FENTON FARM SUBDIVISION by CHASE MEADOWS

Preliminary Servicing Report

Prepared for ***Newell and Grant Brown Ltd.***

JOB#: 19018 | September 15, 2020

SUBMITTED BY: EVB Engineering

800 Second Street W., Cornwall
ON K6J 1H6

613.935.3775
EVBengineering.com

Table of Contents

1. Introduction

1.1 Background

This preliminary servicing report is submitted on behalf of Newell and Grant Brown Ltd. in support of the proposed draft plan for the Fenton Farm Subdivision, by Chase Meadows. This preliminary servicing report, completed by EVB Engineering (EVB), includes sanitary sewage collection, stormwater collection, water distribution, and stormwater management for the proposed development.

1.2 General Description & Land Use

The Fenton Farm Subdivision is located north of County Road 36, east of Jim Brownell Boulevard, south of the Canadian National Railway, and west of Avonmore Road. It is situated on Part of E ½ Lot 33, Concession 5, in the Township of South Stormont (Geographic Township of Cornwall) within the County of Stormont, Ontario (refer to the Draft Plan found in Appendix A).

The proposed development is approximately 6.05 hectares that will comprise of single and semi-detached unit housing. Upon completion of the Population Projections & Settlement Area Boundary Review, prepared by Hemson Consulting Inc., the Township of South Stormont has submitted a proposal to amend the United Counties of SD&G's Official Plan (2017) under Section 21 of the Planning Act. The amendment proposes to adjust the settlement boundary of Long Sault to include lands identified for future growth and development in the Official Plan by re-designating or removing other lands within the settlement boundary. An open house was held by the Township of South Stormont on September 23rd, 2019, followed by a public meeting on October 9th, 2019.

The subject land is designated as Residential District in the County's Official Plan, allowing for a full range of low, medium and high-density housing types. Likewise, the Township's zoning by-law designates the subject land as Rural – Special Exception Seven (RU-7), Serviced-First (RS-1), and Flood Plain (FP). The RRCA does not foresee any issues with the proposed development residing within the boundary of the flood plain. In conjunction with this application, a zoning amendment application will be submitted in order to change the zoning of the subject land to Residential Serviced-First and Second (Holding), dependent on the proposed lot fabric. As outlined in the South Stormont Comprehensive Zoning By-Law, the holding designation will be removed by amendment under Section 36 of the Planning Act, once municipal services are available at the site.

The proposed Fenton Farm Subdivision is a 43-lot development of which the Owner intends to develop 30 single-unit dwellings and 13 semi-detached units (26 dwellings). A 20.0m west and east right-of-way has been included into the design for future roadway connections.

A Trans-Northern pipeline easement currently runs across the proposed subdivision. It is located at the northerly limits of the site. This Trans-Northern pipeline easement will be maintained.

Lastly, a rail line is located at the very northerly limits of the subject land. In accordance with J.E. Coulter Associates' Guidelines for New Development in Proximity to Railway Operations (May 2013), a 30.0m building setback for new residential developments has been implemented. In order to ameliorate the inherent potential for the occurrence of safety, security, noise, and vibration, an earthen berm will also be constructed in accordance with J.E. Coulter's Guidelines.

2. Preliminary Servicing

In order to satisfy the requirements of the draft plan submission, EVB has completed a Preliminary Servicing Plan based off the proposed Draft Plan. This plan illustrates the proposed development of 43 residential lots, complete with municipal services on 6.05 hectares of land. The subdivision will terminate with a turning circle at the northern limit of the proposed development.

Full municipal services will be provided, including sanitary sewers, watermains, storm sewers (including rear yard catchbasins), stormwater management facility, asphalt roadways, street lighting, and utilities (Bell, Gas, Hydro).

The proposed road allowance will be established as 20.0m in accordance with the Township of South Stormont standard for local streets.

The Township of South Stormont will allocate both water and sewage capacity to the development based on the available capacity at the Long Sault Water Treatment Plant and Long Sault Wastewater Treatment Plant.

The Preliminary Servicing Plan (FIG.1) can be found in Appendix B.

3. Servicing

3.1 Sanitary Collection System

A sewage collection system is proposed for the development to transport sewage to the Long Sault wastewater treatment plant, located on Robin Road, before being discharged into the surface waters. Design of the sewage collection system for the development will be consistent with the *Ministry of Environment (MOE) design Guidelines for Sewage Works (2008).*

The proposed sanitary sewer will connect to an existing 250mm diameter sanitary sewer located along County Road 36. The sewage will discharge to the County Road 36 pumping station and will ultimately flow south west to the existing Long Sault Wastewater Treatment Plant located along Robin Road via a 250mm diameter forcemain.

Sanitary laterals will service each property and be installed from the main line sewer to the property boundary. Sanitary laterals will be installed with minimum and maximum slopes of 2% and 8% respectively; consistent with provincial standards.

A collection of mapping was completed for the Long Sault area as part of the Wastewater Masterplan, completed by WSP in July 2014. The Masterplan provided an evaluation of the capacity of the sanitary sewer collection system within the village of Long Sault, including all pumping stations. The Masterplan concluded that the sewer system has sufficient capacity for future development (i.e. Fenton Farm Subdivision). The Masterplan did recommend that the Township monitor the performance of the County Road 36 pumping station. However, in speaking with the Township, it is our understanding that the County Rd. 36 pumping station capacity was increased due to adjustments in the operation of the facility, and it now has significant capacity remaining.

The proposed sanitary collection system layout for the proposed subdivision is shown on the preliminary servicing plan (FIG. 1) found in Appendix B. The sanitary catchment areas (FIG. 2) and preliminary sanitary design sheets can be found in Appendix C.

3.1 Water Supply

The water supply for the proposed development will consist of a new watermain which will be connected to the existing 200mm diameter watermain located along County Road 36. The water distribution system will be consistent with Township standards. The distribution system will provide potable water to the residents of the proposed subdivision and provide fire protection to the area.

The water supply will be designed consistent with MOE *Design Guidelines for Drinking Water Systems (2008).* The watermain will be designed to not exceed 700kPa (100 psi) under minimum hourly demand and not fall below 275 kPa (40 psi) during peak hourly demand. The watermain will also be designed so that normal operating pressures range between 350 kPa to 480 kPa (50 to 70 psi) under maximum day demand conditions. The watermain design will also ensure that a minimum pressure of 140 kPa (20 psi) is met under maximum day plus fire flow conditions.

The Township of South Stormont will be required to commit sufficient uncommitted reserve capacity from the Long Sault Water Treatment Plant to accommodate this proposed development.

The proposed water distribution layout for the development is shown on the preliminary servicing plan (FIG.1), be found in Appendix B.

3.2 Stormwater Collection

The Ministry of Environment, Conservation and Parks (MOECP) requires 80% total suspended solids (TSS) removal and requires that the pre-development peak flows not be exceeded for the 5 and 100-year storm events. A new stormwater management facility is therefore proposed to achieve the qualitative and quantitative requirements.

The *Stormwater Management (SWM) Planning and Design Manual* (2003) was used to determine the design criteria for the proposed facility.

Storm water runoff from the proposed development will be conveyed to the new stormwater management facility via lot grading, swales, and a series of proposed storm sewers. The storm sewer collection system will be sized based on the peak flow of a storm event with a 5-year return period, an initial time of concentration of 20 minutes and a Manning roughness coefficient of 0.013.

Storm laterals will service each property and will be installed from the main line sewer to the property boundary. Storm laterals will be installed with minimum and maximum slopes of 2% and 8% respectively; consistent with provincial standards.

3.2.1. Site Overview and Catchment Areas

The existing drainage patterns were established based on a topographical survey completed by Kim Adams Surveying.

The proposed drainage patterns will be established based on the proposed lot fabric as described in the Draft Plan (DP.1). Typical split lot grading and/or back to front lot grading consistent with details in the Township of South Stormont's Subdivision Manual will direct stormwater runoff from the proposed lots to a stormwater collection system (rear yard swales, rear yard catchbasins, and storm sewers) that will ultimately discharge to the new stormwater management facility.

3.2.2. Runoff Coefficients

An average runoff coefficient was applied based on the Township's Subdivision Manual. An average runoff coefficient of 0.20 was used for pre-development conditions based on a grassed, undeveloped area. Likewise, an average runoff coefficient of 0.45 was used for post-development conditions based on single family dwellings, rural setting, and semi-detached dwellings.

3.2.3. Quantitative Sizing

The rational method and associated criteria (runoff coefficients, time of concentration, rainfall intensity) were used to calculate the pre and post development runoff for storm events with return periods of 5 and 100-years respectively.

As can be seen in the table below, 393.65m^3 and 675.49m^3 of active storage is required to attenuate post development flows to pre-development levels for a 5-year and 100-year event respectively.

Table 1: Required Active Storage for 5-Year and 100-Year Storm Events

	Pre-Development			Post-Development				Required Quantitative Storage (m^3)
Return Period (Years)	Area (ha)	C Factor	Peak Runoff (L/s)	Area (ha)	C Factor	Uncontrolled Peak Runoff (L/s)	Controlled Peak Runoff (L/s)	
5	6.05	0.20	110.35	6.05	0.45	405.35	110.35	393.65
100	6.05	0.20	172.92	6.05	0.45	621.80	172.92	675.49

3.2.4. Qualitative Sizing

The Ministry of Environment's (MOE) Stormwater Management Planning and Design Manual (2003) was referenced to determine which type of SWM facility to apply to the subject land. Upon review of Table 4.1, a wet pond and wetland will be considered during preliminary design, while the facility is to be finalized during detailed design.

Straw bale flow checks and light duty fencing are also to be maintained throughout the duration of construction and to be removed only once seeding is completed and grass in the roadside ditches has reached a height of 150mm. The straw bale flow checks will be installed in the road swales to minimize sediment transport during construction of the subdivision.

Wet Pond

In previous meetings with the Township, they have expressed concern with the maintenance associated with the construction of an additional stormwater management pond. However, the location and configuration of the pond has been chosen to facilitate elimination should the Township proceed with a central stormwater management facility.

By interpolating Table 3.2 of the MOE Design Manual, 167.02m^3/ha will be required to achieve the required TSS removal rate of 80%. Of this amount, 40m^3/ha is to be extended detention and the remainder (127.02m^3/ha) is to be permanent storage. As such, a minimum of 242.09m^3 of extended detention and 768.77m^3 of permanent storage will be required.

Table 4.6: Wet Pond – Summary of Design Guidance from MOE's Stormwater Management Planning and Design Manual was referenced in determining a preliminary wet pond footprint, sized to accommodate the required storages outlined above. Based on an assumed wet pond base footprint of 3m x 9m with 5H:1V side slopes below permanent pool and 3H:1V side slopes in all other locations, the required permanent pool storage volume can be achieved at a depth of 2.1m with respect to the bottom of the pond. The required extended detention, 5-year, and 100-year storage volumes can be achieved at depths of 0.35, 0.5, and 0.8m with respect to the permanent pool elevation. Accounting for an additional safety buffer of 0.50m above the 100-year water

level elevation, a minimal excavated footprint of approximately 31.8m x 37.8m would be required with additional space needed for grading purposes to tie into the existing ground elevation. Block 45 has been sized with sufficient area to house this stormwater management facility.

Wetland

By interpolating Table 3.2 of the MOE Design Manual, 92.10m^3/ha will be required to achieve the required TSS removal rate of 80%. Of this amount, 40m^3/ha is to be extended detention and the remainder (52.10m^3/ha) is to be permanent storage. As such, a minimum of 242.09m^3 of extended detention and 315.30m^3 of permanent storage will be required.

Table 4.7: Wetlands – Summary of Design Guidance from MOE's Stormwater Management Planning and Design Manual was referenced in determining a preliminary wetland footprint sized to accommodate the required storages outlined above. Based on an assumed wetland base footprint of 29m x 35m with 3H:1V side slopes, the required permanent pool storage volume can be achieved at a depth of 0.3m with respect to the bottom of the pond. The required extended detention, 5-year, and 100-year storage volumes can be achieved at depths of 0.21, 0.33, and 0.55m with respect to the permanent pool elevation. Accounting for an additional safety buffer of 0.50m above the 100-year water level elevation, a minimal excavated footprint of approximately 37.2m x 43.2m would be required with additional space needed for grading purposes to tie into the existing ground elevation. Block 45 has been sized with sufficient area to house this stormwater management facility.

4. Right-of-Way

Asphalt roadways will be constructed for the development consistent with the Township of South Stormont standards for an urban cross-section with a road allowance of 20.0m. This can be generally summarized as an asphalt roadway consisting of two (2) 4.0m lanes, one (1) standard barrier curb and gutter for each side and a 1.5m wide sidewalk located on the north/west side of the right-of-way. A turning circle will be provided to provincial standards at the northern termination of the road labeled "Street 'A'" on the attached plans.

A cross section of the proposed 20.0m urban right-of-way (FIG.4) can be found in Appendix E.

5. Calculated Sight Distance

For the purpose of this report, the '*TACC Geometric Design Guide for Canadian Roads (1999)*' was referenced to determine the minimum sight distance and the stopping sight distance required at the intersection of Road 'A' and County Road 36.

The intersection sight distance was calculated in order to ensure vehicles can safely execute all available maneuvers, namely left turns and right turns. Road 'A' is to feature a stop control. As such, the sight triangles are a function of the vehicular speed along

County Road 36 and the aforementioned turning maneuvers of the stopped vehicle along Road 'A'.

The stopping sight distance was computed to ensure that no collision would occur in the event that a vehicle executes an unsafe turning movement from the stop control onto County Road 36.

5.1 Design Controls

5.1.1. Design Speed

The posted speed limit along County Road 36 is 80km/hr. When taking into consideration the geometric features of the roadway, a design speed of 100km/hr was utilized.

5.1.2. Object Height

For intersection sight distance, a height of 1.08m was used to represent the height above the roadway surface to the object. This value represents a conservative approach, where the height of the head-lights/tail-lights was used, applying a 1° angle upward to account for the diffusion of light.

In like manner, for stopping sight distance, a height of 0.6m was used to represent the height above the roadway surface to the object.

5.1.3. Driver Eye Height

A height of 1.05m was used to conservatively represent the height above the roadway surface to the driver's eye height.

5.2 Turning Maneuvers

As mentioned above, two turning maneuvers were considered when examining the intersection sight distance: left turns and right turns. As such, three scenarios were evaluated to determine whether sufficient sight distance can be achieved, namely:

1) Vehicles turning left onto County Road 36 with traffic approaching from the left (figure 1 below);
2) Vehicles turning left onto County Road 36 with traffic approaching from the right (figure 1 below); and
3) Vehicles turning right onto County Road 36 with traffic approaching from the left (figure 2 below).

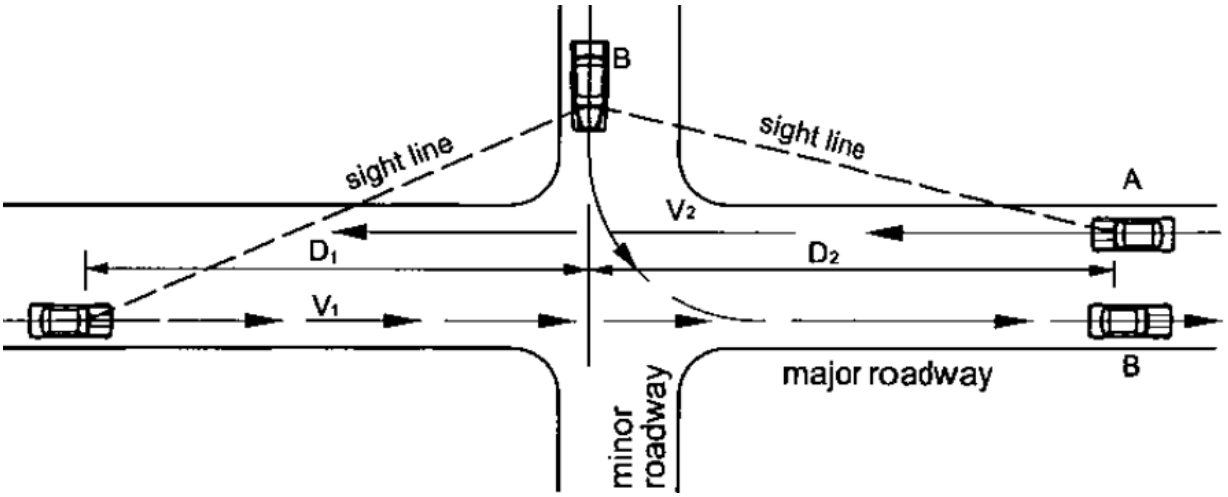


Figure 1: Departure – left turn

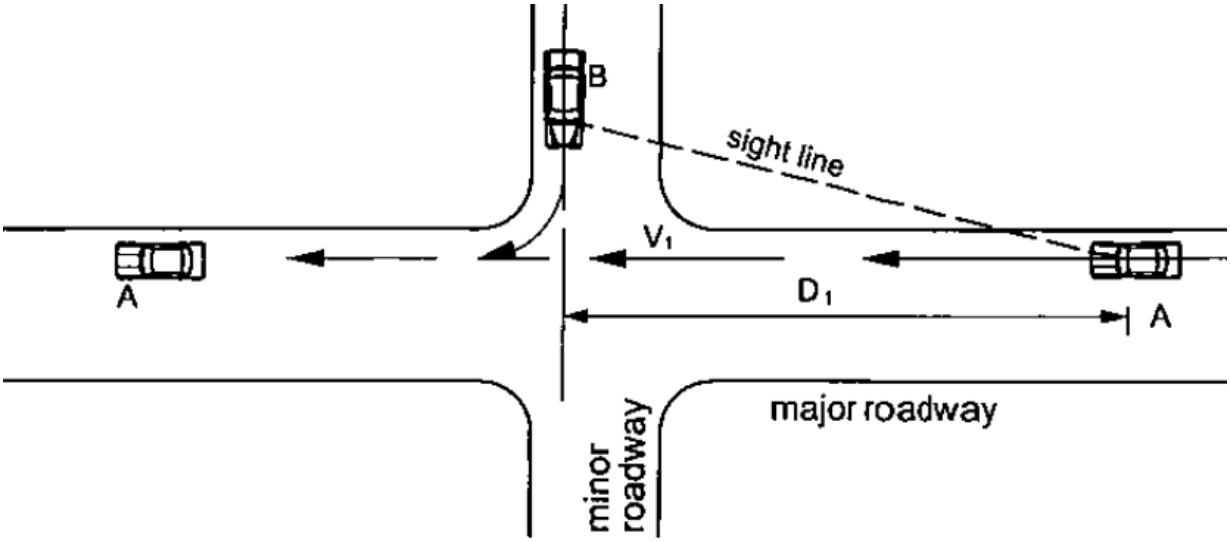


Figure 2: Departure - right turn

5.2.1. Scenario 1

For vehicles turning left onto County Road 36, sufficient sight distance must be provided such that the turning vehicle will avoid interruption of through traffic approaching from the left. The required sight distance was determined using Figure 2.3.3.4a from the *TACC Geometric Design Guide for Canadian Roads (1999)*.

$$D_2 \approx 192m$$

5.2.2. Scenario 2

For vehicles turning left onto County Road 36, sufficient sight distance must be provided such that the turning vehicle not be overtaken by a vehicle approaching from the right. The required sight distance was determined by interpolating the area bounded by

AASHTO B1 and B-2b on Figure 2.3.3.4b from the *TACC Geometric Design Guide for Canadian Roads (1999)*.

$$D_1 \approx 212m\ (lower) - 375m(upper)$$

5.2.3. Scenario 3

For vehicles turning right onto County Road 36, sufficient sight distance must be provided such that the turning vehicle not be overtaken by a vehicle approaching from the left. The required sight distance was determined by interpolating the area bounded by AASHTO B2 and Cb on Figure 2.3.3.4b from the *TACC Geometric Design Guide for Canadian Roads (1999)*.

$$D_1 \approx 175m\ (lower) - 212m(upper)$$

5.3 Sight Triangles

The sight distance calculated from the aforementioned three (3) scenarios were examined and compared with the field data collected for the proposed intersection. Using topographic information collected by EVB Engineering, the roadway profile of County Road 36 was established. As can be seen in Figure 5 (Appendix F), the proposed intersection is situated in a sag curve. The proposed intersection sight triangle can be summarized as follows:

Table 2: Summary of Sight Distances

Scenario	Required	Available
1) Left-turn; traffic from left	192m	> 300m
2) Left-turn; traffic from right	212 – 375m	> 268m
3) Right-turn; traffic from left	175 – 212m	> 300m

As can be seen from Table 2, the available sight distance for a departing vehicle is at least equal to the minimum required sight distance along County Road 36. Furthermore, with an unobstructed view of the entire intersection, drivers have sufficient sight distance to anticipate and avoid collisions

5.4 Stopping Sight Distance

The stopping sight distance was computed looking at two scenarios: 1) if a car were to turn left onto County Road 36, would the approaching car from the right be able to stop in time; and 2) if a car were to turn right onto County Road 36, would the approaching car from the left be able to stop in time. As mentioned above, a profile of County Road 36 was established in order to examine the existing grades for both approaches. The required stopping sight distance was then compared to the available sight distance. This can be summarized as follows:

Table 3: Summary of Stopping Sight Distance

Scenario	Required	Available
1) Left-turn; traffic from right	206m	> 268m
2) Right-turn; traffic from left	236m	> 300m

As can be seen from Table 3, the available sight distance for an approaching car is greater than the required stopping sight distance.

6. Schedule

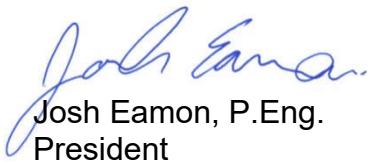
This preliminary servicing report is prepared in support of the Draft Plan approval. The Owner will be undertaking the detailed engineering design and executing a subdivision agreement with the Township of South Stormont following Draft Plan approval.

Please do not hesitate to contact the undersigned should you have any questions or concerns.

Respectfully submitted,

EVB Engineering

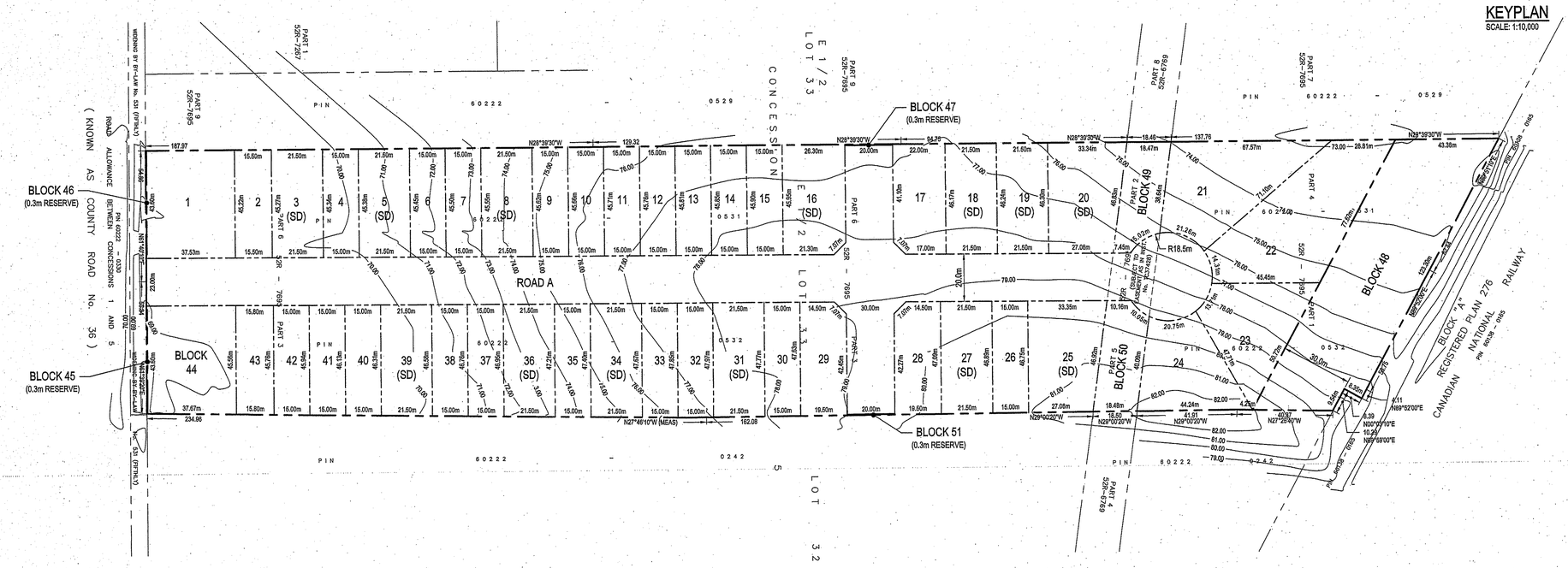
Rebecca Luck, P.Eng.
Municipal Engineer



Josh Eamon, P.Eng.
President

APPENDIX A

Draft Plan



KEYPLAN
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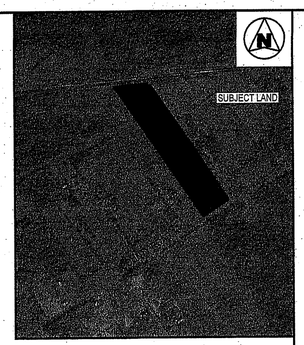

SCHEDULE OF LAND USE

DWELLING TYPE OR LAND USE	NUMBER OF LOTS	NUMBER OF DWELLINGS
SINGLE	30	30
SEMI-DETACHED	13	26
STREET		
BLOCK	8	
OTHER		

DRAFT PLAN OF SUBDIVISION OF PART OF

PART OF E ½ LOT 33 CONCESSION 5

GEOGRAPHIC TOWNSHIP OF CORNWALL,
TOWNSHIP OF SOUTH STORMONT
COUNTY OF STORMONT, ONTARIO

ADDITIONAL INFORMATION AS REQUIRED UNDER SECTION 51, PLANNING ACT

A) AS SHOWN ON DRAFT PLAN
B) AS SHOWN ON DRAFT PLAN
C) AS SHOWN ON DRAFT PLAN
D) REFER TO SCHEDULE OF LAND USE E) AS SHOWN ON DRAFT PLAN
F) AS SHOWN ON DRAFT PLAN
G) AS SHOWN ON DRAFT PLAN
H) MUNICIPAL WATER SERVICE
I) CLAY/BOULDERS
J) AS SHOWN ON THE DRAFT PLAN
K) HYDRO, BELL, CABLE, NATURAL GAS, SANITARY SEWER, WATERMAIN.
L) REFER TO SCHEDULE OF LAND USE

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE THIS DRAFT PLAN OF SUBDIVISION TO BE SUBMITTED TO THE MINISTER OF MUNICIPAL AFFAIRS FOR APPROVAL.

7 Oct 2020
DATED

NEWELL & GRANT BROWN LTD.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJOINING LANDS ARE CORRECTLY SHOWN.

05.5.2020
DATED

KIM C. ADAMS
ONTARIO LAND SURVEYOR

DATE	No.	REVISION
2020/08/21	2	REVISED DRAFT PLAN APPROVAL
2020/01/27	1	ISSUED FOR DRAFT PLAN APPROVAL

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EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-5450
WEBSITE: EVBengineering.com

CLIENT:

NEWELL AND GRANT BROWN LTD.

PROJECT:

FENTON FARM SUBDIVISION

TITLE:

DRAFT PLAN

SCALE: 1:1000	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2019/02/13
DRAWN BY: K.B.W.	DRAWING NO. DP1.1
CHECKED BY: J.E.	

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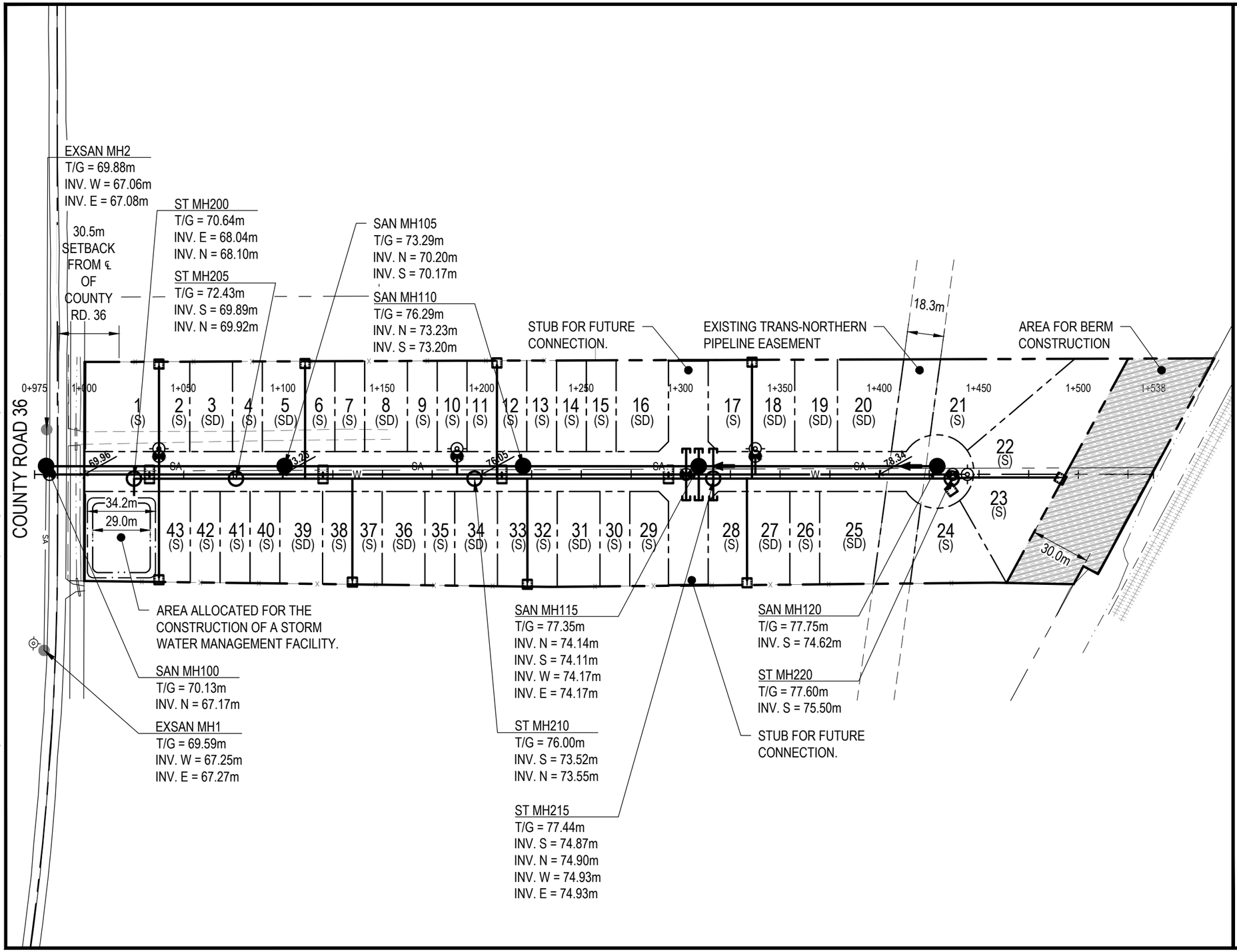
APPENDIX B

FIG. 1 – Preliminary Servicing Plan



LEGEND

- NEW PROPERTY LINE
- EXISTING PROPERTY LINE
- NEW WATERMAIN
- EXISTING WATERMAIN
- NEW SANITARY SEWER
- EXISTING SANITARY SEWER
- NEW STORM SEWER
- NEW FIRE HYDRANT
- EXISTING FIRE HYDRANT
- NEW SANITARY MANHOLE
- EXISTING SANITARY MANHOLE
- NEW STORM MANHOLE
- 74.53 PROPOSED ELEVATION

EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:

NEWELL & GRANT BROWN LTD.

PROJECT:

FENTON FARM SUBDIVISION

TITLE:

PRELIMINARY SERVICING PLAN

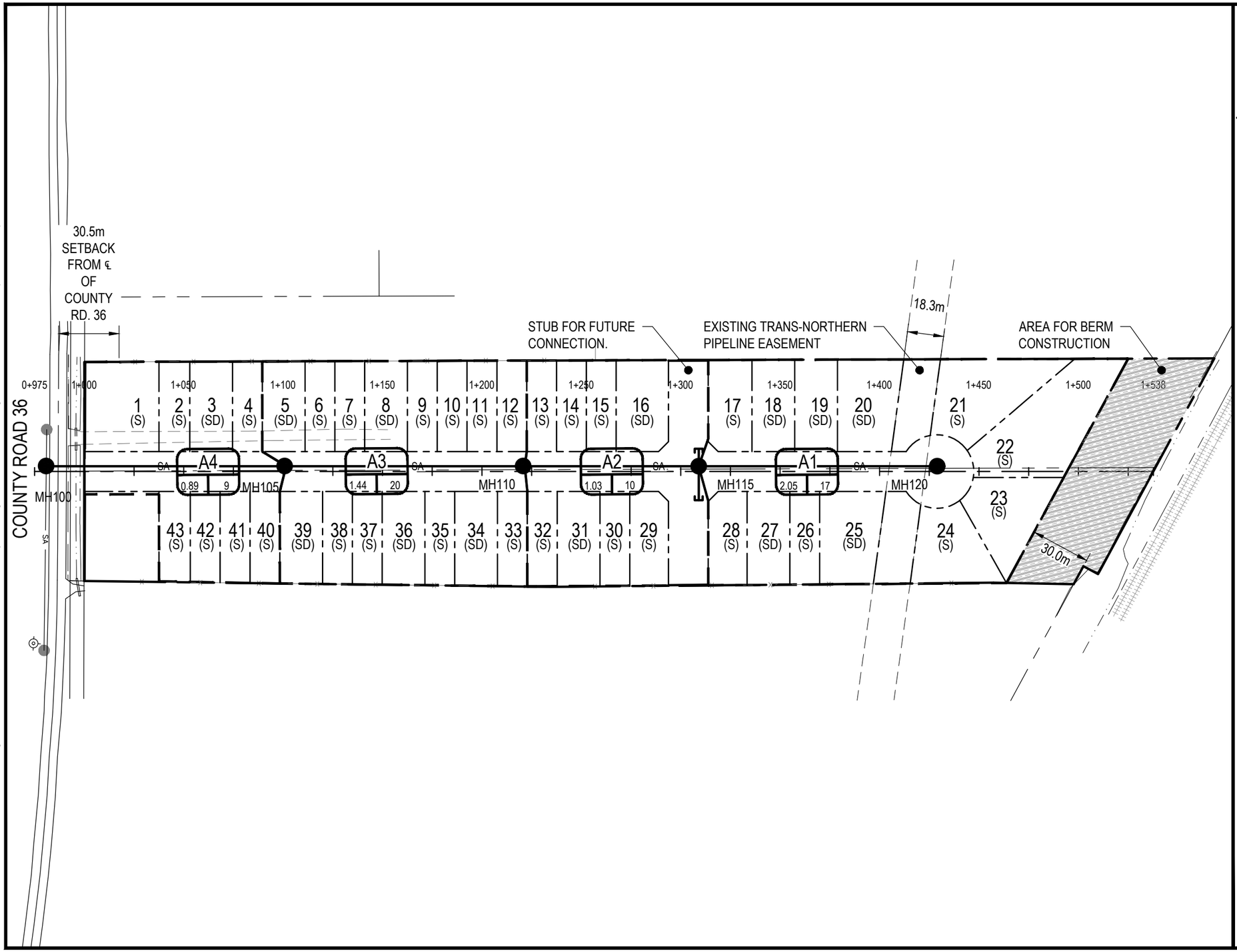
SCALE: 1:2000	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2020/09/15
DRAWN BY: R.L.	DRAWING NO. FIG.1
CHECKED BY: J.E.	

M:\2019\19018 - Fenton Farm Subdivision\6.0 Dwg\6.2 Civil\3.0 Non-production\3.1 FGS\Preliminary Servicing Report\19018-FIG-1.dwg Oct 02, 2020-11:23am BY:(Rebecca.Luck)

APPENDIX C

FIG. 2 – Sanitary Catchment Areas

Preliminary Sanitary Design Sheet



LEGEND:

- SANITARY DRAINAGE BUBBLE
- A1 — AREA LABEL
- 0.78 | 0.30 — NO. OF DWELLINGS / AREA IN HECTARE
- SANITARY CATCHMENT AREA
- NEW SANITARY MANHOLE

EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:

NEWELL & GRANT BROWN LTD.

PROJECT:

FENTON FARM SUBDIVISION

TITLE:

SANITARY CATCHMENT AREAS

SCALE: 1:2000	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2020/01/24
DRAWN BY: R.L.	DRAWING NO. FIG.2
CHECKED BY: J.E	

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Preliminary Sanitary Sewer Design Sheet

Client: Newell and Grant Brown Ltd.

Service Location and Contributing Areas						Inlet Flow										Outlet Pipe Data								
						Individual			Cumulative														Pipe Inverts	
Location	Manhole		Contributing Areas			Population			Σ	Σ	q	Peaking	Peak Flow	I*A	Q	SIZE	Slope	Qcap	Q/Qcap	Velocity	Length	Δ Elev		
	From	To	No.	Ha	Σ Areas	No. Lots	Pop.	P(1000)	P(1000)	AREA (ha)	l/cap/d)	Factor (M)	(l/s)	(l/s)	(l/s)	(mm)	(%)	(l/s)		(m/s)	(m)	(m)	U/S	D/S
Road A	MH120	MH115	A1	2.05	A1	17	51	0.051	0.051	2.05	450	4.00	1.06	0.39	1.45	200	0.40%	20.74	0.07	0.66	120	0.480	74.62	74.14
	MH115	MH110	A2	1.03	A1 - A2	10	30	0.030	0.081	3.08	450	4.00	1.69	0.59	2.27	200	1.00%	32.80	0.07	1.04	88.24	0.882	74.11	73.23
	MH110	MH105	A3	1.44	A1 - A3	20	60	0.060	0.141	4.52	450	4.00	2.94	0.86	3.80	200	2.50%	51.86	0.07	1.65	120	3.000	73.20	70.20
	MH105	MH100	A4	0.89	A1-A4	9	27	0.027	0.168	5.41	450	4.00	3.50	1.03	4.53	200	2.50%	51.86	0.09	1.65	120	3.000	70.17	67.17

Design Parameters

Coefficients

Mannings n = 0.0130

Persons Per Lot 3.0

Flows

Average Daily Per Capita Flow (q): 450 l/cap/d

Peak Extrenuous Flow (I): 0.19 l/s/ha

Designed By:
Rebecca Luck, P.Eng.

Reviewed By:
Josh Eamon, P.Eng

Project:
Fenton Farm Subdivision

Location:
Long Sault, Ontario

Dwg. Reference:
FIG.2 - Sanitary Catchment Areas

Project Number:
19018

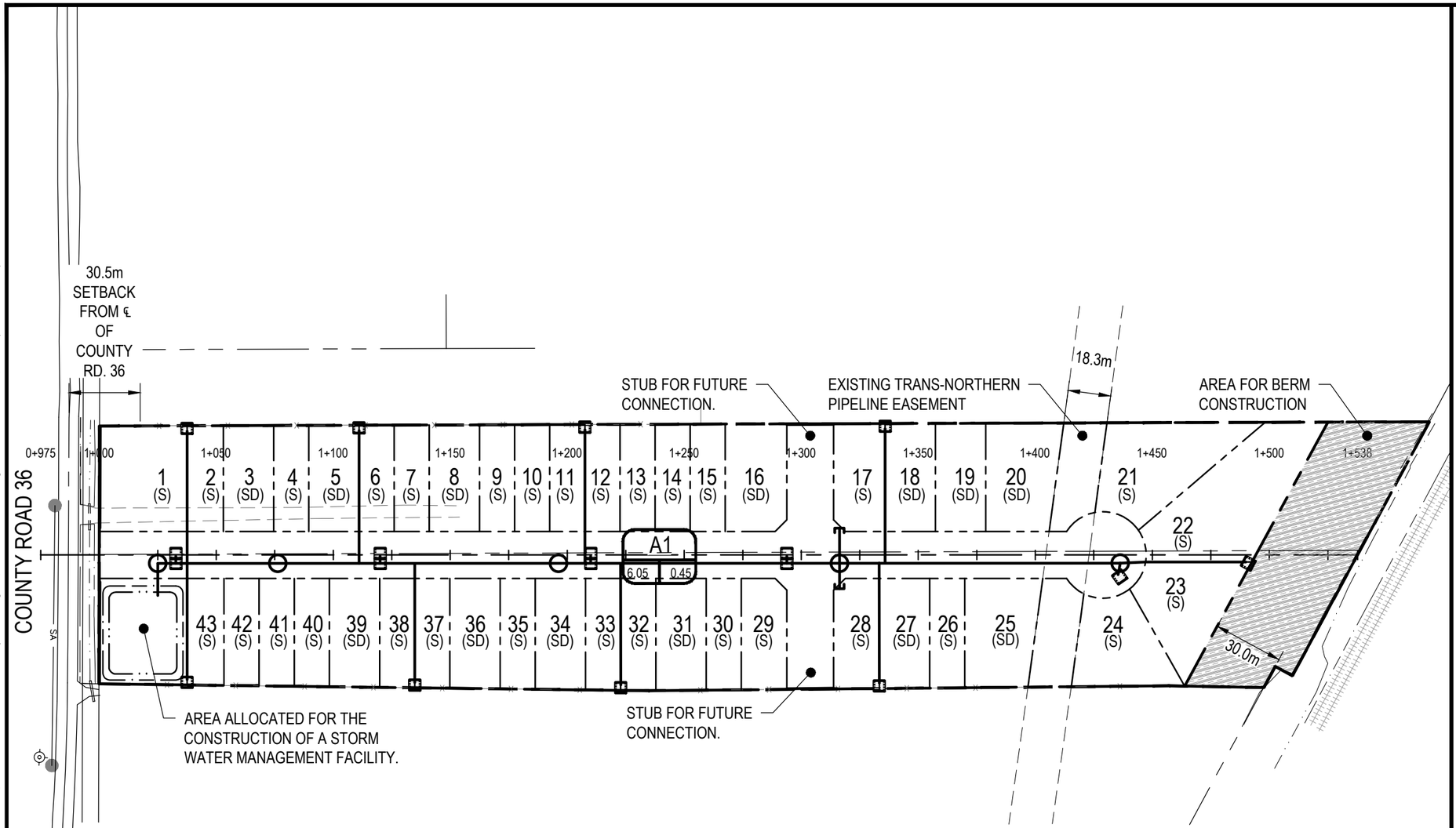
Date:
2-Oct-20

Sheet Number:
1/1

APPENDIX D

FIG. 3 – Stormwater Catchment Areas

Preliminary Runoff and Stormwater Management Calculations



M:\2019\19018 - Fenton Farm Subdivision\6.0 Dwg\6.2 Civil\3.0 Non-production\3.1 FGS\Preliminary Servicing Report\19018-FIG-3.dwg Oct 02, 2020-12:00pm BY:(Rebecca.Luck)

LEGEND:

STORM DRAINAGE BUBBLE
A1 — AREA LABEL
0.78 | 0.30 — RUNOFF COEFFICIENT / AREA IN HECTARE
STORM DRAINAGE LIMIT

EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:
NEWELL & GRANT BROWN LTD.

PROJECT:
FENTON FARM SUBDIVISION

TITLE:
STORM CATCHMENT AREAS

SCALE: 1:2000	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2020/01/24
DRAWN BY: R.L.	DRAWING NO. FIG.3
CHECKED BY: J.E.	

Pre-Development & Post Development Runoff Calculations

Project Name: Fenton Farm Subdivision
Project No: 19018
Client: Newell and Grant Brown Ltd.

Designed By: R. Luck, E.I.T.
Reviewed By: J. Eamon, P.Eng.
Date: January 24, 2020

Pre-Development Peak Run-off Rates (Allowable)

Contributing Area		Runoff Data						
No.	Ha	C	AC	Tc (min.)	I (mm/hr)		Q (L/s)	
					5 Year	100 Year	5 Year	100 Year
A1	6.05	0.20	1.21	41.66	32.79	51.39	110.35	172.92
Total	**6.05**	**0.20**	**1.21**				**110.35**	**172.92**

Uncontrolled Post-Development Peak Run-off Rates

Contributing Area		Runoff Data						
No.	Ha	C	AC	Tc (min.)	I (mm/hr)		Q (L/s)	
					5 Year	100 Year	5 Year	100 Year
A101	6.05	0.45	2.72	20.00	53.54	82.12	405.35	621.80
Total	6.05	0.45	2.72					

Allowable Release Rates (L/s)	
5 Year	110.35
100 Year	172.92

Pre-Development Tc (Airport Formula)

High point	82.03	m
Low point	69.02	m
S	3.06	%
L	425	m
Tc	41.66	min

5 Year Required Storage Calculations

Project Name: Fenton Farm Subdivision
Project No: 19018
Client: Newell and Grant Brown Ltd.

Designed By: R. Luck, E.I.T.
Reviewed By: J. Eamon, P.Eng.
Date: January 24, 2020

Rational Method Storage Computation
Storage Rate Method

Contributing Area (Contolled)		
No.	**Ha**	**C**
A101	6.05	0.45
Σ Areas		**6.05**
Weighted 'C' Factor		**0.45**

	Storm Event	Q (L/s)
Total Allow. Release Rate	5 Year	110.35
Total Actual Release Rate	5 Year	110.35

Time (Min.)	I (mm/hr)	Peak Flow (L/s)	Actual Release Rate (L/s)	Required Storage Rate (L/s)	Required Storage Volume (m^3)
5	151.66	1148.25	110.35	1037.90	311.37
10	93.42	707.32	110.35	596.97	358.18
15	70.36	532.76	110.35	422.41	380.17
20	57.55	435.71	110.35	325.36	390.43
25	49.24	372.78	110.35	262.43	393.65
30	43.34	328.18	110.35	217.83	392.09
35	38.92	294.65	110.35	184.30	387.04
40	35.45	268.40	110.35	158.05	379.31
45	32.65	247.18	110.35	136.83	369.45
50	30.33	229.63	110.35	119.28	357.85
55	28.37	214.83	110.35	104.48	344.80
60	26.70	202.16	110.35	91.81	330.51

100 Year Required Storage Calculations

Project Name: Fenton Farm Subdivision
Project No: 19018
Client: Newell and Grant Brown Ltd.

Designed By: R. Luck, E.I.T.
Reviewed By: J. Eamon, P.Eng.
Date: January 24, 2020

Rational Method Storage Computation
Storage Rate Method

Contributing Area (Contolled)		
No.	**Ha**	**C**
A101	6.05	0.45
Σ Areas		**6.05**
Weighted 'C' Factor		**0.45**

	Storm Event	Q (L/s)
Total Allow. Release Rate	100 Year	172.92
Total Actual Release Rate	100 Year	172.92

Time (Min.)	I (mm/hr)	Peak Flow (L/s)	Actual Release Rate (L/s)	Required Storage Rate (L/s)	Required Storage Volume (m^3)
5	253.33	1918.05	172.92	1745.13	523.54
10	156.05	1181.52	172.92	1008.60	605.16
15	117.54	889.92	172.92	717.00	645.30
20	96.13	727.81	172.92	554.89	665.87
25	82.24	622.70	172.92	449.78	674.67
30	72.40	548.19	172.92	375.27	675.49
35	65.01	492.19	172.92	319.27	670.48
40	59.21	448.33	172.92	275.41	660.99
45	54.53	412.90	172.92	239.98	647.95
50	50.66	383.58	172.92	210.66	631.99
55	47.40	358.86	172.92	185.94	613.61
60	44.60	337.69	172.92	164.77	593.16
65	42.17	319.31	172.92	146.39	570.92
70	40.04	303.19	172.92	130.27	547.14
75	38.16	288.92	172.92	116.00	521.98
80	36.48	276.17	172.92	103.25	495.61

Water Quality Required Storage Calculations
Wet Pond

Project Name: Fenton Farm Subdivision
Project No: 19018
Client: Newell and Grant Brown Ltd.

Designed By: R. Luck, E.I.T.
Reviewed By: J. Eamon, P.Eng.
Date: January 24, 2020

Relationship Between Watershed Imperviousness and the Storm Runoff Coefficient	
Impervious %	**C Factor**
16	0.2
100	0.9

Contributing Area Equivalent Impreviosuness %	
Weighted 'C' Factor	**Imperviousness %**
0.45	46.00

Contributing Area (Contolled)		
No.	**Ha**	**C**
A101	6.05	0.45
Σ Areas		**6.05**
Weighted 'C' Factor		**0.45**

Protection Level (%)	SWM Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	**55%**	**75%**	**85%**
80	Wet Pond	140	190	225	250
70	Wet Pond	90	110	130	150
60	Wet Pond	60	75	85	95

Required TSS Removal for Site (%):	80	%
Total Area of Site (ha):	6.05	ha
Contibuting Area (Controlled) (ha):	6.05	ha
Required Removal on Controlled Area to Achieve Required TSS Removal:	80.00	%

Impervious Level %	Required Storage Volume (m3/ha)
35	140.00
55	190.00
75	225.00
85	250.00

Required Storage Volume (m3/ha) for Impervious Level of 46.00:	167.02	m^3/ha
Required Extended Detention Volume (40m3/ha of Contributing Area):	242.09	m^3
Required Permanent Pool Volume (Remainder):	768.77	m^3

Water Quality Required Storage Calculations
Wetland

Project Name: Fenton Farm Subdivision
Project No: 19018
Client: Newell and Grant Brown Ltd.

Designed By: R. Luck, E.I.T.
Reviewed By: J. Eamon, P.Eng.
Date: January 24, 2020

Relationship Between Watershed Imperviousness and the Storm Runoff Coefficient	
Impervious %	**C Factor**
16	0.2
100	0.9

Contributing Area Equivalent Impreviosuness %	
Weighted 'C' Factor	**Imperviousness %**
0.45	46.00

Contributing Area (Contolled)		
No.	**Ha**	**C**
A101	6.05	0.45
Σ Areas		**6.05**
Weighted 'C' Factor		**0.45**

Protection Level (%)	SWM Type	Storage Volume (m^3/ha) for Impervious Level			
		35%	**55%**	**75%**	**85%**
80	Wetland	80	105	120	140
70	Wetland	60	70	80	90
60	Wetland	60	60	60	60

Required TSS Removal for Site (%):	80	%
Total Area of Site (ha):	6.05	ha
Contibuting Area (Controlled) (ha):	6.05	ha
Required Removal on Controlled Area to Achieve Required TSS Removal:	80.00	%

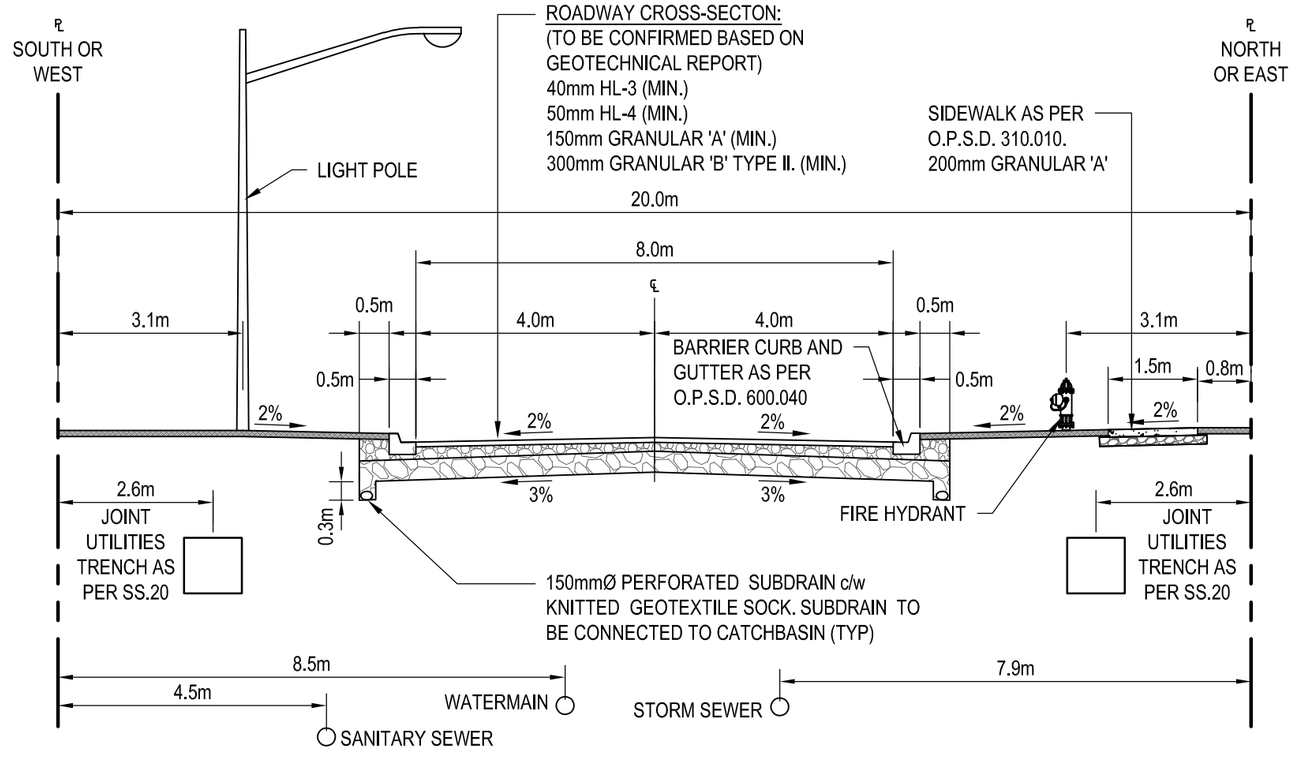
Impervious Level %	Required Storage Volume (m3/ha)
35	80.00
55	105.00
75	120.00
85	140.00

Required Storage Volume (m3/ha) for Impervious Level of 46.00:	92.10	m^3/ha
Required Extended Detention Volume (40m3/ha of Contributing Area):	242.09	m^3
Required Permanent Pool Volume (Remainder):	315.30	m^3

APPENDIX E

FIG. 4 – Typical 20.0m Urban Cross Section

NOTE: FIRE HYDRANT SHOULD BE INSTALLED 3.1m FROM PROPERTY LINE.



EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:

GRANT & NEWELL BROWN LTD.

PROJECT:

FENTON FARM SUBDIVISION

TITLE:

TYPICAL 20.0m URBAN CROSS-SECTION

SCALE: NT.S.	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2020/08/15
DRAWN BY: R.L.	DRAWING NO.
CHECKED BY: J.E.	FIG.4

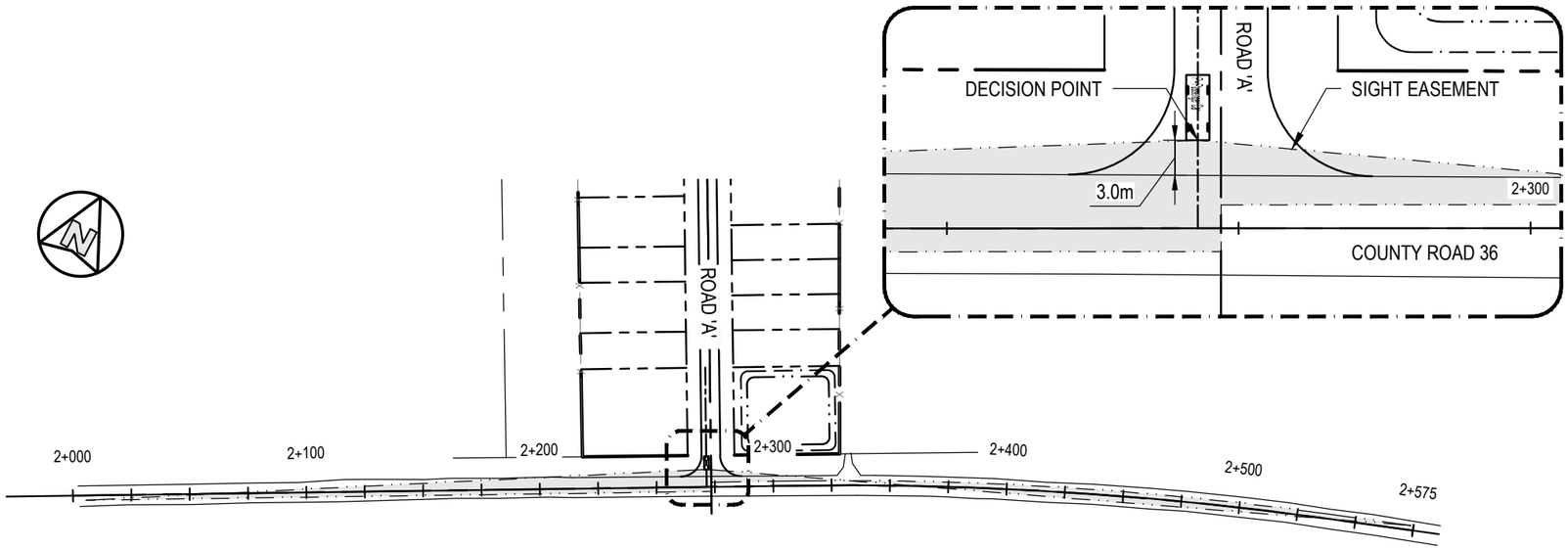
M:\2019\19018 - Fenton Farm Subdivision\6.0 Dwg\6.2 Civil\3.0 Non-production\3.1 FGS\Prelinary Servicing Report\19018-FIG-4b.dwg Sep 15, 2020-9:07am BY:(Ken.White)

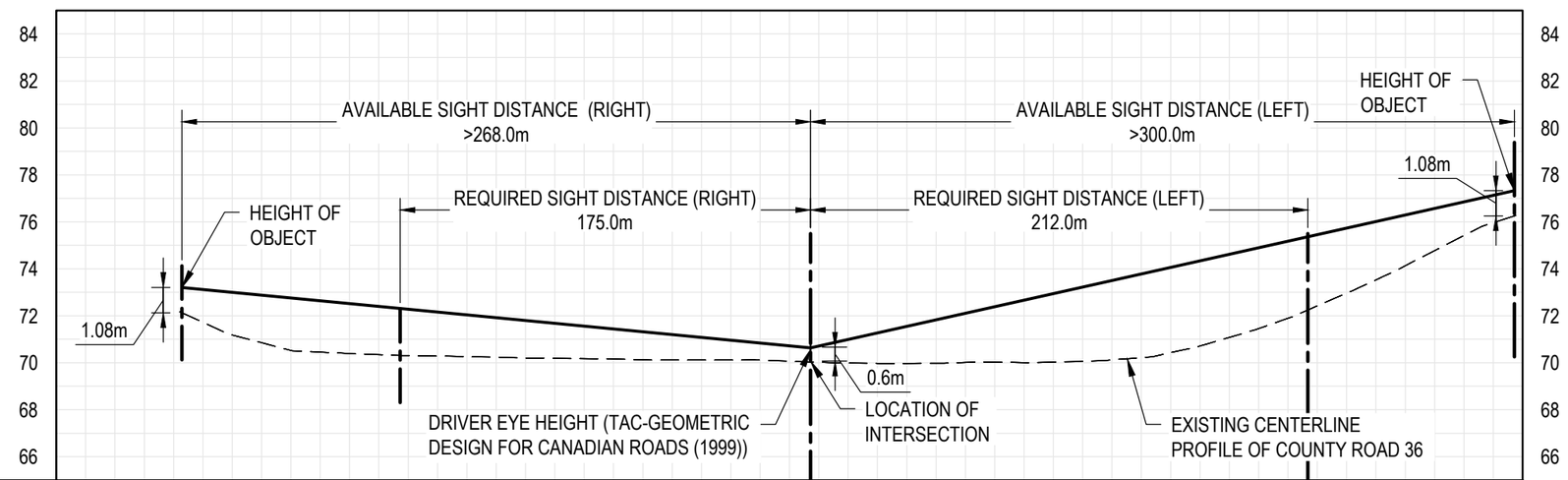
APPENDIX F

FIG. 5 – Intersection Sight Distance Evaluation

FIG. 6 – Stopping Sight Distance

Stopping Sight Distance Calculations





STATION	1+975	2+000	2+025	2+050	2+075	2+100	2+125	2+150	2+175	2+200	2+225	2+250	2+275	2+300	2+325	2+350	2+375	2+400	2+425	2+450	2+475	2+500	2+525	2+550	2+575
CENTERLINE GRADE	EXISTING		71.18	70.53	70.39	70.30	70.26	70.20	70.18	70.12	70.11	70.11	70.02	69.97	69.97	70.03	70.03	70.12	70.43	71.08	71.89	72.97	74.13	75.42	

EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:

NEWELL & GRANT BROWN LTD.

PROJECT:

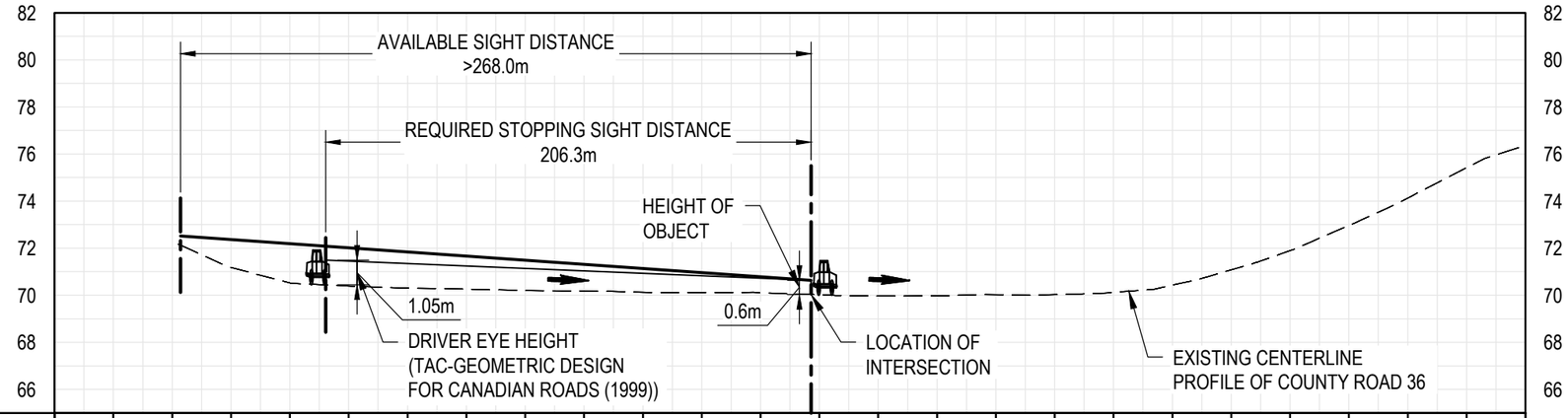
FENTON FARM SUBDIVISION

TITLE:

INTERSECTION SIGHT DISTANCE EVALUATION

SCALE: H:1:2500; V:1:250	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2020/09/29
DRAWN BY: K.B.W.	DRAWING NO. FIG.5
CHECKED BY: J.E.	

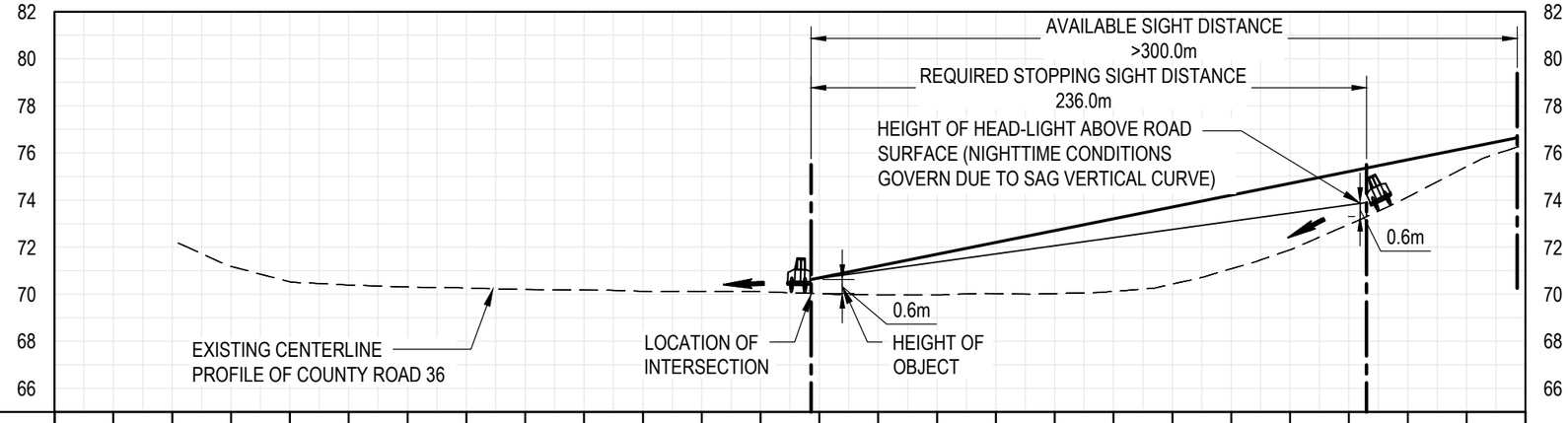
M:\2019\19018 - Fenton Farm Subdivision\6.0 Dwg\6.2 Civil\3.0 Non-production\3.1 FGS\Preliminary Servicing Report\19018-FIG-5-6.dwg Oct 07, 2020-2:43pm BY:(Rebecca.Luck)



STATION	1+975	2+000	2+025	2+050	2+075	2+100	2+125	2+150	2+175	2+200	2+225	2+250	2+275	2+300	2+325	2+350	2+375	2+400	2+425	2+450	2+475	2+500	2+525	2+550	2+575
CENTERLINE GRADE	EXISTING		71.18	70.53	70.39	70.30	70.26	70.20	70.18	70.12	70.11	70.11	70.02	69.97	69.97	70.03	70.03	70.12	70.43	71.08	71.89	72.97	74.13	75.42	

LEFT - TURNING VEHICILE

SCALE: H:1:2500; V:1:250



STATION	1+975	2+000	2+025	2+050	2+075	2+100	2+125	2+150	2+175	2+200	2+225	2+250	2+275	2+300	2+325	2+350	2+375	2+400	2+425	2+450	2+475	2+500	2+525	2+550	2+575
CENTERLINE GRADE	EXISTING		71.18	70.53	70.39	70.30	70.26	70.20	70.18	70.12	70.11	70.11	70.02	69.97	69.97	70.03	70.03	70.12	70.43	71.08	71.89	72.97	74.13	75.42	

RIGHT - TURNING VEHICILE

SCALE: H:1:2500; V:1:250

EVB ENGINEERING
800 SECOND STREET WEST
CORNWALL, ONTARIO CANADA, K6J 1H6
TEL: 613-935-3775 | FAX: 613-935-6450
WEBSITE: EVBengineering.com

CLIENT:

NEWELL & GRANT BROWN LTD.

PROJECT:

FENTON FARM SUBDIVISION

TITLE:

STOPPING SIGHT DISTANCE EVALUATION

SCALE: H:1:2500; V:1:250	JOB NO: 19018
DESIGNED BY: R.L.	DATE: 2020/09/29
DRAWN BY: K.B.W.	DRAWING NO. FIG.6
CHECKED BY: J.E.	

M:\2019\19018 - Fenton Farm Subdivision\6.0 Dwg\6.2 Civil\3.0 Non-production\3.1 FGS\Preliminary Servicing Report\19018-FIG-5-6.dwg Oct 07, 2020-2:43pm BY:(Rebecca.Luck)

Stopping Sight Distance Calculation

Project Name: Fenton Farm Subdivision
Project No.: 19018

The stopping sight distance was calculated using the following formula:

$$SSD = 0.278tV + d$$

Where:
SSD: Stopping sight distance [m]
t: Perception and reaction time [s]
V: Initial speed [km/hr]
d: Braking distance [m]

The braking distance was calculated using the following formula:

$$d = \frac{V^2}{254(f \pm G)}$$

Where:
f: Coefficient of friction between the tires and the roadway
G: Percent grade divided by 100

1) Left-Turning Vehicle

$$d = \frac{(100)^2}{254(0.29 - 0.0023)}$$
$$d = 136.84m$$

Where:
V = 100 km/hr
f = 0.29 (taken from Table 1.2.5.2)
G = 0.23% = 0.0023 (derived from profile)

$$SSD = 0.278tV + d$$
$$SSD = 0.278(2.5)(100) + (136.84)$$
$$SSD = 206.34m$$

Where:
t = 2.5s (taken from table 1.2.2.1)

2) Right-Turning Vehicle

$$d = \frac{(100)^2}{254(0.29 - 0.054)}$$
$$d = 166.82m$$

Where:
V = 100 km/hr
f = 0.29 (taken from Table 1.2.5.2)
G = 5.40% = 0.054 (derived from profile)

$$SSD = 0.278tV + d$$
$$SSD = 0.278(2.5)(100) + (166.82)$$
$$SSD = 236.32m$$

Where:
t = 2.5s (taken from table 1.2.2.1)