M.J. Davenport & Associates Ltd.

CONSULTING ENGINEERS AND PLANNERS

MURRAY J. DAVENPORT, P.Eng. MICHAEL M. DAVENPORT, P.Eng.

October 12, 2022

Township of Douro-Dummer
894 South Street,
P.O. Box 92
Warsaw, ON
K0L 3A0

Attention: Ms. Christina Coulter
Senior Planner

Re: Paterson and Carrington - Site Plan Approval
4034 Centre Road, Bolton's Corners
Township of Douro-Dummer
Project No. 21-D-5883

Dear Christina,

Attached is a copy of the following drawings and calculations prepared in response to the D.M. Wills Associates comments dated October 4, 2022 and the Otonabee Region Conservation Authority comments dated October 5, 2022 submitted for your information:

1. Site Plan Drawing No. 5883-02.
2. Drainage Area Plan Drawing No. 5883-03.
3. Erosion Control Plan Drawing No. 5883-EC.
4. 100-year Rational Method and Open Channel Flow Calculation for Proposed Drainage Ditch.

D.M. Wills Associates Comments:

1. *The revision block should be updated to reflect the current submission and date.*

   The revision blocks on the Site Plan and the Erosion Control Plan have been updated.

2. *Confirm the drainage area and 100-year flow directed to the proposed outfall ditch. A rough sketch and rational method calculations are sufficient to address this comment.*

LOCATION: 2010 KEENE ROAD • OTONABEE • ONTARIO • K9J 6X7
MAILING ADDRESS: P.O. BOX 2452 STN MAIN • PETERBOROUGH • ONTARIO • K9J 7Y8
Telephone (705) 745-6676 •Fax (705) 745-7326 • E-mail: davenporteng@gmail.com

Drainage Area Plan Drawing No. 5883-03 identifies the total catchment area and the landuse of the area flowing into the proposed outfall ditch. The 100-year rational method calculations and the open channel flow calculations attached to this letter indicates that the proposed outfall ditch has sufficient capacity to convey peak stormwater flows in excess of the calculated 100-year flow rates.

3. *The size and depth of rip-rap should be identified on the Site Plan.*

   150mm diameter rip-rap with a design depth of 0.30 metres.

4. *An updated Erosion Control Plan is required and should include the external ditching.*

   The Erosion Control Plan has been updated to show the external ditching. Light duty silt fence is proposed to be placed around the proposed outfall ditch and the culvert to be removed and replaced. A 0.20-metre-high pea stone bag flow check dam is proposed in the outfall ditch and will remain in place until the soils are stabilized and the outfall ditch vegetation is established.

Otonabee Region Conservation Authority Comments:

1. *Please add rip-rap Slope Protection details to the drawing.*
   a. *What size of rip-rap is being placed?*
   b. *What thickness of rip-rap layer?*
   c. *There should be a scour protection measure placed under the proposed rip-rap?*

   The specified rip-rap is a 0.30 metre depth of 150mm diameter rip-rap. The rip rap will be placed on non-woven terrafix filter cloth for scour protection.

2. *Please provide re-vegetation details for the ditch and slope.*

   A note has been added to the Site Plan specifying that the proposed drainage ditch, side slopes and disturbed area around the drainage ditch shall be hydroseeded after final grading has been completed. Hydroseeding will establish and stabilize the underlying soil more quickly then seed and requires less initial maintenance than sod.

3. *Please include erosion and sediment control measured for the ditch and slope work.*

   See response to D.M. Wills Associates comment Point #4 above.

We are available to discuss this project at your convenience.

Yours truly,

M.J. DAVENPORT & ASSOCIATES LTD.

Jacob Clark, P.Eng.

LICENSED PROFESSIONAL ENGINEER
J. D CLARK
100226373
OCT. 12, 2022
PROVINCE OF ONTARIO

c.c.: Ms. Kathy Carrington & Mr. David Paterson

M.J. Davenport & Associates Ltd.

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MURRAY J. DAVENPORT, P.Eng. MICHAEL M. DAVENPORT, P.Eng.

PATERSON & CARRINGTON
4034 Center Road, Bolton's Corners
PROPOSED DITCH RATIONAL METHOD CALCULATION

The peak flow capacity of the grass ditch proposed to be constructed northwest of the project site was analyzed using the Manning's equation for calculating open channel flow. The Rational Method was used to calculate the 100-year storm event peak flow rate expected to accumulate in the ditch based on the upstream catchment area. By demonstrating that the conveyance capacity of the proposed drainage ditch is greater than the calculated 100-year peak flow rate, it will be shown that adequate capacity of conveyance in the proposed ditch exists.

The watershed area directed to the proposed drainage ditch is based on the natural topography of the land determined by a topographical survey, by a visual field inspection and from Ontario Base Mapping taken from the County of Peterborough GIS application. The proposed grading of the subject site is used in determining the ditch drainage area. The watershed area draining into the proposed ditch is detailed on the Drainage Area Plan Drawing No. 5883-03.

The proposed drainage ditch is designed with a minimum flow depth of 0.47 metres, maximum 5:1 side slopes and a minimum longitudinal slope of 2.0 percent. It is assumed in the following calculations that the ditch lining will consist of unmaintained tall grass, making the 'n' value in the Manning's equation 0.050. The conveyance capacity of the proposed ditch has been evaluated at the section with the lowest depth of flow and the narrowest bottom section. This corresponds to the section of the ditch with the lowest conveyance capacity.

The detailed ditch capacity calculation using the Manning's equation are as follows:

Worst Case Grass Ditch Section (0.47m Depth, 3.0m Bottom Width):

$$Q = \frac{1.0}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$$
$$= \left(\frac{1.0}{0.050}\right)(2.5145)(0.3227)^{\frac{2}{3}}(0.020)^{\frac{1}{2}}$$
$$= 3.346 m^3/s$$

n = 0.050 (Manning's coefficient for unmaintained tall grass lined channels)
A = 2.5145m^2 (Area of cross-section of channel)
R = 0.3227m (Hydraulic radius)
S = 2.00% m/m (Lowest slope of proposed swale)

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Rational Method – 100-Year Peak Flow Rate Calculations

Proposed Drainage Ditch:

The drainage area directed to the proposed ditch is approximately 1.679 hectares. The watershed length is 230 metres and the average watershed slope is 1.6%. The calculated time of concentration is 11.3 minutes using the Bransby-Williams Method for the watershed area. The minimum time of concentration is conservatively assumed to be 10 minutes for the urban subwatershed area. The peak flow rate expected to accumulate in the drainage ditch during the 100-year storm event is calculated using the Rational Method as follows:

$$Q = 0.0028CiA$$
$$= 0.0028 \times 0.41 \times 141.1 \times 1.679$$
$$= 0.272\, m^3/s$$

Q = Peak runoff rate (m^3/s)
C = 0.41 (Weighted composite runoff coefficient of drainage area - Table 1)
i = 141.1 mm/hr (10 minute - 100 Year Peterborough Airport rainfall intensity, mm/hr)
A = 1.679 ha (Drainage area, ha)

Table 1
Drainage Ditch Weighted Composite Runoff Coefficient

Surface	Area (sm)	Runoff Coefficient (C)
Impervious	2,104	0.90
Grass Landscaped	9,937	0.25
Gravel	2,285	0.80
Treed	2,467	0.25
Total	**16,793**	**0.41**

From the calculations demonstrated above, the proposed drainage ditch will provide adequate capacity of conveyance of calculated peak flow rates generated by all storm events up to and including the 100-year storm event.

NOTES:

1. DRAINAGE SHALL BE SELF-CONTAINED ON SITE BY THE CONSTRUCTION OF SWALES OR DRAIN TO A PROTECTED OUTLET. DRAINAGE SHALL NOT IMPACT ADJACENT PROPERTIES.
2. SEDIMENT AND EROSION CONTROL MEASURES SHALL BE IMPLEMENTED TO PREVENT MIGRATION OF SILT AND SEDIMENT FROM THE SUBJECT LOT TO ANY ADJACENT LOT, INCLUDING MUNICIPAL RIGHT-OF-WAY. SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT SILT AND SEDIMENT LADEN SURFACE WATER DOES NOT ENTER ANY WATERCOURSES OR ENVIRONMENTALLY SENSITIVE AREA, EITHER OVERLAND OR THROUGH THE STORM DRAINAGE SYSTEM. THE OWNER/BUILDER SHALL COMPLY WITH ALL DIRECTIVES ISSUED BY ANY OF THE ENVIRONMENTAL AGENCIES.
3. INTERIM GRADING MEASURES MAY BE REQUIRED DURING BUILDING CONSTRUCTION TO ENSURE THAT DRAINAGE DOES NOT ADVERSELY AFFECT THE NEIGHBORING PROPERTIES. ROUGH GRADING OF THE PROPERTY SHALL BE COMPLETED SUCH THAT DRAINAGE IS CONTAINED ON SITE OR CONTROLLED TO A PROTECTED OUTLET.
4. THE OWNER/BUILDER IS RESPONSIBLE FOR OBTAINING UTILITY AND SERVICING LOCATES PRIOR TO ANY WORKS.
5. ALL DISTURBED AREAS ON SITE ARE TO BE SODDED OR SEEDED OVER A MINIMUM OF 150mm OF TOPSOIL OR APPROVED EQUIVALENT.
6. THE PROPOSED DRAINAGE DITCH, SIDE SLOPES AND DISTURBED AREA AROUND THE DRAINAGE DITCH SHALL BE HYDROSEEDED AFTER EXCAVATION AND SHAPING IS COMPLETED.
7. NO ELEVATIONS WILL BE LESS THAN 0.15m BETWEEN FINAL GRADE AND TOP OF FOUNDATION WALL.
8. THE SUBMISSION OF THIS PLAN REPRESENTS THAT OWNER HEREBY ACKNOWLEDGES THAT ANY GRADING CHANGES THAT OCCUR THROUGH THE CONSTRUCTION THAT RESULT IN ADVERSE EFFECTS TO EXISTING ADJACENT PROPERTIES WILL REQUIRE AN AS-CONSTRUCTED SITE GRADING PLAN.

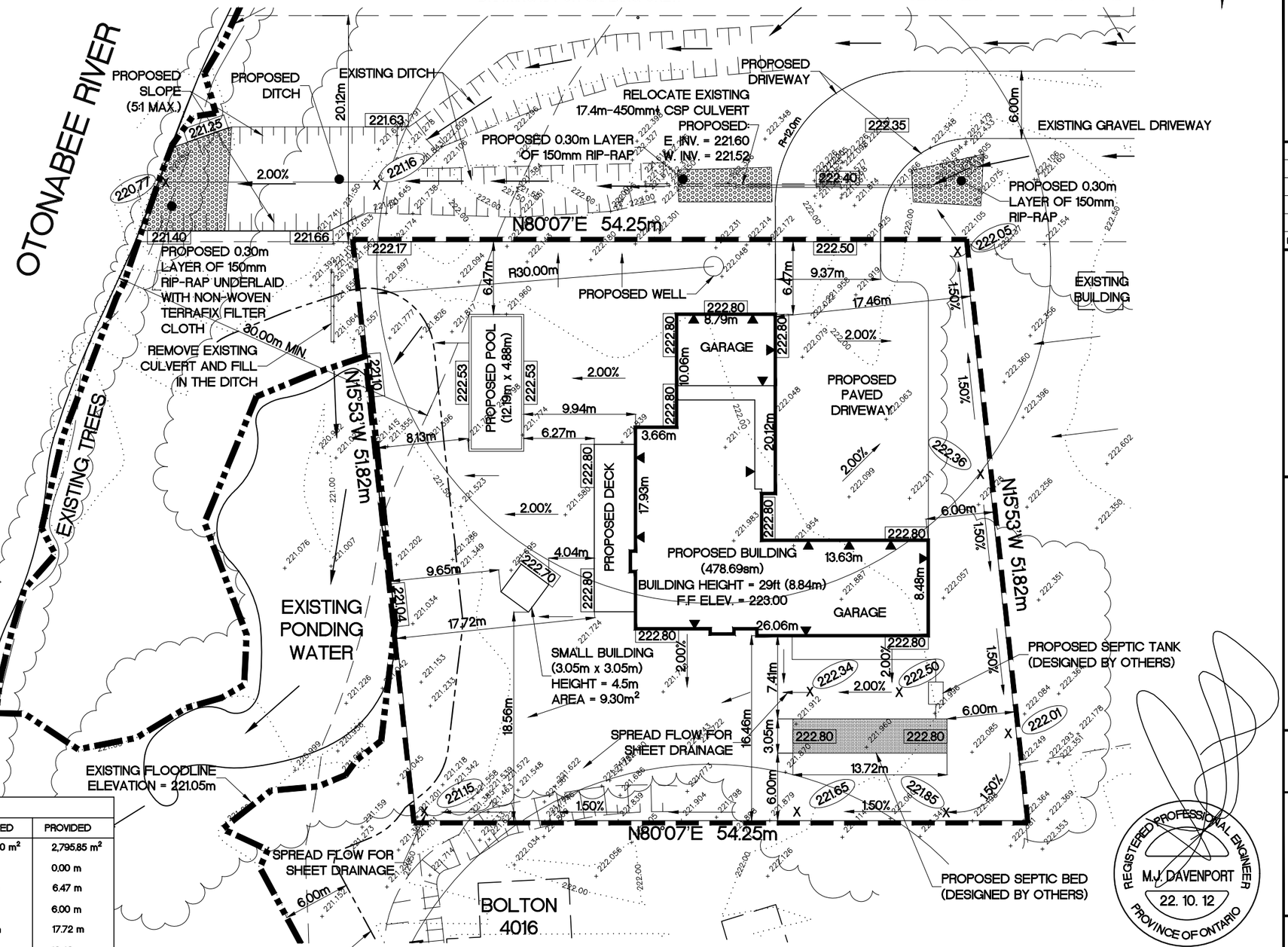
SCALE 1 : 400

10 0 10 20

NOTE:

1. THIS DRAWING MUST NOT BE INTERPRETED AS A LOCATION SURVEY PREPARED BY AN ONTARIO LAND SURVEYOR. THIS DRAWING IS FOR GRADING ONLY.

NOTE: UNDERGROUND HYDRO SERVICES TO COUNTY ROAD No. 32.



0.25m (MIN.)
3:1 (MAX.)

TYPICAL SWALE SECTION

REGISTERED PROFESSIONAL ENGINEER
M.J. DAVENPORT
22. 10. 12
PROVINCE OF ONTARIO

LOT SUMMARY

DESCRIPTION	REQUIRED	PROVIDED
MINIMUM LOT AREA	2,700 m²	2,795.85 m²
MINIMUM LOT FRONTAGE	0 m	0.00 m
MINIMUM FRONT YARD	6 m	6.47 m
MINIMUM INTERIOR SIDE YARD	6 m	6.00 m
MINIMUM EXTERIOR SIDE YARD	15 m	17.72 m
MINIMUM REAR YARD	15 m	16.46 m
MINIMUM WATER YARD	30 m	--
MINIMUM FLOOR AREA	100 m²	478.69 m²
MINIMUM FIRST STOREY FLOOR AREA	60 m²	478.69 m²
MAXIMUM LOT COVERAGE	15%	17.1%
MAXIMUM HEIGHT	9 m	8.84 m
MAXIMUM NUMBER OF DWELLINGS PER LOT	1	1

AREA SUMMARY

DESCRIPTION	AREA (sq.m)	COVERAGE (%)	BYLAW
DETACHED DWELLING AND ATTACHED DECK	478.69	17.1%	15.0%
ACCESSORY STRUCTURES	68.79	2.5%	5.0%
LANDSCAPE	2,248.37	80.4%	
TOTAL	2,795.85	100%	

KEY PLAN

NO.	REVISIONS	DATE	BY	APP'D
4.	AS PER D.M. WILLS AND ORCA (04/10/22)	06/10/22	JC	MJD
3.	UNDERGROUND HYDRO NOTE REVISED	30/08/22	JC	MJD
2.	GARAGE IDENTIFIED	08/06/22	JZ	MJD
1.	AS PER TOWNSHIP OF DOURO-DUMMER COMMENTS (25/05/22)	26/05/22	JZ	MJD

BENCHMARKS

BM 1 ELEV. 224.784 (CGVD28-78)

BRASS CAP ON THE CONCRETE OF EAST SIDE OF LOCK 24.
BENCHMARK No. 72U414

LEGEND

100.00	PROPOSED ELEVATION
100.00	PROPOSED SWALE ELEVATION
→	PROPOSED DRAINAGE
3R ▼	PROPOSED NUMBER OF 200mm RISERS
100.00	EXISTING SWALE ELEVATION
* 100.00	EXISTING ELEVATION TO REMAIN UNCHANGED

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& ASSOCIATES LIMITED
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PATERSON & CARRINGTON

4034 CENTRE ROAD, BOLTONS CORNERS
LOT 10 CONCESSION IX
TOWNSHIP OF DOURO
TOWNSHIP OF DOURO DUMMER
COUNTY OF PETERBOROUGH

SITE PLAN

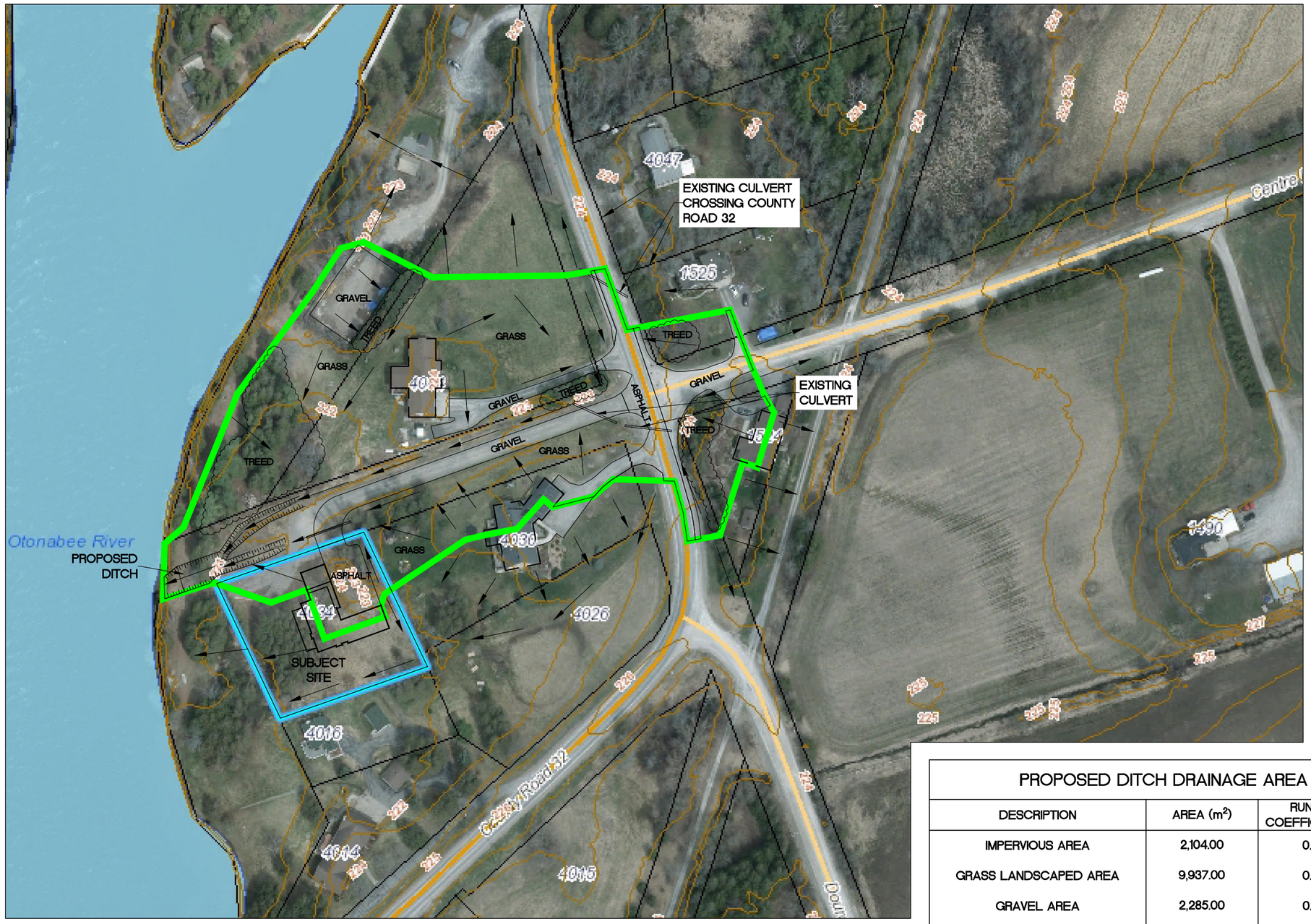
DESIGNED BY: M. J. DAVENPORT	SCALE: 1 : 400
DRAWN BY: J. ZHOU	
DATE: APRIL, 2021	DRWG. NO.: 5883-02B
PROJECT NO.: 21-D-5883	

NOTES:

1. THE WATERSHED AREA DIRECTED TO THE PROPOSED OUTLET DITCH IS BASED ON THE NATURAL TOPOGRAPHY OF THE LAND DETERMINED BY A TOPOGRAPHICAL SURVEY CARRIED OUT BY M.J. DAVENPORT + ASSOCIATES, A VISUAL FIELD INSPECTION AND FROM ONTARIO BASE MAPPING FROM THE COUNTY OF PETERBOROUGH GIS SYSTEM. THE PROPOSED GRADING OF THE PROJECT SITE WAS ACCOUNTED FOR IN THE WATERSHED AREA DETERMINATION.

SCALE 1 : 1500

50 0 50 100



PROPOSED DITCH DRAINAGE AREA SUMMARY

DESCRIPTION	AREA (m^2)	RUNOFF COEFFICIENT 'C'	COVERAGE (%)
IMPERVIOUS AREA	2,104.00	0.90	12.53
GRASS LANDSCAPED AREA	9,937.00	0.25	59.17
GRAVEL AREA	2,285.00	0.80	13.61
TREED AREA	2,467.00	0.25	14.69
TOTAL	16,793.00	0.41	100.00

REGISTERED PROFESSIONAL ENGINEER
M.J. DAVENPORT
22. 10. 12
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KEY PLAN

NO.	REVISIONS	DATE	BY	APP'D

BENCHMARKS

BM 1 ELEV. 224.784 (CGVD2978)

BRASS CAP ON THE CONCRETE OF EAST SIDE OF LOCK 24.
BENCHMARK No. 72U414

LEGEND

- 100.00 PROPOSED ELEVATION
- 100.00 PROPOSED SWALE ELEVATION
- DRAINAGE
- DRAINAGE AREA BOUNDARY
- 100.00 EXISTING SWALE ELEVATION
- * 100.00 EXISTING ELEVATION TO REMAIN UNCHANGED

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COUNTY OF PETERBOROUGH

DRAINAGE AREA PLAN

DESIGNED BY: M. J. DAVENPORT	SCALE: 1 : 1500
DRAWN BY: J. CLARK	
DATE: OCTOBER, 2022	DRWG. NO.: 5883-03
PROJECT NO.: 21-D-5883	

NOTES:

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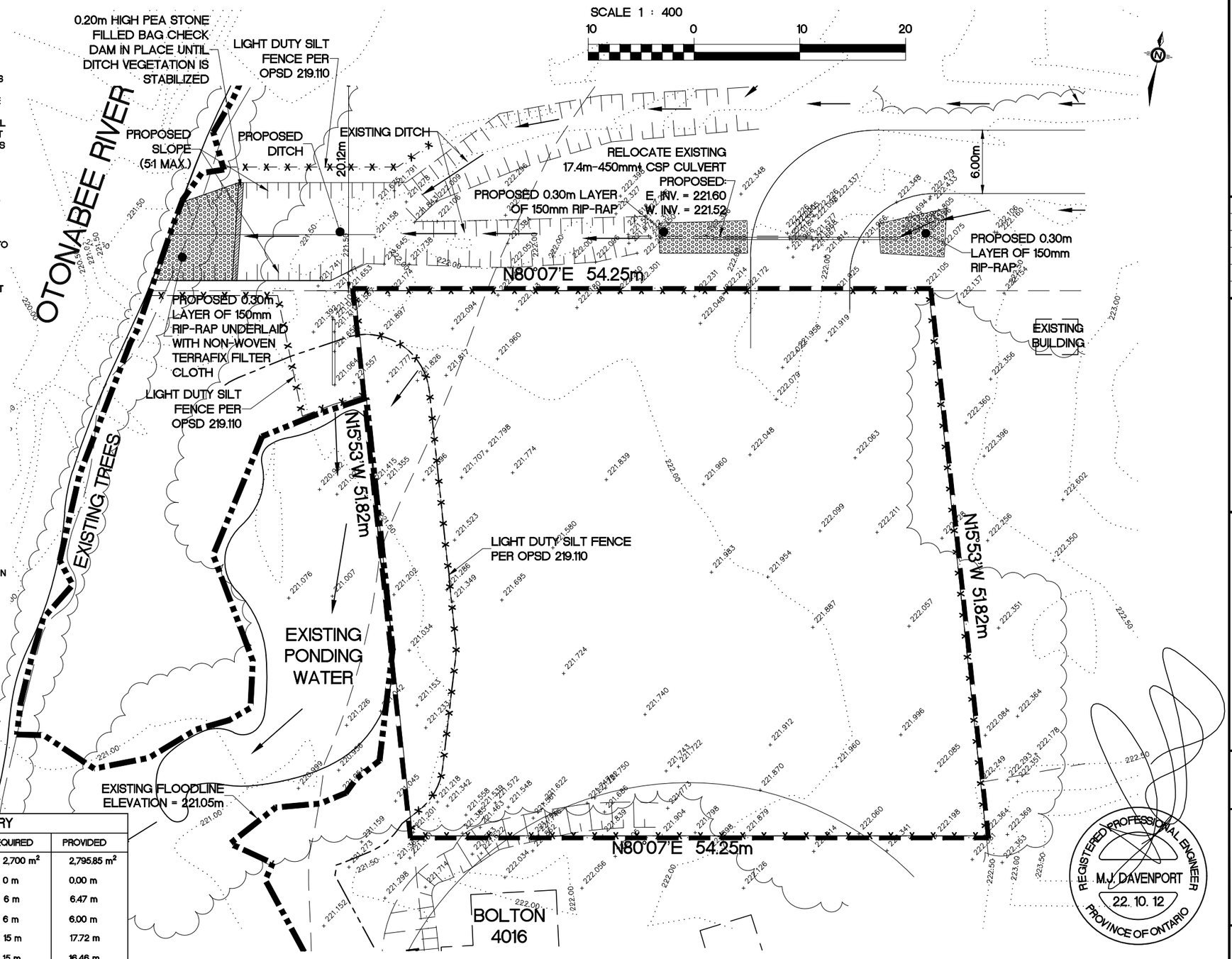

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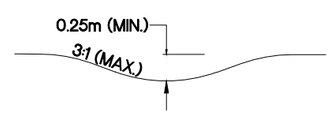

TYPICAL SWALE SECTION

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EROSION CONTROL PLAN

DESIGNED BY: M. J. DAVENPORT	SCALE: 1 : 400
DRAWN BY: J. ZHOU	
DATE: APRIL, 2021	DRWG. NO.: 5883-EC
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