

Date: July 14, 2022  
UEM Project #20-118

Prepared for:

**TOWN OF NIAGARA-ON-THE-LAKE**

Prepared by:

**URBAN & ENVIRONMENTAL MANAGEMENT INC.**

# STORMWATER MANAGEMENT BRIEF FOR ESTATE WINERY SITE PLAN APPROVAL 823 LINE 6 ROAD, NIAGARA-ON-THE-LAKE



UEM



## Stormwater Management Brief

<b>Project:</b>	Big Head Winery, 823 Line 6 Road, Niagara-on-the-Lake		
<b>Client:</b>	Big Head Wines	<b>Prepared By:</b>	L. Smith, E.I.T. M. Molek, P. Eng
<b>Subject:</b>	Stormwater Management Brief, Estate Winery		
<b>Date:</b>	July 14 <sup>th</sup> , 2022	UEM Project No. 20-118	

### 1.0 Introduction

The following stormwater management brief has been prepared in support of the Estate Winery development for the site located at 823 Line 6 Road, Niagara-on-the-Lake. Site plan approval was previously obtained for the renovation of the existing barn, with services installed for the planned building additions. The existing barn is located on a large parcel of land. However, the focus of the review is for the 2.58 ha area in the vicinity of the existing home and barn portion of the site and includes the Estate Winery additions, Phase 2 additions and the new entrance and parking lot works.

### 2.0 Stormwater Management Plan

For the proposed Site Plan Application (SPA), the Town of Niagara-on-the-Lake requested pre- and post-development stormwater flow calculations, and identification of how on-site drainage will be managed. The proposed total building additions to the original barn, are approximately 2,200m<sup>2</sup> including, sidewalks, and crushing area concrete pad. The total pavement area including the new entrance, parking area and driveway is approximately 3,300m<sup>2</sup>, and excludes the existing driveway to the home, which will be decommissioned. It was also assumed that the driveway and parking lot areas would be paved in the future, in order to size the stormwater management infrastructure for ultimate development conditions.

The proposed stormwater management plan will consist of downspout discharge to pervious grass areas to allow infiltration of stormwater runoff generated by the roof, as well as 388m of infiltration trench is proposed to intercept runoff south, east, and west of the proposed addition including the new entrance and parking lot areas. The trenches will also provide stormwater retention which will reduce runoff and will attenuate the stormwater peak flow.

Pre and post drainage area plans have been prepared showing proposed conditions and identifying the drainage pattern of the site. Flow estimates for the 5-year and 100-year storm events have been prepared for this site as well as the required storage volume required in the infiltration system.



### 3.0 Pre and Post Development

Drainage features servicing the site include: Four Mile Creek on the western edge of the property, which collects some overland flow from the vineyard. The front of the property to the north has a ditch that runs along Line 6 Road. The eastern edge of the site generally slopes to the north draining towards the Line 6 roadside ditch. To the south, there are three catch basins and swales that collect overland flow from the vineyard.

The pre-development discharge rate for the site was calculated to be 182.5 L/ for the 5-year storm, and 292.9 L/s for the 100-year storm. The post-development uncontrolled discharge rate for the site was calculated to be 247.3 L/s for the 5-year storm, and 397.0 L/s for the 100-year storm.

The proposed building additions will replace an existing gravel storage area, and an existing grass area. The downspouts along the north, east, and south sides of the building will be directed to pervious grass areas. The downspout on the west side of the building will be directed to asphalt areas and planter beds with infiltration trench. The proposed hardscaping will replace existing grass area. A runoff coefficient of 0.9 was used for the existing building, asphalt, and gravel areas. A runoff coefficient of 0.2 was used for the grass areas.

To reduce runoff from the building additions and proposed parking lot areas, infiltration trenches are proposed to provide infiltration as well as direct runoff from east and south of the proposed winery, and eventually north along the sides of the proposed driveway. The infiltration will also help to detain stormwater on-site.

A small area along the east side of the building will be directed to a 54 m infiltration trench including 150mm diameter perforated pipe subdrain and NDS Flow Well storage chamber located in the vicinity of the northeast corner of the winery and will provide approximately 14.4m<sup>3</sup> of stormwater runoff storage

An infiltration trench will be constructed west of the proposed addition along the planters and direct runoff to the infiltration trench south of the parking lot. Along the planters, the infiltration trench will be 56m of 200mm perforated pipe subdrain and 800mm x 800mm clear stone and will provide approximately 15.3 m<sup>3</sup> of runoff storage. The trench will outlet to an infiltration trench along the south edge of the parking lot via a 200mm Boss 2000 non-perforated rigid HDPE pipe. In addition, a 66m trench including 150mm diameter subdrain pipe will be installed along the south limits of the building addition and will provide approximately 17.6 m<sup>3</sup> of runoff storage. This trench will convey the water away from the property line and new building additions and direct runoff to the interior of the site, tying into the planter bed/parking lot system located on the west side of the new building additions.

Starting at the southeast corner of the proposed parking lot and running west then north along the edge of the parking lot, there will be a 71m of 200mm diameter perforated pipe subdrain and 800mm x 800mm clear stone infiltration trench that will provide approximately 19.4m<sup>3</sup> of



stormwater runoff storage. The trench system will be cross under the new driveway and will be directed to another infiltration trench that runs east of the proposed driveway.

A 200mm Boss 2000 non-perforated rigid HDPE pipe will cross the proposed driveway and will direct runoff from the parking lot system, north towards Line 6 through a 141m of 200mm diameter perforated pipe subdrain and 800mm x 800mm clear stone infiltration trench, that will provide approximately 38.6m<sup>3</sup> of runoff storage.

West of the proposed driveway a 141m long swale and subdrain is proposed to provide some additional infiltration. Both infiltration trench and swale subdrains, running north along the driveway will terminate at the north end of the site, shy of the Line 6 roadside ditch to retain stormwater onsite.

The infiltration systems have been designed to retain stormwater and control the post-development peak flow rates up to the 100-year storm event to the pre-development peak flow rates. It was determined that a storage volume 64.8m<sup>3</sup> is required for the proposed works to control runoff to within predevelopment rates

The proposed infiltration trench systems will have a combined storage capacity of 105.3m<sup>3</sup>, which will offset rainfall generated from the proposed building addition and site works. Attached are pre- and post-development runoff calculations including infiltration trench volume calculations.

**Table 3-1: Pre- and Post-Development Flow Rates and Required Storage Volumes**

Storm	Pre-Development Flow Rate (L/s)	Post-Development Uncontrolled Flow Rate (L/s)	Target Post-Development Flow Rate	Storage Volume Required (m <sup>3</sup> )
5-year	182.5	247.3	182.5	38.9
100-year	292.9	397.0	292.9	64.8
<b>Total Storage Required (m<sup>3</sup>)</b>				<b>64.8</b>
<b>Total Storage Provided (m<sup>3</sup>)</b>				<b>105.3</b>

## 4.0 Maintenance Procedures

The infiltration trenches have been designed to require minimal maintenance. They will be wrapped in a geotextile terrafix 270R material which will prevent debris and most sedimentation from entering the trench system. Cleanouts will be installed at one end of each trench to allow for CCTV inspection and cleaning procedures. The Flow-Well has a removable drain at the surface that can be utilized to perform visual inspections and cleaning out of the well. Recommended maintenance schedule for the stormwater management system is as follows.



**Table 4-1: Recommended Routine Maintenance Tasks**

<b>Maintenance Task</b>	<b>Frequency</b>
Flush out sediment in subdrain	As needed
Visual inspection of trench surface (check for any abnormalities, settling of system, sinkholes adjacent to trench)	Annually
CCTV of subdrain	Annually

## 5.0 Conclusion

With the proposed building addition rooftop downspouts discharging overland to pervious grass areas, and the proposed installation of an infiltration trench south, east, and west of the proposed building and hardscaping area to attenuate runoff, retain stormwater and provide infiltration, the proposed stormwater management plan will meet the stormwater management objectives of controlling site discharge to within pre-development levels for up to the 100-year design storm. The proposed infiltration system has more than enough storage capacity to meet the demands of the 100-year design storm.

## Attachments

Subdrain Cleanout Detail

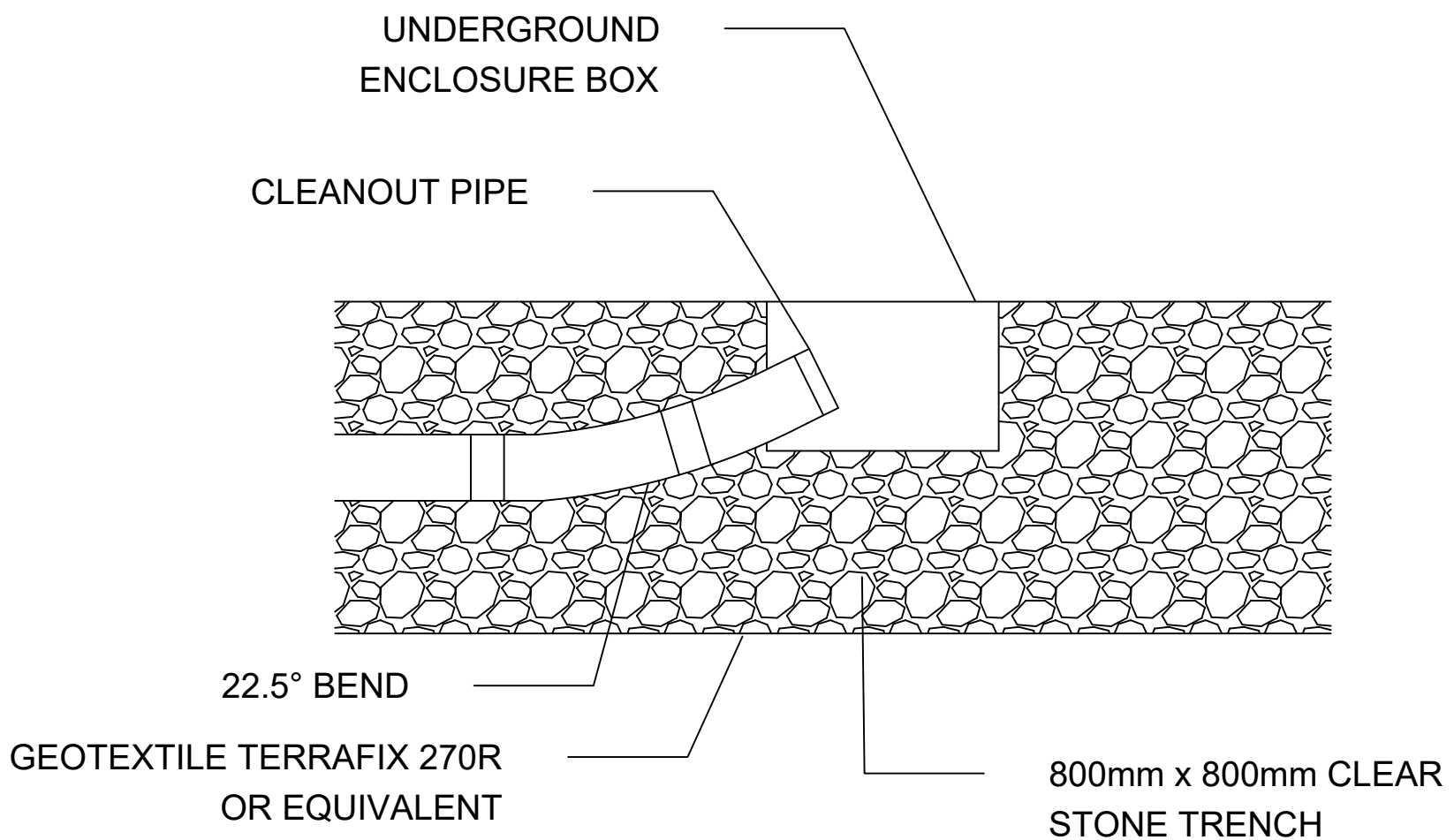
NDS Flow-Well Information

Stormwater Runoff & Storage Calculations – Pre and Post-Development

Stormwater Management Plan

Grading and Erosion and Sediment Control Plan – Estate Winery

# SUBDRAIN CLEANOUT DETAIL



## NOTES:

1. UNDERGROUND ENCLOSURE BOX SHALL HAVE A CLOSED TOP TO PREVENT DEBRIS FROM ENTERING SYSTEM.
2. UNDERGROUND ENCLOSURE BOX SHALL BE LOCATED AWAY FROM VEHICLE AND FARM EQUIPMENT TRAFFIC AREAS, OR SHALL BE DESIGNED AND CONSTRUCTED TO CARRY VEHICLE LOADS.

PROJECT NO. 20-118

DSGN

DR

CHK

APVD



**BIG HEAD WINERY**

**PHASE 2 SWM PLAN**

PROJ No. 20-118

DATE Nov. 18, 2021

SCALE

NTS



# FLO-WELL®: A BETTER DRY WELL

DRAINAGE



With the Flo-Well®, water can now be infiltrated into the subsoil rapidly and easily. Unlike competitive systems, there is no need for piping systems to transport stormwater to a far-off discharge point, large heavy equipment, considerable excavation of current landscaped areas, nor large labor costs that those systems incur. With Flo-Well, water infiltration is now easier than ever.

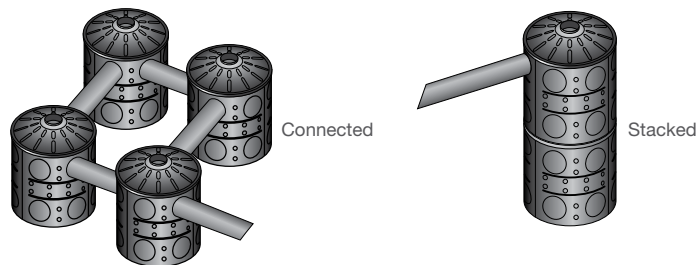
## Options

Larger 9" or 12" grates can be added to Flo-Well to manage surface water.	Ideal as a stand-alone drain:	Ideal as a stand-alone reservoir:
<b>This option is ideal for draining:</b>	Disturbs only 4 square feet of turf to install	Collect and hold rainwater for lawn and garden irrigation (used with a pump connected to a garden hose)
Golf course areas prone to puddling	Requires less than 10 cubic feet of soil removed to bury	Connect Flo-Well to rain gutters using a catch basin & grate below each downspout (see drawing)
Playground areas under slides and swings	Measures only 24" in diameter by 28.75" high	Ideal solution for arid areas impacted by drought
Outdoor drinking fountain runoff	Weighs only 22 pounds	Reservoir for pond and waterfall recirculation pumps
Outdoor showers at beaches	Holds over 48 gallons. Or, connect to existing system for increased drainage capabilities	
Wash-down areas		

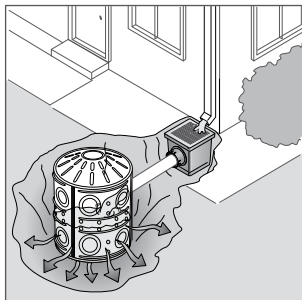


## Stackable & Expandable

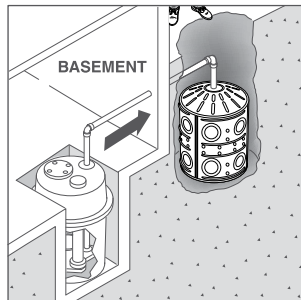
Flo-Well® can be used individually, connected in series or in any array, and can be stacked up to 4 units high (with center support pipe).



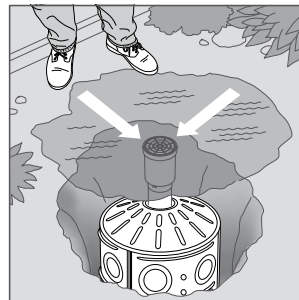
## Applications



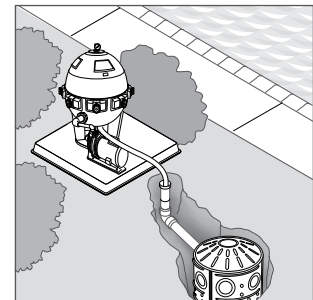
For gutters and downspouts



Install with sump pumps

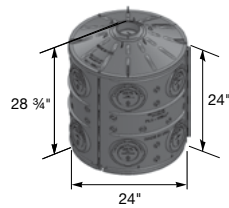


Eliminates puddles

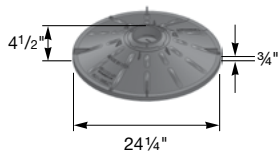


Backwash tank

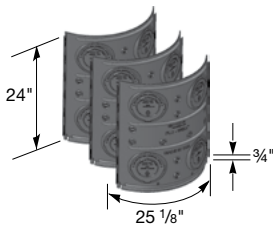
# FLO-WELL® ENGINEERED DRY WELL



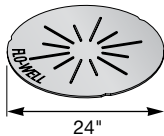
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
FWAS24WH	24" diam. x 28.75"H Flo-Well® Stormwater Leaching System	Black	1	18.96	10FW	NDS #FWAS24WH structural foam polyolefin round drywell system with UV inhibitors. 50 gal. storage capacity.
<b>Includes 3 side panels, 1 top component.</b> Fits 4" Sch. 40 Pipe and 4" DWV Pipe.						



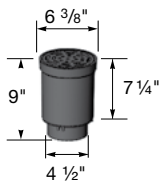
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
FWAS24CWH	24" diam. Flo-Well® Cover	Black	2	5.92	10FW	Structural foam polyolefin round drywell system cover with UV inhibitors. 24-1/4" dia., 4-1/2" height, 3/4" outer lip, 4.5" center knockout fits NDS #FWSD69, std pipe and 4" Sch. 40 pipe.
Use with #FWAS24.						



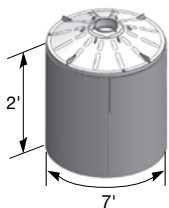
Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
FWSPS3WH	Flo-Well® Side Panels/Extension Only	Black	1	4.35	10FW	Structural foam polyolefin side panels with UV inhibitors with 22 1-1/2" knockout leaching ports and 4 4.5" knockout inlet/outlet ports per panel. 0.75" lip for firm stacking.
<b>Includes 3 side panels; makes 1 round drywell.</b> (May also be used as a durable compost bin)						



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
FWBP24	24" diam. Flo-Well® Bottom	Black	5	3.41	10FW	Structural foam polyolefin round Flo-Well® bottom with UV inhibitors. 24" diameter with six 1-1/2" leaching ports. Collects debris for easy cleanout.
Fits #FWAS24. (Not included in #FWAS24 kit)						



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
FWSD69	4" Sch. 40 Surface Drain Inlet with Grate	Black	8	1.85	10FW	Structural foam polyolefin 6" grate with 4" inlet with UV inhibitors. 6" diameter at inlet. 9" high. 4.5" OD fits Sch. 40 PVC fittings. Open surface area 8.22 square inches. 25.15 GPM.
Fits #FWAS24 and #FWAS24C. ADA Compliant.						



Part No.	Description	Color	Pkg. Qty.	Wt. Ea. (lbs.)	Product Class	Specifications
FWFF67	Porous Filter Fabric Wrap for Flo-Well®	Black	1	0.35	10FW	7' long x 2' wide to surround Flo-Well® Drywell System. Non-woven fabric. Weight 1 oz. Mullen burst 175 psi. 200 GPM flow-through.
Use with #FWAS24.						



**STORM RUNOFF CALCULATIONS**

July 14, 2022

Urban & Environmental Mangement Inc.

**IDF CURVES**

**RATIONAL METHOD**

OUR FILE: 20-118  
PROJECT: Big Head Wines Estate Winery

$i = a / (tc + c)^b$   
Where:  $i$  = rainfall intensity (mm/hr)  
 $tc$  = time of concentration (min)  
coeff.  $a = \begin{matrix} \text{5-year} & \text{100-year} \\ 664 & 980 \end{matrix}$   
 $b = \begin{matrix} 0.744 & 0.732 \\ 4.7 & 3.7 \end{matrix}$

$Q = 2.78AiR$   
Where:  $Q$  = Flow (L/s)  
 $A$  = Area (ha)  
 $R$  = Runoff Coefficient

DESIGNED BY: LS  
CHECKED BY: MM

Storage =  $Q_{post} \times T_d - Q_{pre} (T_d + T_c) / 2$

Description	Area (ha)	R	A * R	TC (min)	i (mm/hr)	Q (L/S)
<b>PRE-DEVELOPMENT FLOW ESTIMATES</b>						
<b>5-year</b>						
<b>AREA 1</b>						
Buildings	0.126	0.9	0.113	10.000	89.88	28.3
Asphalt	0.160	0.9	0.144	10.000	89.88	36.1
Gravel	0.019	0.9	0.017	10.000	89.88	4.3
Grass	2.278	0.2	0.456	10.000	89.88	113.8
Building Additions		0.9	0.000	10.000	89.88	0.0
<b>Total Area</b>	<b>2.583</b>		<b>0.730</b>			<b>182.5</b>
<b>100-year</b>						
<b>AREA 1</b>						
Buildings	0.126	0.9	0.113	10.000	144.26	45.5
Asphalt	0.160	0.9	0.144	10.000	144.26	57.9
Gravel	0.019	0.9	0.017	10.000	144.26	6.8
Grass	2.278	0.2	0.456	10.000	144.26	182.7
Building Additions		0.9	0.000	10.000	144.26	0.0
<b>Total Area</b>	<b>2.583</b>		<b>0.730</b>			<b>292.9</b>
<b>POST-DEVELOPMENT FLOW ESTIMATES</b>						
<b>5-year</b>						
<b>AREA 1</b>						
Buildings	0.126	0.9	0.113	10.000	89.88	28.3
Asphalt/Concrete	0.330	0.9	0.297	10.000	89.88	74.2
Gravel	0.000	0.9	0.000	10.000	89.88	0.0
Grass	1.907	0.2	0.381	10.000	89.88	95.3
Building Additions	0.220	0.9	0.198	10.000	89.88	49.5
<b>Total Area</b>	<b>2.583</b>		<b>0.990</b>			<b>247.3</b>
<b>100-year</b>						
<b>AREA 1</b>						
Buildings	0.126	0.9	0.113	10.000	144.26	45.5
Asphalt/Concrete	0.330	0.9	0.297	10.000	144.26	119.1
Gravel	0.000	0.9	0.000	10.000	144.26	0.0
Grass	1.907	0.2	0.381	10.000	144.26	153.0
Building Additions	0.220	0.9	0.198	10.000	144.26	79.4
<b>Total Area</b>	<b>2.583</b>		<b>0.990</b>			<b>397.0</b>

**Storage Volume Determination (5-Year Storm)**

Qtargt (m³/s)	Td (min.)	i (mm/hr)	Td (sec.)	Qpost (m³/s)	Sd (m³)
0.1825	10	89.88	600	0.247	38.9
	15	72.29	900	0.092	-54.5
	20	61.09	1200	0.077	-71.4
	25	53.26	1500	0.067	-90.4
	30	47.44	1800	0.060	-110.8
	35	42.92	2100	0.054	-132.2
	40	39.30	2400	0.050	-154.3
	45	36.31	2700	0.046	-176.9
	50	33.81	3000	0.043	-200.0
	55	31.68	3300	0.040	-223.4
	60	29.84	3600	0.038	-247.2
	65	28.24	3900	0.036	-271.2
	70	26.82	4200	0.034	-295.3
	75	25.56	4500	0.032	-319.7
	80	24.42	4800	0.031	-344.3
	85	23.40	5100	0.030	-368.9
Storage Required (m³)					<b>38.9</b>

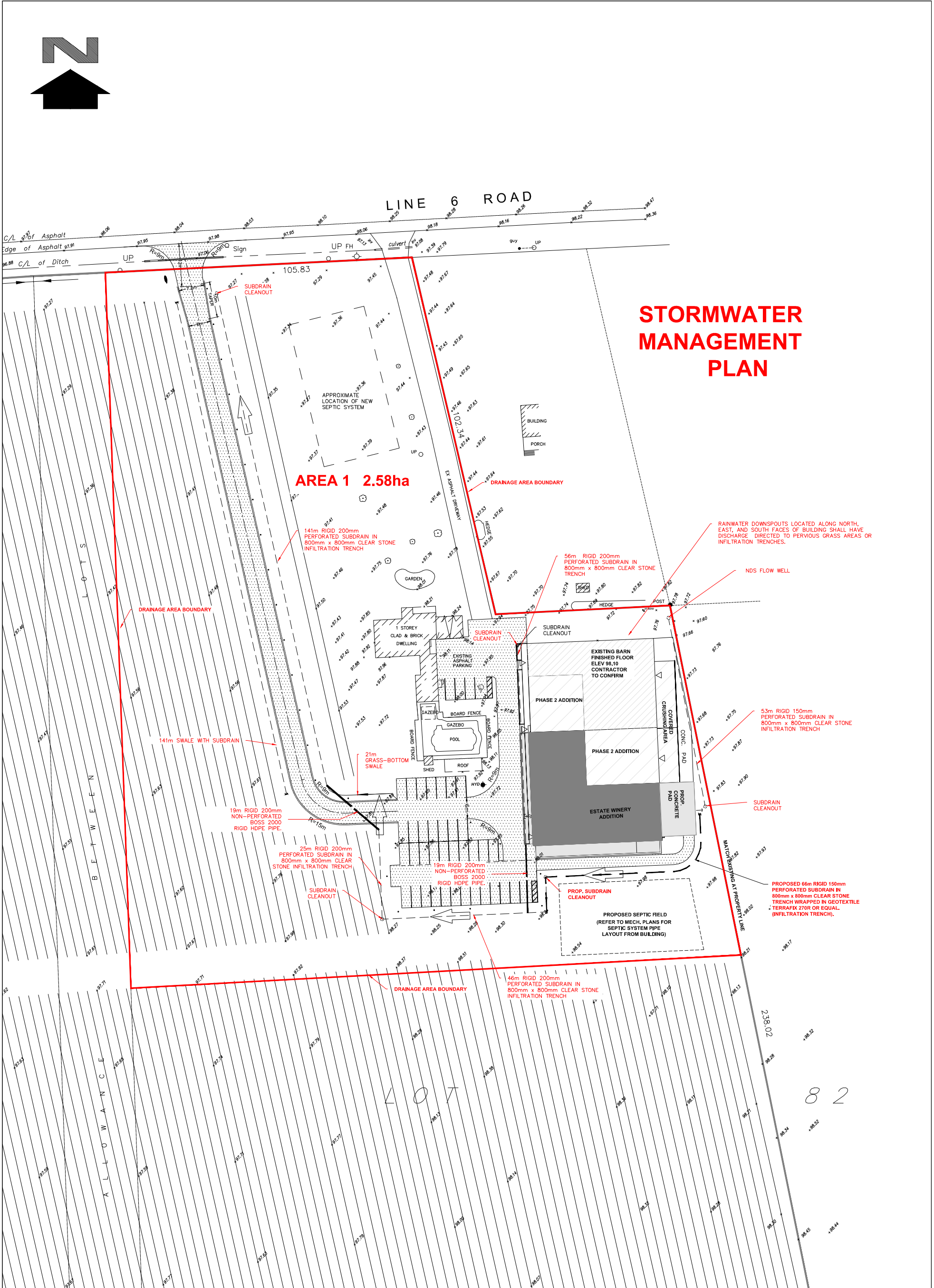
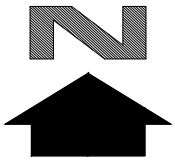
**Storage Volume Determination (100-Year Storm)**

Qtargt (m³/s)	Td (min.)	i (mm/hr)	Td (sec.)	Qpost (m³/s)	Sd (m³)
0.2929	10	144.26	600	0.397	62.4
	15	114.88	900	0.316	64.8
	20	96.59	1200	0.266	55.3
	25	83.96	1500	0.231	39.0
	30	74.65	1800	0.205	18.2
	35	67.46	2100	0.186	-5.6
	40	61.72	2400	0.170	-31.8
	45	57.01	2700	0.157	-59.7
	50	53.07	3000	0.146	-89.1
	55	49.73	3300	0.137	-119.6
	60	46.84	3600	0.129	-151.1
	65	44.32	3900	0.122	-183.4
	70	42.10	4200	0.116	-216.5
	75	40.12	4500	0.110	-250.1
	80	38.35	4800	0.106	-284.3
	85	36.76	5100	0.101	-318.9
Storage Required (m³)					<b>64.8</b>
<b>Total Required Storage Volume (m³)</b>					<b>64.8</b>

**Notes:**

**1. Proposed infiltration trench storage capacity**

Description	Length	Cross-Sectional Area	Volume
Infiltration Trench with 150mm Subdrain (0.4 Stone Void Space)	120	0.266	31.9
Infiltration Trench with 200mm Subdrain (0.4 Stone Void Space)	268	0.274	73.4
<b>Total</b>			<b>105.3</b>



**AREA 1 2.58ha**

**STORMWATER  
MANAGEMENT  
PLAN**

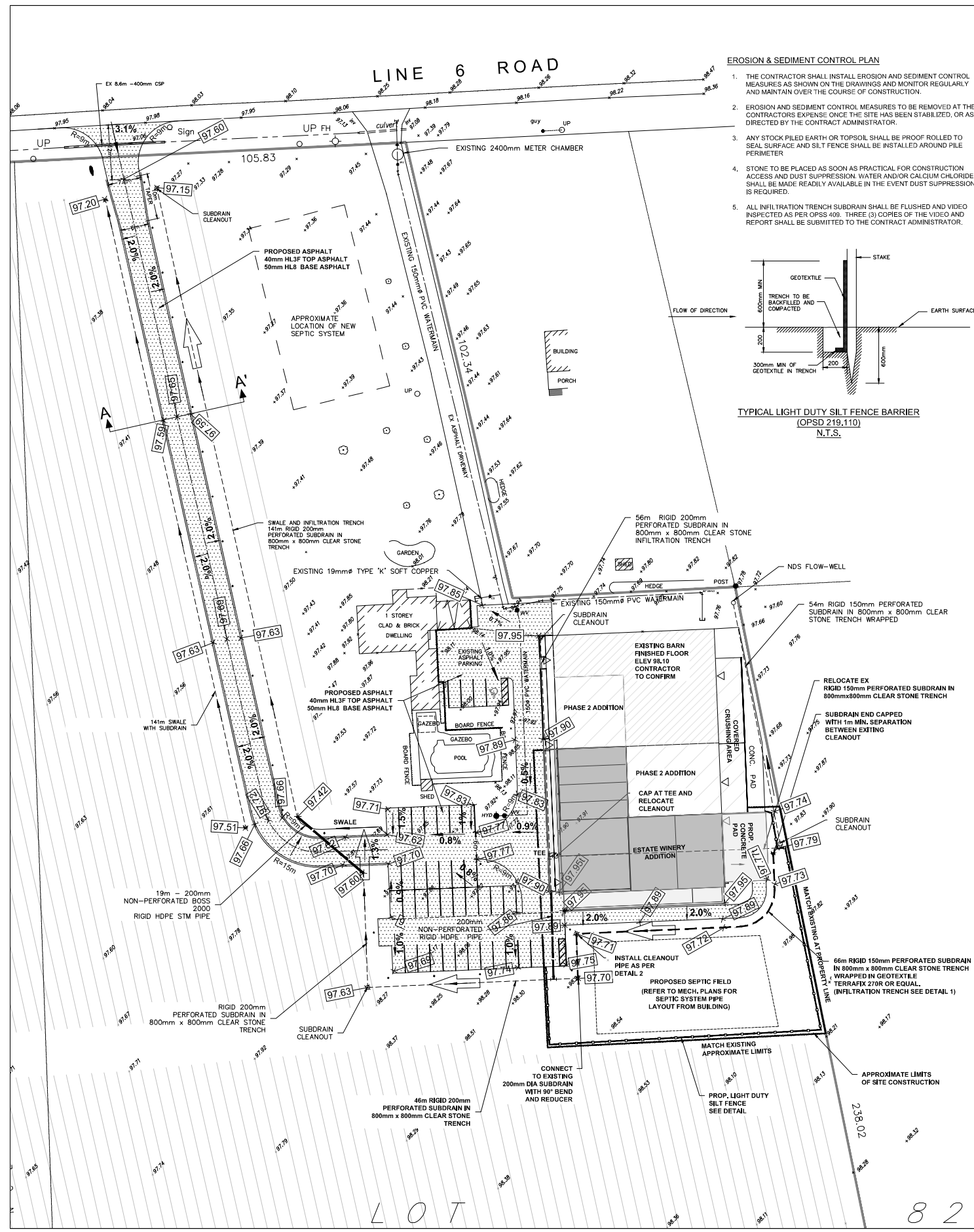
DSGN
DR
CHK
APVD



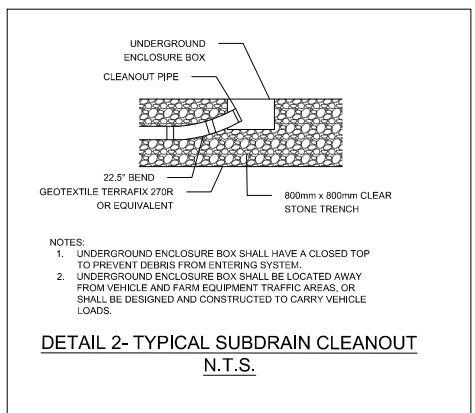
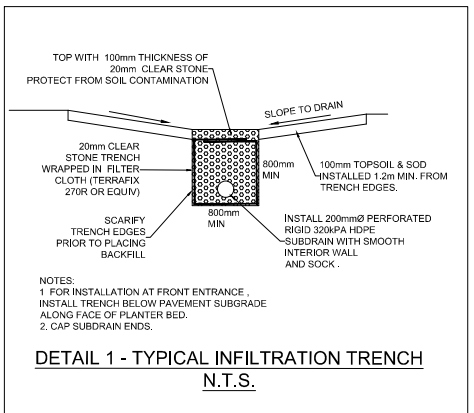
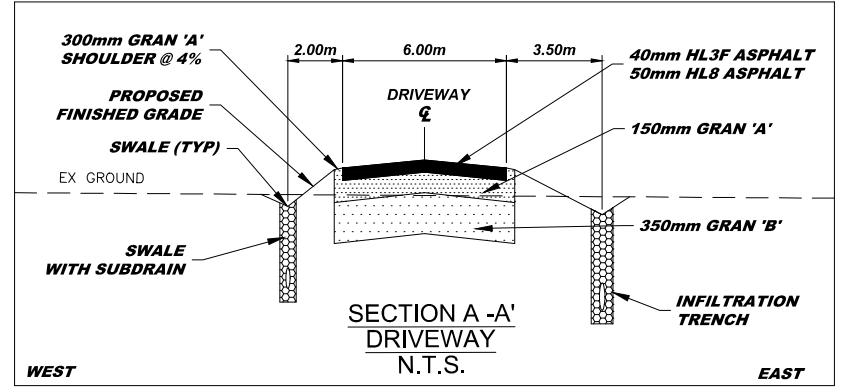
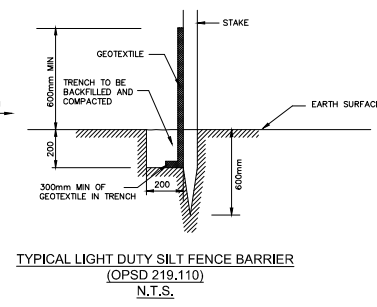
**BIG HEAD WINERY ESTATE SWM PLAN**

PROJ No. 20-118	DATE July 14, 2022	SCALE	NTS
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- EROSION & SEDIMENT CONTROL PLAN**
1. THE CONTRACTOR SHALL INSTALL EROSION AND SEDIMENT CONTROL MEASURES AS SHOWN ON THE DRAWINGS AND MONITOR REGULARLY AND MAINTAIN OVER THE COURSE OF CONSTRUCTION.
  2. EROSION AND SEDIMENT CONTROL MEASURES TO BE REMOVED AT THE CONTRACTOR'S EXPENSE ONCE THE SITE HAS BEEN STABILIZED, OR AS DIRECTED BY THE CONTRACT ADMINISTRATOR.
  3. ANY STOCK PILED EARTH OR TOPSOIL SHALL BE PROOF ROLLED TO SEAL SURFACE AND SILT FENCE SHALL BE INSTALLED AROUND PILE PERIMETER.
  4. STONE TO BE PLACED AS SOON AS PRACTICAL FOR CONSTRUCTION ACCESS AND DUST SUPPRESSION. WATER AND/OR CALCIUM CHLORIDE SHALL BE MADE READILY AVAILABLE IN THE EVENT DUST SUPPRESSION IS REQUIRED.
  5. ALL INFILTRATION TRENCH SUBDRAIN SHALL BE FLUSHED AND VIDEO INSPECTED AS PER OPS 409. THREE (3) COPIES OF THE VIDEO AND REPORT SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR.



- GENERAL NOTES:**
- 1.1 ALL MEASUREMENTS ARE IN METRIC UNITS UNLESS OTHERWISE NOTED.
  - 1.2 CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
  - 1.3 CIVIL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ARCHITECTURAL SITE PLAN, LANDSCAPE PLAN AND MECHANICAL DRAWINGS.
  - 1.4 THE CONTRACTOR SHALL FIELD CHECK EXISTING CONDITIONS, VERIFY ALL DIMENSIONS, ELEVATIONS AND REPORT ANY DISCREPANCIES TO THE CONSULTANT PRIOR TO COMMENCEMENT OF ANY WORK.
  - 1.5 ALL WORK SHALL BE IN ACCORDANCE WITH THE RELEVANT SECTIONS OF THE ONTARIO BUILDING CODE, ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS, THE TOWN OF NIAGARA-ON-THE-LAKE REQUIREMENTS WHICH EVER IS MORE STRINGENT UNLESS OTHERWISE NOTED ON THE DRAWINGS OR IN THE SPECIFICATIONS.
  - 1.6 THE COST AND SUBMISSION OF ALL PERMITS ARE THE RESPONSIBILITY OF THE CONTRACTOR. PERMITS REQUIRED INCLUDE BUT MAY NOT BE LIMITED TO THE FOLLOWING: TOWN OF NIAGARA-ON-THE-LAKE CONSTRUCTION ENCROACHMENT AND ENTRANCE PERMIT.
  - 1.7 THE CONTRACTOR SHALL PROVIDE APPROPRIATE SHORING FOR TRENCH EXCAVATION IN ACCORDANCE WITH THE ONTARIO OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS.
  - 1.8 SELECT NATIVE MATERIAL SHALL BE USED FOR SEWER TRENCH BACKFILL, EXCEPT UNDER EXISTING PAVEMENT WHERE BACKFILL SHALL BE GRANULAR 'A' MATERIAL.
  - 1.9 ALL GRANULAR BACKFILL MATERIAL SHALL BE COMPACTED TO 98% STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMD); ALL NATIVE BACKFILL SHALL BE COMPACTED TO 95% SPMD UNLESS OTHERWISE NOTED.
  - 1.10 ALL DISTURBED AREAS SHALL BE RESTORED BY THE CONTRACTOR TO MATCH EXISTING CONDITIONS OR BETTER (I.E. EXISTING PAVEMENT, CURBS, LANDSCAPED AREAS, SIDEWALK, ETC.) OR AS NOTED ON THE DRAWINGS. HARD SURFACE MATCH LINES SHALL BE SAWCUT.
  - 1.11 THE CONTRACTOR SHALL KEEP WORK SITE CLEAN AND FREE OF ALL CONSTRUCTION DEBRIS DURING CONSTRUCTION AND LEAVE THE SITE CLEAN UPON COMPLETION OF WORK OR PORTIONS OF WORK.
  - 1.12 ALL PROPERTY BARS SHALL BE PROTECTED. ANY DAMAGED PROPERTY BARS SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.
  - 1.13 ALL DEVIATIONS FROM THE WORKING DRAWINGS MUST BE APPROVED BY THE CONSULTANT. THE CONTRACTOR MUST KEEP AN ACCURATE RECORD OF ALL CHANGES FROM THE ORIGINAL CONSTRUCTION DRAWINGS AND SPECIFICATIONS.
  - 1.14 ASBUILT DRAWINGS ARE TO BE PROVIDED TO THE ENGINEER WITH FINAL SITE GRADING ELEVATIONS, VALVE LOCATIONS, MAN-HOLE AND CATCHBASIN STRUCTURE RIM ELEVATIONS AND INVERTS, AND ANY CHANGES TO THE DESIGN.
- SUBDRAIN**
- 2.1 SUBDRAIN SHALL BE RIGID PERFORATED HIGH DENSITY POLYETHYLENE (HDPE) PIPE WITH KNITTED GEOTEXTILE SOCK AS PER OPS 409, UNLESS NOTED OTHERWISE. SEE AS NOTED ON DRAWINGS.
  - 2.2 ALL INFILTRATION TRENCH SUBDRAINS SHALL BE VIDEO INSPECTED AS PER OPS 409. THREE (3) COPIES OF THE VIDEO AND REPORT SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR. ANY CRUSHED OR DAMAGED SUBDRAIN PIPE (S) ARE TO BE REPAIRED TO THE SATISFACTION OF THE ENGINEER.
- RELEVANT SPECIFICATIONS**
- OPSS 206 Grading
  - OPSS 310 Hot Mix Asphalt
  - OPSS 314 Unreated Granular
  - OPSS 401 Trenching, Backfilling and Compacting
  - OPSS 405 Subdrains
  - OPSS 501 Compacting
  - OPSS 510 Removal
  - OPSS 518 Control of Water from Dewatering Operations
  - OPSS 502 Topsoil
  - OPSS 503 Sodding
  - OPSS 504 Seed and Cover
  - OPSS 505 Temporary Erosion and Sediment Control Measures
- RELEVANT STANDARD DRAWINGS**
- OPSD 219.110 Light Duty Silt Fence Barrier
  - OPSD 902.010 Flexible Pipe Embedment and Backfill, Earth Excavation

**LEGEND**

x 194.19	EXISTING ELEVATION
x (194.19±)	EXISTING ELEVATION INTERPOLATED
○	EXISTING MANHOLE
□	EXISTING CATCHBASIN
⊕	EXISTING FIRE HYDRANT
⊕	EXISTING WATER VALVE
⊕	EXISTING CURB STOP
ST	EXISTING STORM SEWER
S	EXISTING SANITARY SEWER
W	EXISTING WATER LINE
G	EXISTING GAS LINE
B	EXISTING BELL LINE
H	EXISTING HYDRO LINE
SL	EXISTING STREET LIGHT
TV	EXISTING CABLE TV
194.39	PROPOSED ELEVATION
194.39	PROPOSED ELEVATION TOP OF CONCRETE
◁	PROPOSED DOOR LOCATION
---	PROPOSED STORM SEWER
---	PROPOSED SWALE
---	PROPOSED SUBDRAIN
---	PROPOSED SILT FENCE
---	DRAINAGE BREAKLINE
→	FLOW DIRECTION
→	OVERLAND FLOW

**TOPOGRAPHIC SURVEY NOTES:**

TOPOGRAPHIC SURVEY PREPARED BY KIRKUP + MASCOE + URE SURVEY LTD. REFER TO PLAN OF SURVEY DRAWING NO. 19-0101-2siteplan

**LOCAL BENCHMARK:**

REFER TO TOPOGRAPHIC SURVEY PLAN FOR LOCAL BENCHMARK INFORMATION

**NOTES**

1. The position of pole lines, conduits, watermain, sewers, and other underground and above ground utilities and structures is not necessarily shown on the contract drawings, and where shown the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, the contractor shall identify the exact location of all such utilities and structures and shall assume liability for damage to them.
2. Check all dimensions and report any inconsistencies to the Engineer before proceeding with the work - DO NOT SCALE DRAWINGS.
3. This drawing is an instrument of Professional Service and is intended for use only in connection with the project covered by the Engineering Agreement.
4. Urban & Environmental Management Inc., does not assume any responsibility for losses, damages, and costs arising from use or misuse of this drawing by persons, firms, or corporations without prior written consent of Urban & Environmental Management Inc. Copyright Urban & Environmental Management Inc., 2021. All rights reserved. No part of this drawing may be reproduced in any form or by any means without the written permission of Urban & Environmental Management Inc.

No.	REVISION	DATE	BY
1	ESTATE WINERY SIMM UPDATES	JULY 14/22	MM
1	ENTRANCE AND DRIVEWAY DESIGN	JUNE 25/22	MM
0	ISSUED FOR REVIEW	MAY 2/22	LS

OWNER'S NAME

OWNER'S SIGNATURE

TOWN OF NIAGARA-ON-THE-LAKE

LORD MAYOR

TOWN CLERK

Date

CONSULTANT:

**UEM** URBAN & ENVIRONMENTAL MANAGEMENT INC. PROFESSIONAL CONSULTING SERVICES

4701 St. Clair Avenue, Suite 301, Niagara Falls, ON Canada L2E 3S9  
TEL: (905) 371-9764 FAX: (905) 371-9763

CLIENT:

PROJECT:

**823 LINE 6 ROAD  
BIG HEAD ESTATE WINERY  
NIAGARA-ON-THE-LAKE**

TITLE:

**GRADING PLAN &  
SEDIMENT CONTROL PLAN**

CHECKED: MM	DRAWN: LS	Project No. 20-118
DATE: APRIL 22, 2022	SCALE: 1:500	DWG. No. C01

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