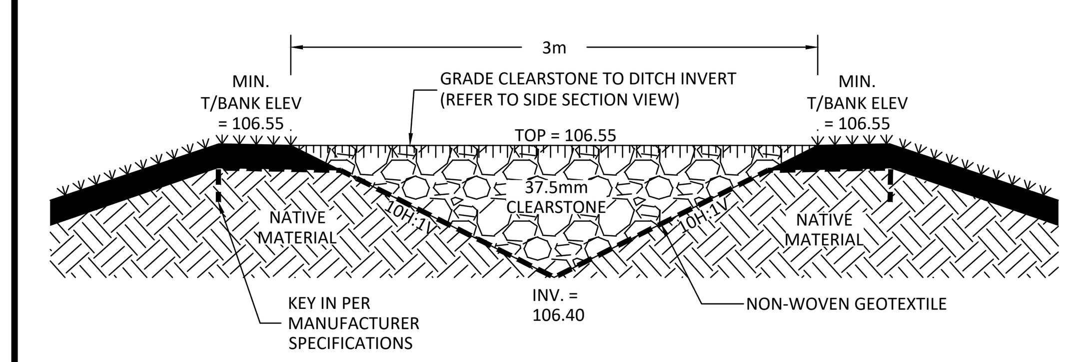
DETAILS FOR STORMWATER MANAGEMENT FACILITY PLAN VIEW

NOT TO SCALE

LOW WATER CROSSING DETAIL CROSS-SECTION B-B'

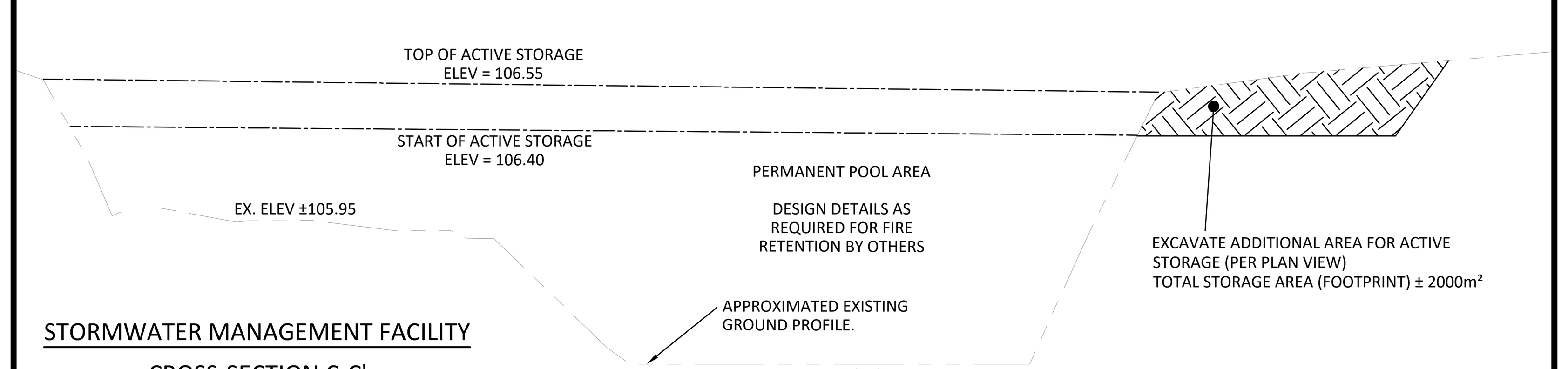
NOT TO SCALE





OUTLET CONTROL STRUCTURE END VIEW

NOT TO SCALE

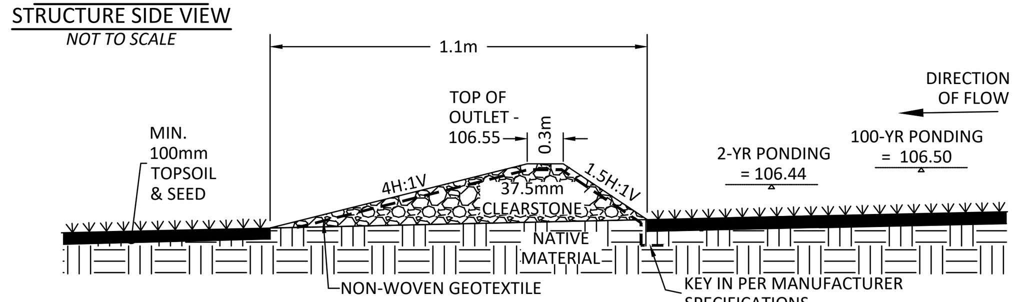


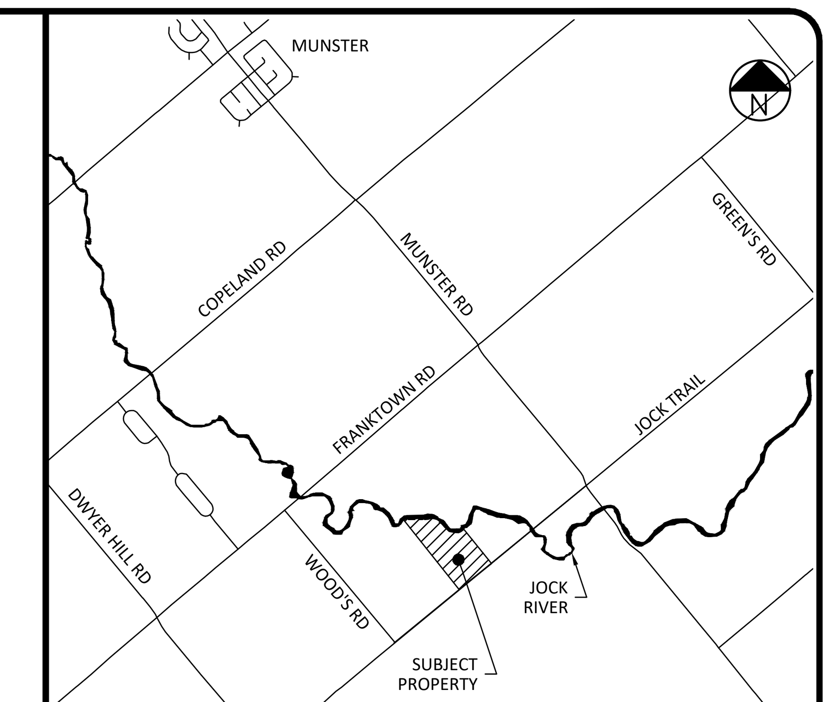
STORMWATER MANAGEMENT FACILITY CROSS-SECTION C-C'

NOT TO SCALE

OUTLET CONTROL STRUCTURE SIDE VIEW

NOT TO SCALE





SITE LOCATION MAP N.T.S.

PAGE SIZE	24" x 36"	SCALE	N.T.S.

SHADE GROUP INC.
PO BOX 1716
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K0A 1A0

LEGEND

(IF APPLICABLE)

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- EX. EDGE OF ASPHALT
- EX. EDGE OF SHOULDER
- EX. DITCH
- 100.00 — EX. CONTOUR AND ELEVATION
- APPROX. LOCATION OF EXISTING UNDERGROUND UTILITIES
- EX. BUILDING
- EX. OVERLAND FLOW ROUTE
- 2.0% — EX. OVERLAND FLOW SLOPE AND DIRECTION OF FLOW
- EX. TREES + BRUSH
- 0.3% — SWALE SLOPE AND DIRECTION OF FLOW
- 106.17 (S) — SWALE DESIGN ELEVATION
- 106.20 (EX) — EX. DITCH ELEVATION
- PR. TOP OF SLOPE
- PR. FENCING
- 106.50 (EX) — DESIGN ELEVATION - MATCH EXISTING
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M. K. SHADE
100170995
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10. GRADING NOT TO EXTEND BEYOND PROPERTY LINES.
11. ALL PARKING LOT AND GRADING WORKS ARE TO BE COMPLETED IN ACCORDANCE WITH CITY STANDARDS AND SPECIFICATIONS. THE CONTRACTOR IS TO ENSURE POSITIVE DRAINAGE AWAY FROM ALL BUILDINGS.
12. ALL WORKS ARE TO BE PERFORMED IN ACCORDANCE WITH CURRENT CODES AND STANDARDS.
13. ANY CHANGES MADE TO THIS PLAN ARE TO BE VERIFIED AND APPROVED BY SHADE GROUP INC. AND ARE SUBJECT TO APPROVAL FROM THE APPROPRIATE APPROVAL AGENCIES.
14. UNDERSIDE OF FOOTING ELEVATION WAS PROVIDED BY CLIENT. SHADE GROUP HAS PREPARED THE ENCLOSED PLAN BY VISUAL INSPECTION AND THROUGH INPUT FROM OTHERS. SHADE GROUP DID NOT DESTRUCTIVE OR NON DESTRUCTIVE TESTING, NOR WAS SHADE GROUP RETAINED TO COMPLETE ANY EXCAVATION OR DRILLING TO VERIFY SUBSURFACE FEATURES OR CONDITIONS.
15. TOPOGRAPHY OF EXISTING RETENTION AREA IS APPROXIMATE ONLY AND HAS BEEN ESTIMATED BASED ON INFORMATION PROVIDED BY THE OWNER.
16. ENGINEER TO CONFIRM PERMANENT POOL AND ACTIVE STORAGE AREAS POST-CONSTRUCTION.

PARKING LOT CROSS-SECTION

REFER TO THE "ASSESSMENT OF PARKING LOT SUBSURFACE CONDITIONS" REPORT PREPARED BY GEMTEC, DATED JULY 26, 2022 FOR DETAILS PERTAINING TO THE PARKING LOT CROSS-SECTION.

EROSION AND SEDIMENT CONTROL NOTES

1. BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED BY THE CONTRACTOR/OWNER TO PROTECT THE SITE AND SURROUNDING PROPERTIES DURING ANY CONSTRUCTION ACTIVITIES. THIS INCLUDES PRACTICES SUCH AS LIMITING THE AMOUNT OF DISTURBED LANDS, AND INSTALLATION OF SILT FENCE BARRIERS.
2. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED AT THE DISCRETION OF THE PROJECT MANAGER, OWNER, CONSERVATION AUTHORITY, MECP, MUNICIPALITY OR OTHER APPLICABLE REGULATORY AGENCY.
3. DISTURBED AREAS ARE TO BE TOPSOILED, SEEDED AND/OR STABILIZED UPON COMPLETION, OR THROUGH LONG PERIODS OF WORK STOP (E.G. DURING WINTER MONTHS).
4. REGROWTH OF VEGETATION SHALL BE A PRIORITY UPON SITE COMPLETION. VEGETATION OF THE SITE SERVES AS A KEY EROSION AND SEDIMENT CONTROL PRACTICE FOR THE LONG TERM PERFORMANCE OF THE SITE.
5. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO THE START OF CONSTRUCTION. ALL MEASURES ARE TO BE MONITORED AND MAINTAINED THROUGHOUT THE DURATION OF CONSTRUCTION, INCLUDING UPON COMPLETION, UP UNTIL THE SITE IS DEEMED STABLE.
6. ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED AS PER MANUFACTURER SPECIFICATIONS. WHERE NO SUCH SPECIFICATION IS AVAILABLE, REFERENCE SHALL BE MADE TO THE APPROPRIATE OPSD OR OPSS.
7. THE CONTRACTOR IS RESPONSIBLE FOR DEVELOPING A MAINTENANCE AND MONITORING PLAN FOR EROSION AND SEDIMENT CONTROL. THIS SHALL INCLUDE CONSIDERATION FOR INSPECTION, AND DUE CONSIDERATION FOR MAINTENANCE, INCLUDING REMOVAL OF ACCUMULATED SEDIMENT AND REMOVAL IN SUCH A MANNER THAT SEDIMENT IS NOT DISCHARGED DOWNSTREAM.
8. REFER TO THE MTO EROSION AND SEDIMENT CONTROL GUIDE ON PROPER PRACTICE IN MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES.

LIMITATIONS

THIS GRADING AND DRAINAGE PLAN HAS BEEN PREPARED BASED ON EXISTING SITE CONDITIONS AND PROVIDES IMPROVEMENTS WHERE FEASIBLE TO DIRECT RUNOFF TO THE APPROPRIATE OUTLETS. IT IS ACKNOWLEDGED THAT THIS PLAN MAY NOT COMPLY WITH ALL OF THE CITY OF OTTAWA GRADING GUIDELINES HOWEVER GIVEN THE DEVELOPMENT HAS BEEN IN EXISTENCE FOR ~10 YEARS, A COMPLETE RE-GRADE WOULD BE COST PROHIBITIVE. INSTEAD, BEST EFFORTS HAVE BEEN MADE WHERE EVER FEASIBLE.

PROJECT TITLE: **JABULANI WINERY**

DRAWING TITLE: **STORMWATER MANAGEMENT DETAILS PLAN**

DRAWING NO.: **2 OF 2**

CITY DEVELOPMENT APPLICATION NO. D07-12-22-0113. PLAN NUMBER 18922