Floodplain Analysis

Lots 37 & 38 Con 1 Kinloss
Township of Huron-Kinloss, ON

GMBP File: 323029

June 2023

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA

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WWW.GMBLUEPLAN.CA

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LOTS 37 & 38 CON1 KINLOSS, TOWNSHIP OF HURON-KINLOSS

FLOODPLAIN ANALYSIS

JUNE 2023

GMBP FILE: 323029

1. INTRODUCTION

GM Blueplan Engineering Limited has been retained by Grassroots Farm, the owner of Lots 37 & 38 Concession 1 Kinloss in the Township of Huron-Kinloss, to undertake a floodplain analysis for the property. The property is agricultural in nature and is approximately 40.4 hectares (100 acres) in size and is intersected in the southeast corner by the Patterson Municipal Drain. The property is mostly zoned Agriculture (AG4) with some additional special zoning provisions included (AG4-25.44, AG4-169, and AG4-H1) as well as significant areas of Environmental Protection (EP) centred around the wetlands in the north part of the property as well as the Patterson Drain. The property is located at #760 Bruce Road 86, just east of Lucknow.

A map from the Bruce County GIS system is included in Appendix 'A'.

As noted, the Patterson Municipal Drain flows through the property from east to west, traversing the lower southeast corner of the property. In addition to the main channel, the drain also has two tributaries, one receiving flow from lands to the northeast of the property, and one receiving flow from lands southeast of the property. The main channel collects runoff primarily from lands lying south of the property, across Bruce Road 86. Three crossings under Bruce Road 86 were identified. The most easterly crossing, which carries runoff in the tributary from lands southeast of the property, consists of a concrete box culvert of 0.9m span and unknown height. Height of this culvert is unknown as the structure is completely buried and was not accessible. Due to the buried condition, it assumed there is no flow through this culvert. The main drain crosses Bruce Road 86 at a dual structure just east of the property (the "Upper Crossing"), consisting of a hybrid arch structure with a clear opening width of 1.60m and a height to top of the arch of 1.67m. There is also a 1200mm steel pipe in this location although it is set at a higher elevation than the arch culvert. The main drain again crosses Bruce Road 86 just downstream of the property (the "Lower Crossing"), this time via a conventional concrete box culvert with a span of 4.60m and a height of 1.20m. There is also a private culvert on the main drain located immediately east of the property on a laneway; however, the elevation of the laneway is quite low in comparison to Bruce Road 86 and since it is assumed it will offer little impediment to flows from the Regional storm the effects of this culvert were ignored in the study.

A topographic survey of the property was undertaken which included cross sections of the Patterson Drain taken at appropriate intervals starting downstream of the property on the south side of the Lower Crossing and extending upstream to the south side of the Upper Crossing. The cross sections were used to both determine the slope of the channel as well as to develop transects for modelling purposes. A drawing of existing conditions is included in Appendix 'B'.

The intent of the owner at this time is to expand an existing farm related commercial enterprise which may include the construction of small buildings for short-term rental purposes. Correspondence received from Maitland Valley Conservation Authority (MVCA) stated that a floodplain analysis would be required to determine the Regional flood elevation on the site and that any access to the proposed development would need to occur above the Regional flood elevation.

This floodplain analysis is prepared to document the peak flow rate in the Patterson Municipal Drain in the area of the proposed development and to confirm of the floodline elevation during the Regional Storm, all to support proposed development on the property.

2. HYDROLOGIC MODELLING

In order to determine peak flood flow rates, the Ministry of Natural Resource's (MNR) Ontario Flow Assessment Tool (OFAT) was used to determine the upstream catchment size and characteristics. OFAT calculated that the tributary lands to the northeast of the property are approximately 109 hectares (the "North Catchment") and the tributary lands to the south and southeast of the property are approximately 630 hectares (the "South Catchment"). According to the land characterization table, the catchment areas have an overall imperviousness of 2.0%. The following table identifies the various catchment parameters calculated by OFAT that were used to model peak runoff rates. A drawing of the watershed is included in Appendix 'C'. An additional catchment area (the "Property Catchment"), 35.5 hectares in size, which includes the property itself and the property immediately to the east was included in the modelling. This catchment does not impact flood elevations on the property as the outlet point is downstream at the Lower Crossing.

In addition, a Digital Elevation Model (DEM) was created from available orthographic imagery provided by MNR. The 2015 Southwest Ontario Orthophotography point cloud for the area under consideration was utilized to produce a DEM with a vertical accuracy of approximately 0.5m. The DEM was used to determine the average slope of the various catchments.

Table 1 – OFAT Catchment Characterization

Parameter	North Catchment	South Catchment	Property Catchment
Catchment Size (ha.)	109	630	35.5
Imperviousness (%)	2.0	2.0	2.0
Mean Land Slope (%)	1.1	0.17	1.1
Wetland Area (ha.)	17	127	0

The watershed characteristics were then imported into the hydrologic model PCSWMM where the Regional storm was modelled to identify the peak flow rate upstream of the subject property. The Regional storm modelled was as per O.Reg 164/06. It was determined that since the watershed is relatively large and rural in nature that the modified Green-Ampt method of infiltration would be most appropriate. The Soil Survey of Bruce County (Report No. 16) was consulted and it was found that the predominate soil type in the area if Harriston Loam which is a soil with good drainage properties. Therefore, infiltration parameters were selected according to recommended values as provided by Rawls and Brakensiek 1982. The parameters utilized in PCSWMM to model peak flow rates are as follows:

Table 2 – PCSWMM Parameters

Parameter	Value
Catchment Flow Length (m)	150
Manning's 'n' Impervious	0.015
Manning's 'n' Pervious	0.25
Storage Depth Impervious (mm)	2.5
Storage Depth Pervious (mm)	12.5
Suction Head (mm)	225
Hydraulic Conductivity (mm/hr)	13.2
Initial Deficit (frac.)	0.33

Catchment slope differs from the values provided by OFAT and was calculated from the DEM approximating the 85/10 rule.

Peak flow rate was modelled at the point where the main drain crosses under Bruce Road 86 at the Upper Crossing, upstream of the property and also where the main drain crosses Bruce Road 86 again at the Lower Crossing. The conduit (stream) shapes used in PCSWMM were transects as determined from the topographic survey, with a Manning's roughness 'n' of 0.035 for the streambed and 0.040 for the overbank areas. Stream slopes were calculated from the topographic survey and reach lengths were calculated from GIS.

The PCSWMM model resulted in a calculated un-adjusted peak runoff rate of 21.9 m^3/s from the South Catchment, 5.54 m^3/s from the North Catchment, and 1.80 m^3/s from the Property Catchment during the Regional storm event. As both the South and North catchments contain significant areas of wetlands, runoff rates for these two catchments were modified by Design Chart 1.06 of the MTO Drainage Management Manual which allows that peak runoff can be reduced to account for wetland storage areas. It was found that the North catchment contained approximately 15% wetlands in the upper area of the catchment and therefore according to the chart a peak discharge reduction factor (Ks) of 0.77 was applied. Similarly, the South catchment was found to contain 20% wetlands in the middle of the catchment and therefore according to the chart a peak discharge reduction factor (Ks) of 0.56 was applied. This reduced peak runoff rates from the two catchments to 4.3 m^3/s and 12.3 m^3/s respectively. The model PCSWMM was then used to calculate the peak inflow rate into the Patterson Drain at the outlet point of the dual culverts, which is considered the start of the watercourse that will be modelled in HEC-RAS. As the two catchments are different sizes and shapes, they have different lag times to peak flow generation, which results in a combined peak flow rate of 16.51 m^3/s. This is the flow rate that will be used in the HEC-RAS model.

Additionally, the peak flow rate to the inlet side of the was similarly modelled in PCSWMM and was found to be 17.37 m^3/s which will also be used in the HEC-RAS model.

Results of the PCSWMM modelling at the two peak flow locations are included in Appendix 'D'.

3. HYDRAULIC MODELLING

Floodplain elevations during the Regional Storm event were identified through the use of HEC-RAS. As previously noted, a topographical survey was carried out by GMBP in June of 2023 to provide elevations and cross-sections to be used in the HEC-RAS model. The locations of the cross-sections are shown on the drawing included in Appendix 'B'.

To ensure there was no attenuation effect from the upstream dual structure road crossing, flow through this crossing was modelled using the culvert modelling software HY-8 as developed by the US Federal Highway Administration. As noted above, the private culvert immediately east of the property was not considered in the model. It was found that the dual structures provided for conveyance of the peak runoff rate of 12.3 m^3/s from the South catchment at a headwater depth on the south side of Bruce Road 86 of 3.12m. This corresponds to a headwater elevation of 309.87 on the upstream side of the culvert which is less than the road centreline elevation of 311.54 at this point. Therefore, no overtopping of Bruce Road 86 will occur under Regional storm conditions. The Lower Crossing concrete box culvert was also modelled in HY-8 and was found that it is also capable of passing the Regional storm peak flow rate with a headwater surcharge elevation of 307.73, which is considerably less than the Bruce Road 86 elevation of 311.62. See HY-8 modelling results in Appendix 'E'.

HEC-RAS model generated Regional storm event water surface elevations for existing conditions, in metres above sea level (masl), are summarized in Table 3 below for the listed cross-sections. A water surface profile and cross sections are provided in Appendix 'F'.

Table 3 – HEC-RAS Water Surface Elevations (masl) – Existing Conditions

Cross-Section Station	Location of the station	Flood Elevation under Existing Conditions (meters above sea level)
0+087	Inlet side of the downstream road crossing	307.70
0+140	South of the existing buildings on the property	307.74

0+244	Adjacent to the existing buildings on the property	307.78
0+362	Near the east property line	307.79
0+441	On the neighbouring property	307.86
0+572	On the neighbouring property	308.03
0+767	Outlet side of the upstream road crossing	308.18

A plan view with aerial map showing inundated areas under Regional storm conditions is included in Appendix 'G'.

4. CONCLUSION

The Regional flood elevations presented in Table 3 as well as the water surface map included in Appendix 'G' should be considered the limits of the flood hazard area for the property. Development on the property could be considered in all areas outside of the flood hazard limits with appropriate erosion control measures. In addition, any laneways that cross the flood hazard should be elevated above the Regional flood elevation to provide for safe access.

All of which is respectfully submitted,

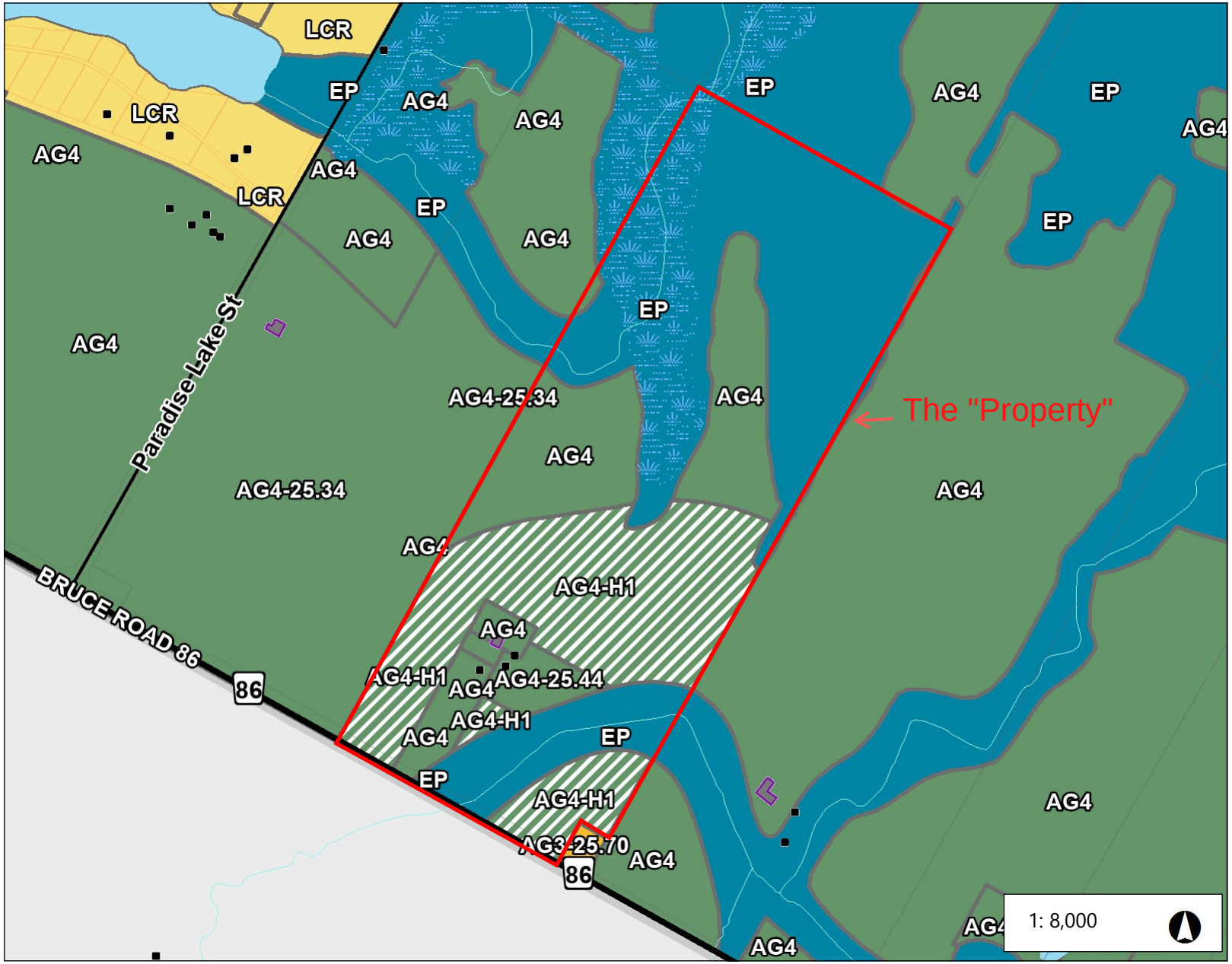
GM BLUEPLAN ENGINEERING LIMITED
Prepared by:

Matt Ash, C.E.T.

APPENDIX ‘A’
ZONING MAP

County of Bruce

Bruce County



Legend

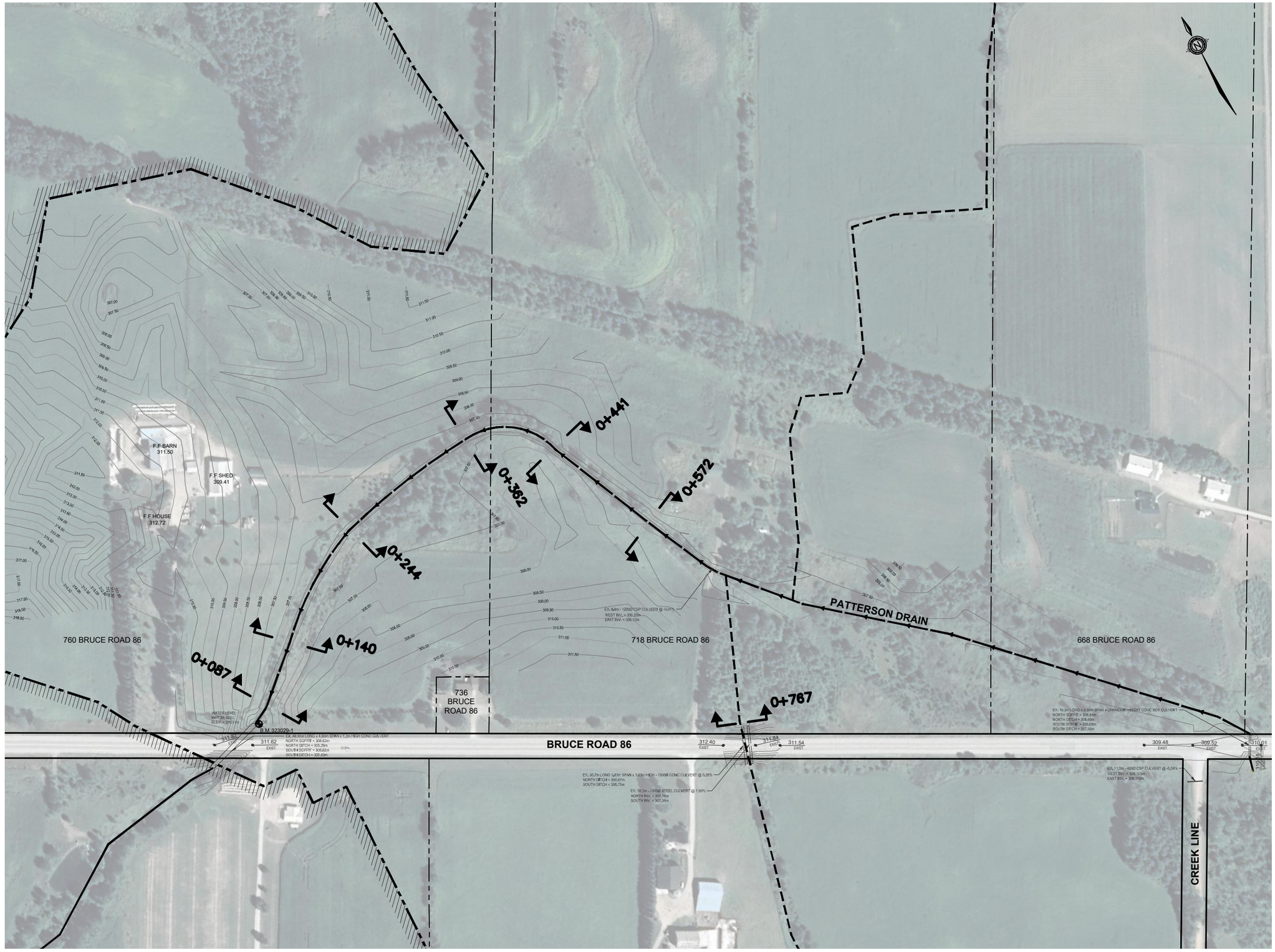
- Ferry
- Provincial Highway
- County Road
  - County Road
  - Bridge reconstruction
- Municipal or Other Road
  - Municipal or Other Road
  - Bridge Detrou
- OBM Building Location
- OBM Building Footprint
- Building Footprint
- Body of Water
- Evaluated Wetland
- Watercourse
  - Permanent Stream
  - Intermittent Stream
- Zones
  - Environmental Protection/Hazard
  - Environmental Protection/Hazard Holding
  - Wetland
  - General Agriculture/Rural
  - General Agriculture/Rural Holding
  - Restricted Agriculture/Rural
  - Restricted Agriculture/Rural Holding
  - Hamlet Residential
  - Mobile Home Park Residential
  - Inland Lake Residential
  - Lifestyle Community Residential
  - Lifestyle Community Residential Holding
  - Resort/Cottage Residential
  - Resort Residential Holding
  - Office Residential
  - Detached Residential
  - Detached Residential Holding
  - Low Density Residential
  - Low Density Residential Holding

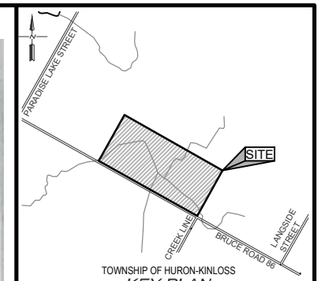
Notes

0.4 0 0.20 0.4 Kilometers

NAD_1983_UTM_Zone_17N

APPENDIX ‘B’
EXISTING CONDITIONS DRAWINGS





TOWNSHIP OF HURON-KINLOSS

KEY PLAN

NOT TO SCALE

NOTES :

1. TOPOGRAPHIC AND EXISTING FEATURES SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING, DATED MAY 30, 2023.

LEGEND:

- PROPERTY LINE
- BENCHMARK LOCATION
- WATERSHED BOUNDARY
- REGIONAL FLOOD AREA
- 307.69 — REGIONAL FLOOD ELEVATION

20 10 0 20 40 60

1:1500 (m) ARCH D '24 X 36'

BENCH MARKS :

323029-1 , ELV = 307.112m

CUT CROSS ON THE TOP OF THE NORTHWEST CORNER OF THE CONCRETE CULVERT LOCATED +/- 50m FROM DRIVEWAY OF GRASSROADS FARM (760 BRUCE ROAD 86)

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND 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 INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

NO.	MM/DD/YY	REVISION DESCRIPTION	CHKD

BluePlan ENGINEERING

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975 WALLACE AVENUE NORTH, LISTOWEL, ON N4W 1M6

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GRASSROADS FARM FLOODPLAIN STUDY

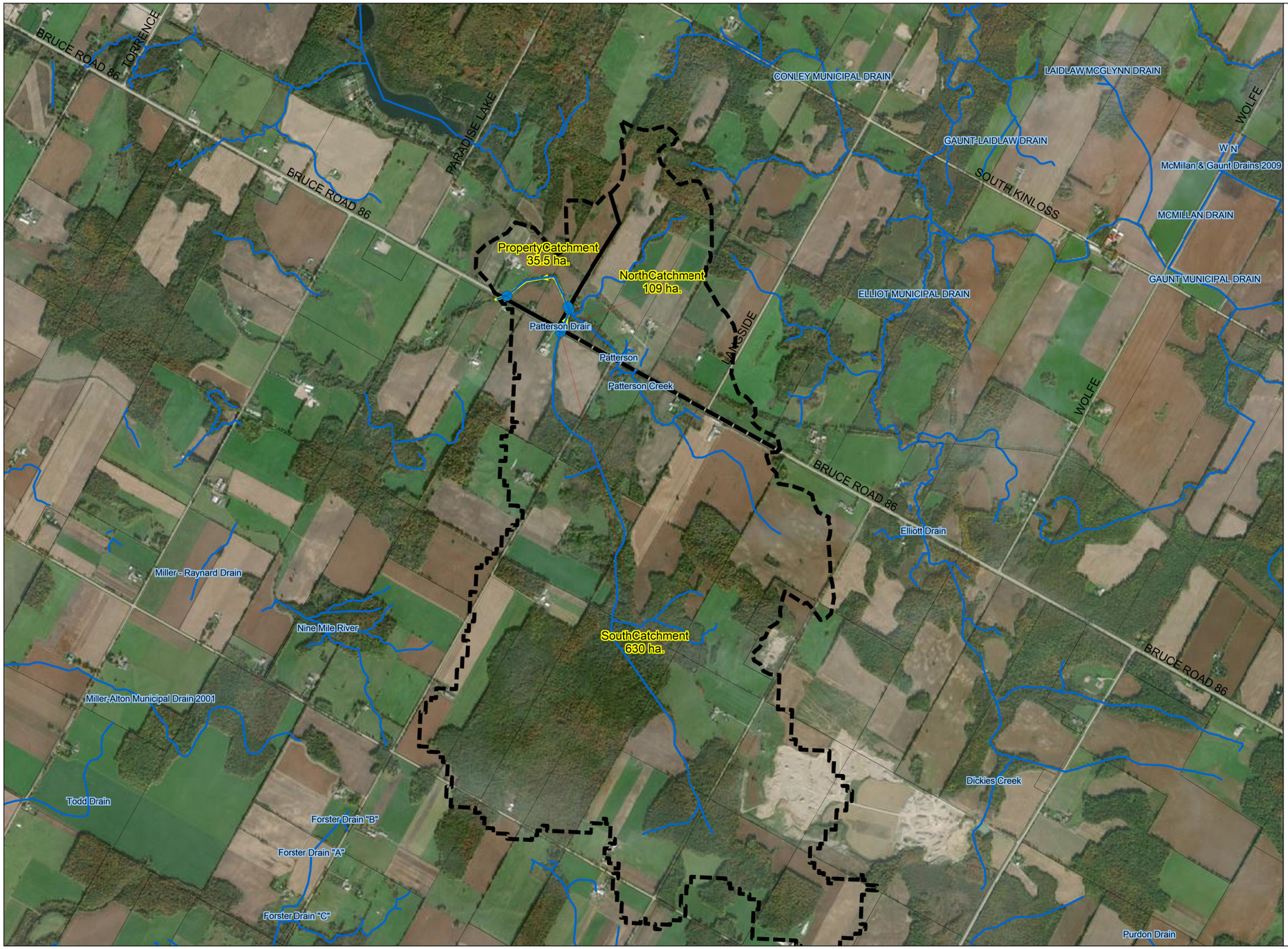
BLAIR MORRISON

TOWNSHIP OF HURON-KINLOSS

CROSS SECTION PLAN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
W.B.	--	323029	1
DESIGNED BY :	DATE :	SCALE :	
M.A.	JUNE 2023	AS NOTED	

APPENDIX ‘C’
WATERSHED



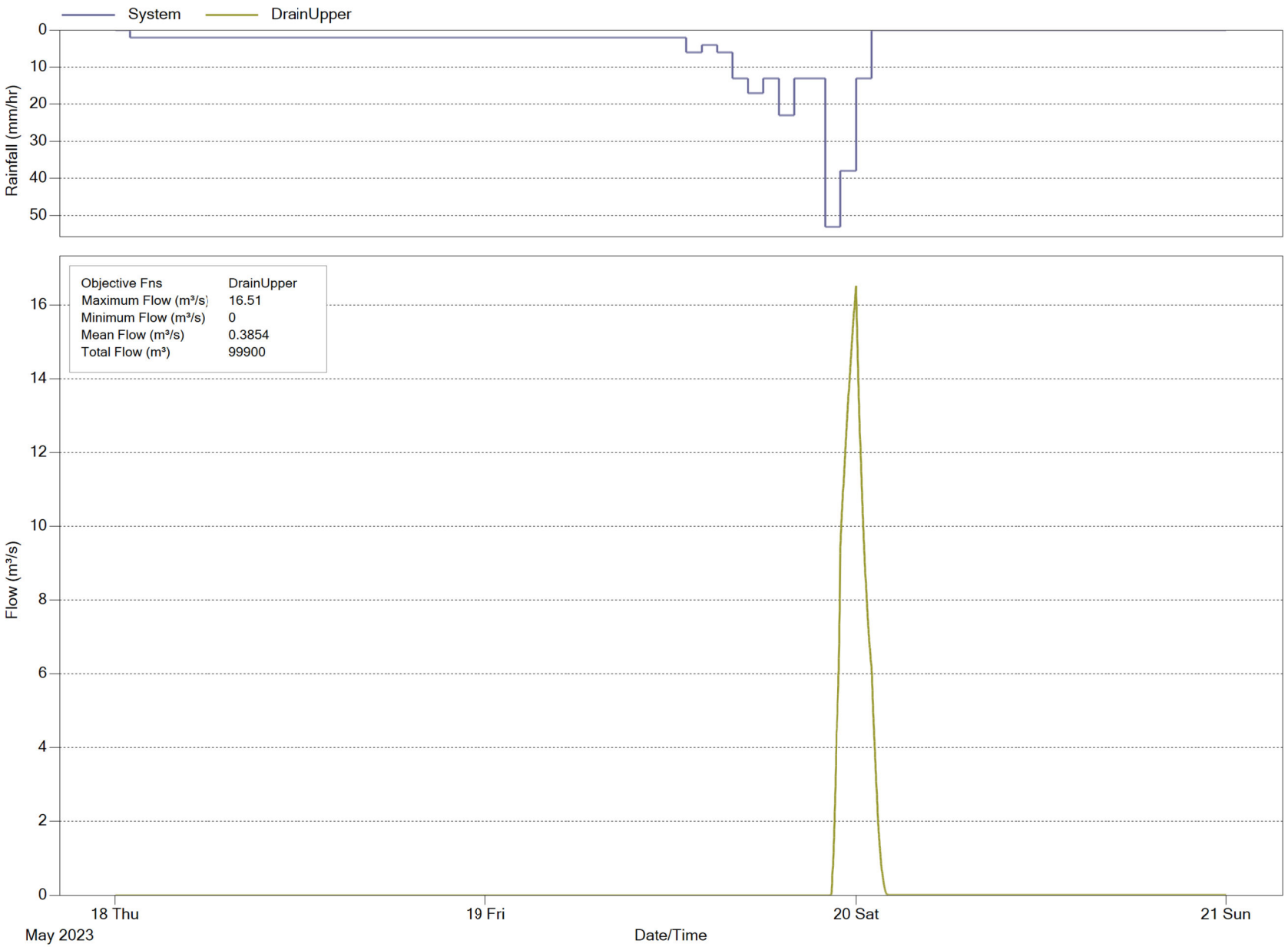
Legend

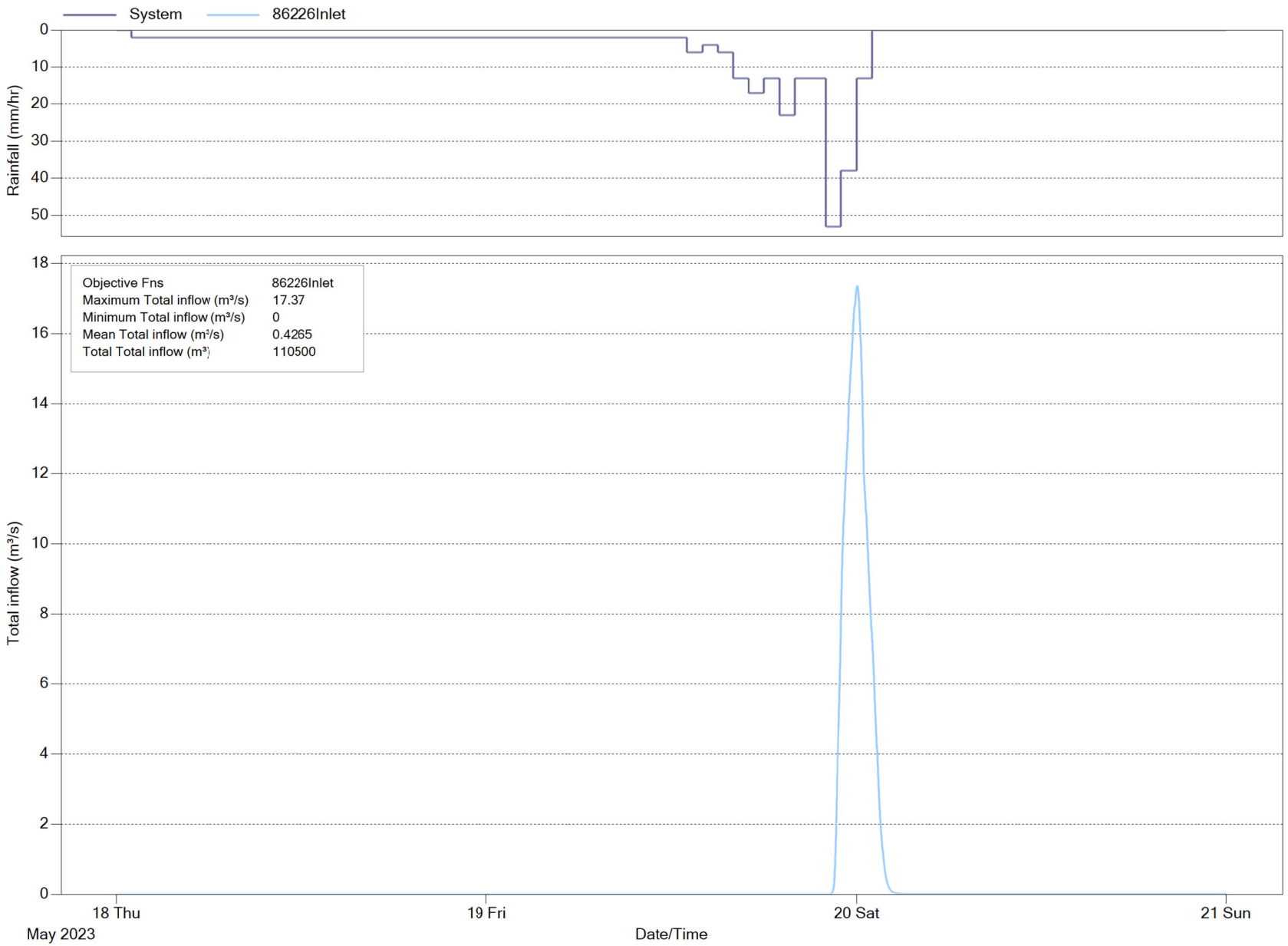
- Municipal Drain
- Catchment

N

1 km

APPENDIX ‘D’
PCSWMM PEAK FLOW RESULTS


System
DrainUpper
Rainfall (mm/hr)
0
10
20
30
40
50
Objective Fns
DrainUpper
Maximum Flow (m³/s)
16.51
Minimum Flow (m³/s)
0
Mean Flow (m³/s)
0.3854
Total Flow (m³)
99900
Flow (m³/s)
16
14
12
10
8
6
4
2
0
18 Thu
May 2023
19 Fri
20 Sat
21 Sun
Date/Time


System
86226Inlet
Rainfall (mm/hr)
0
10
20
30
40
50
Objective Fns 86226Inlet
Maximum Total inflow (m³/s) 17.37
Minimum Total inflow (m³/s) 0
Mean Total inflow (m³/s) 0.4265
Total Total inflow (m³) 110500
Total inflow (m³/s)
0
2
4
6
8
10
12
14
16
18
18 Thu
May 2023
19 Fri
20 Sat
21 Sun
Date/Time

APPENDIX ‘E’
HY-8 CULVERT MODEL RESULTS

UPPER CROSSING

Tailwater Channel Data

Tailwater Channel Option:	Irregular
Channel Slope:	0.003 m/m
Channel Manning's n:	0.035
Channel Invert Elevation	306.670 m

Table 1 – Tailwater Rating Curve

Flow (m3/s)	Elevation (masl)	Depth (m)	Velocity (m/s)
0.000	306.670	0.000	0.000
1.500	307.253	0.583	0.796
3.000	307.467	0.797	0.951
4.500	307.616	0.946	1.024
6.000	307.732	1.062	1.082
7.500	307.861	1.191	1.069
9.000	307.934	1.264	1.128
10.500	307.999	1.329	1.171
12.250	308.069	1.399	1.207
13.500	308.115	1.445	1.227
15.000	308.165	1.495	1.247

Culvert Data Summary – Existing

Arch

Shape:	User Defined
Material:	Concrete & CSP
Span:	1820.000 mm
Rise:	1730.000 mm
Embedment:	0.000 mm
Manning's n (top and sides):	0.026
Manning's n (bottom):	0.035
Culvert Type:	Straight
Inlet Configuration:	Square Edge with Headwall
Inlet Depression:	No
Inlet Station:	4.700 m
Inlet Elevation:	306.750 m
Outlet Station:	35.000 m
Outlet Elevation:	306.67 m
Number of Barrels:	1

Pipe

Shape:	Circular
Material:	Corrugated Steel
Diameter:	1200.000 mm
Embedment:	0.000 mm
Manning's n:	0.026
Culvert Type:	Straight
Inlet Configuration:	Thin Edge Projecting
Inlet Depression:	No
Inlet Station:	4.700 m
Inlet Elevation:	307.360 m
Outlet Station:	35.000 m
Outlet Elevation:	307.180 m
Number of Barrels:	1

Table 2 – Summary of Flows at Upper Crossing

Headwater Elevation (masl)	Total Discharge (m3/s)	Arch Discharge (m3/s)	Pipe Discharge (m3/s)	Roadway Discharge (m3/s)
306.75	0.00	0.00	0.00	0.00
307.57	1.50	1.44	0.06	0.00
307.91	3.00	2.59	0.41	0.00
308.19	4.50	3.64	0.86	0.00
308.44	6.00	4.65	1.35	0.00
308.69	7.50	5.63	1.87	0.00
308.98	9.00	6.62	2.38	0.00
309.37	10.50	7.68	2.82	0.00
309.87	12.25	8.93	3.32	0.00
310.25	13.50	9.82	3.68	0.00
310.75	15.00	10.89	4.11	0.00
311.54	17.20	12.48	4.72	0.00

LOWER CROSSING

Tailwater Channel Data

Tailwater Channel Option:	Irregular
Channel Slope:	0.003 m/m
Channel Manning's n:	0.035
Channel Invert Elevation	305.190 m

Table 3 – Tailwater Rating Curve

Flow (m3/s)	Elevation (masl)	Depth (m)	Velocity (m/s)
0.000	305.190	0.000	0.000
1.800	305.972	0.782	0.723
3.600	306.178	0.988	0.795
5.400	306.297	1.107	0.881
7.200	306.386	1.196	0.967
9.000	306.465	1.275	1.037
10.800	306.536	1.346	1.096
12.600	306.601	1.411	1.148
14.400	306.662	1.472	1.193
17.370	306.752	1.562	1.263
18.000	306.768	1.578	1.280

Culvert Data Summary – Existing

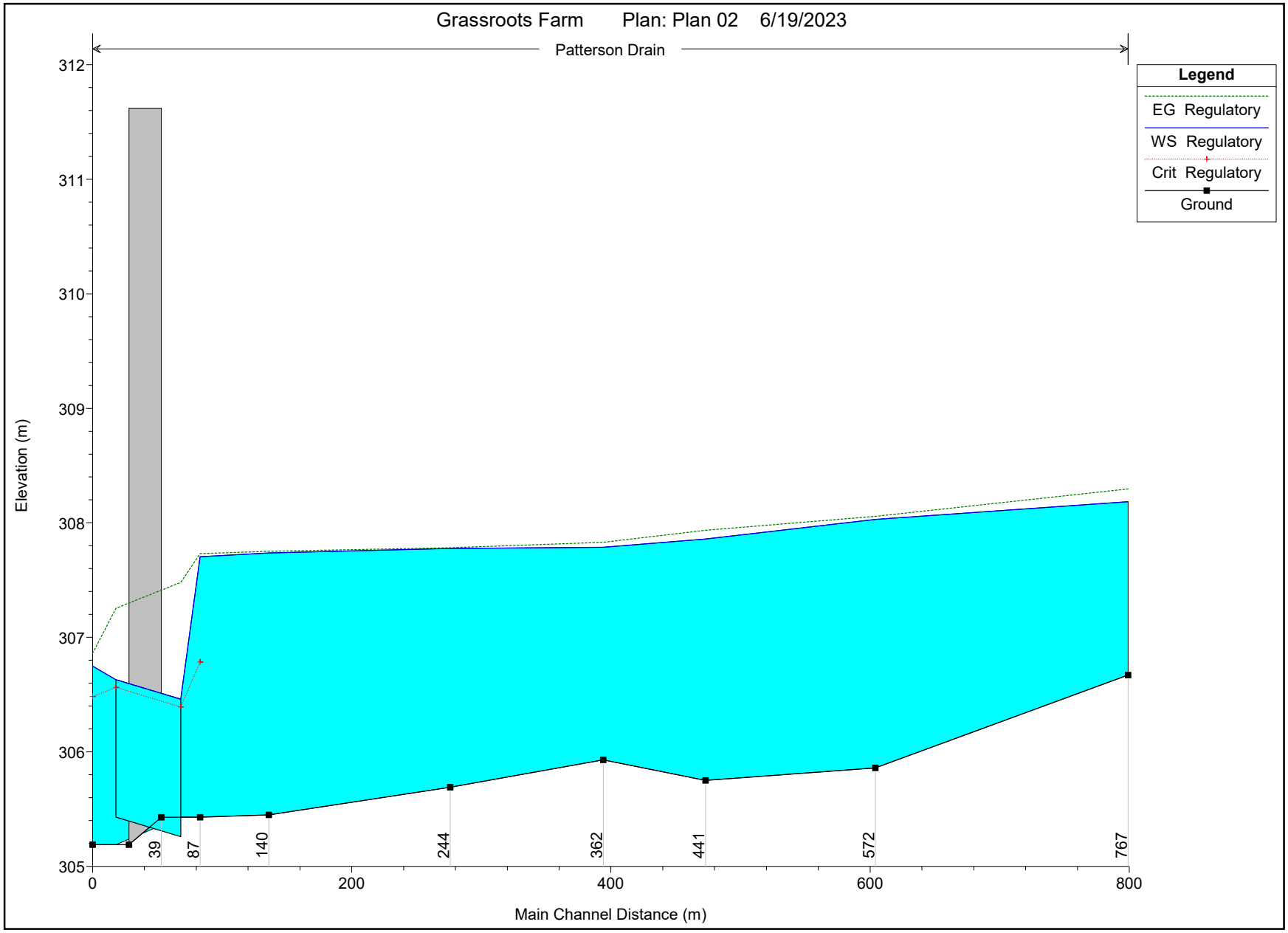
Box Culvert

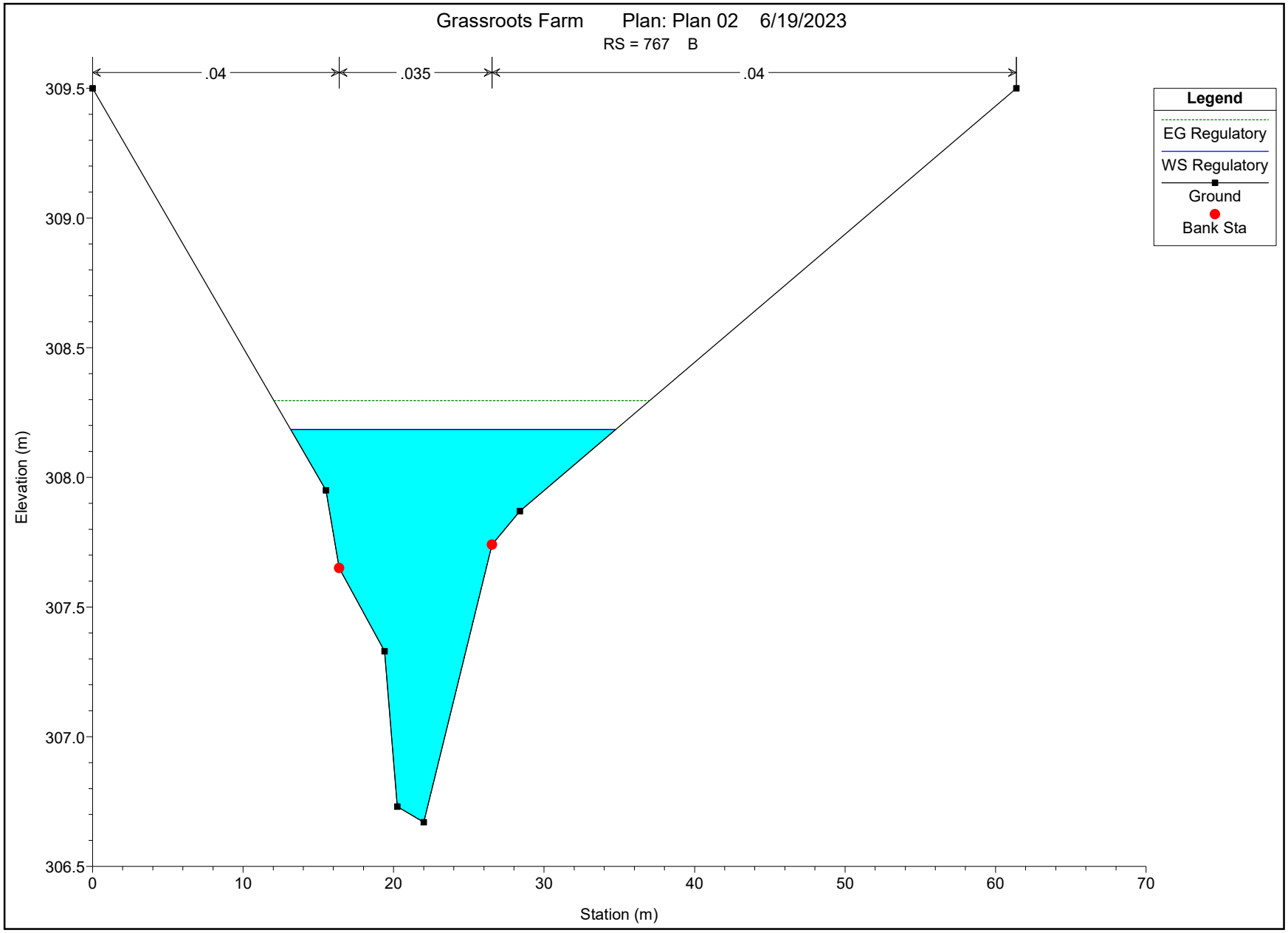
Shape:	Concrete Box
Material:	Concrete
Span:	4600.000 mm
Rise:	1200.000 mm
Embedment:	0.000 mm
Manning's n:	0.013
Culvert Type:	Straight
Inlet Configuration:	Square Edge with Headwall
Inlet Depression:	No
Inlet Station:	49.900 m
Inlet Elevation:	305.260 m
Outlet Station:	0.000 m
Outlet Elevation:	305.430 m
Number of Barrels:	1

Table 4 – Summary of Flows at Lower Crossing

Headwater Elevation (masl)	Total Discharge (m3/s)	Culvert Discharge (m3/s)	Roadway Discharge (m3/s)
305.26	0.00	0.00	0.00
306.01	1.80	1.80	0.00
306.26	3.60	3.60	0.00
306.44	5.40	5.40	0.00
306.59	7.20	7.20	0.00
306.66	9.00	9.00	0.00
306.75	10.80	10.80	0.00
306.88	12.60	12.60	0.00
307.34	14.40	14.40	0.00
307.73	17.37	17.37	0.00
307.82	18.00	18.00	0.00
311.62	34.18	34.18	0.00

APPENDIX ‘F’
HEC-RAS RESULTS
CROSS SECTIONS AND PROFILE


Grassroots Farm Plan: Plan 02 6/19/2023
Patterson Drain
Legend
EG Regulatory
WS Regulatory
Crit Regulatory
Ground
Elevation (m)
312
311
310
309
308
307
306
305
39
87
140
244
362
441
572
767
0
200
400
600
800
Main Channel Distance (m)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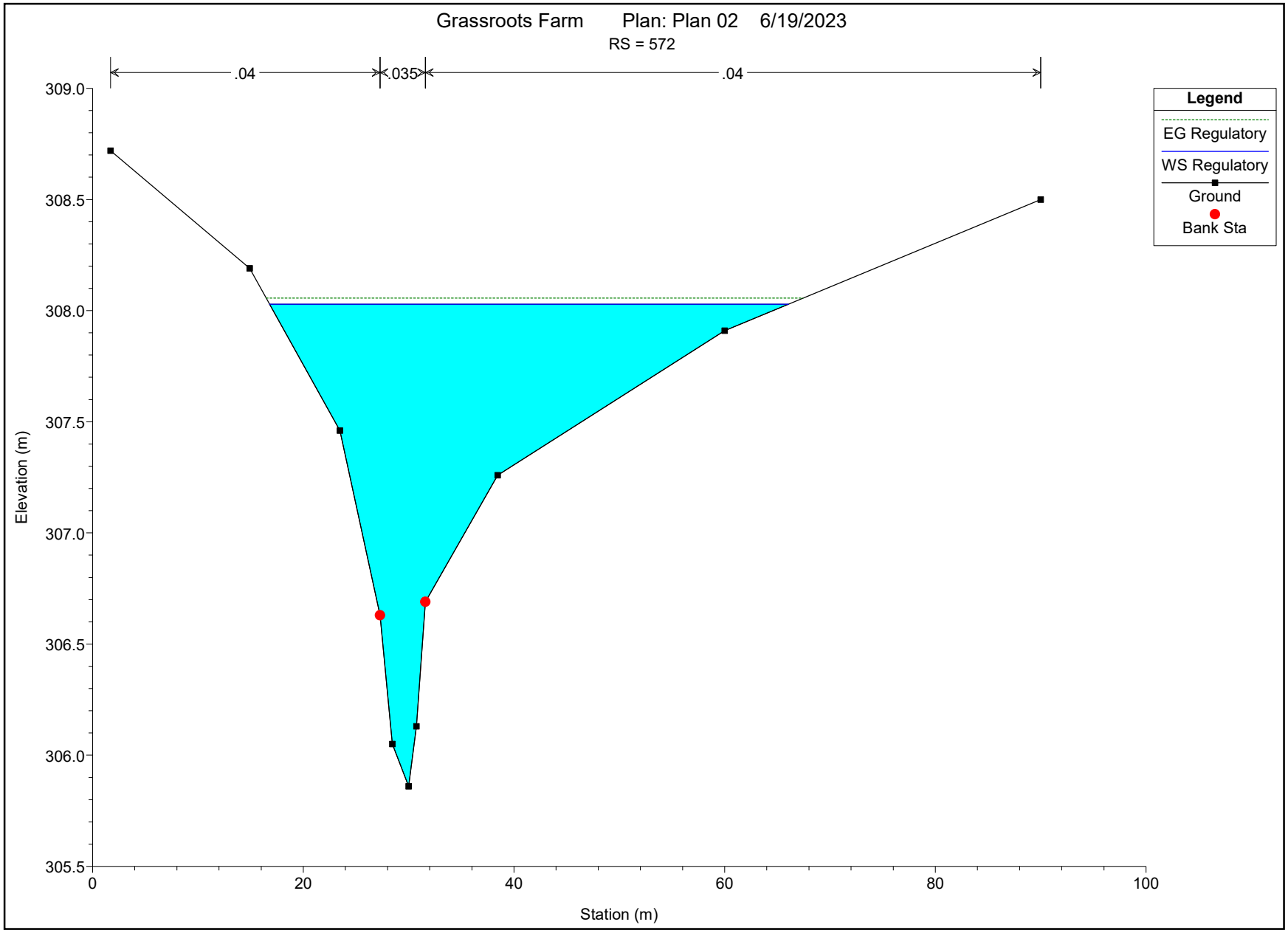
RS = 767 B
.04
.035
.04
309.5
309.0
308.5
308.0
307.5
307.0
306.5
Elevation (m)
0
10
20
30
40
50
60
70
Station (m)
Legend
EG Regulatory
WS Regulatory
Ground
Bank Sta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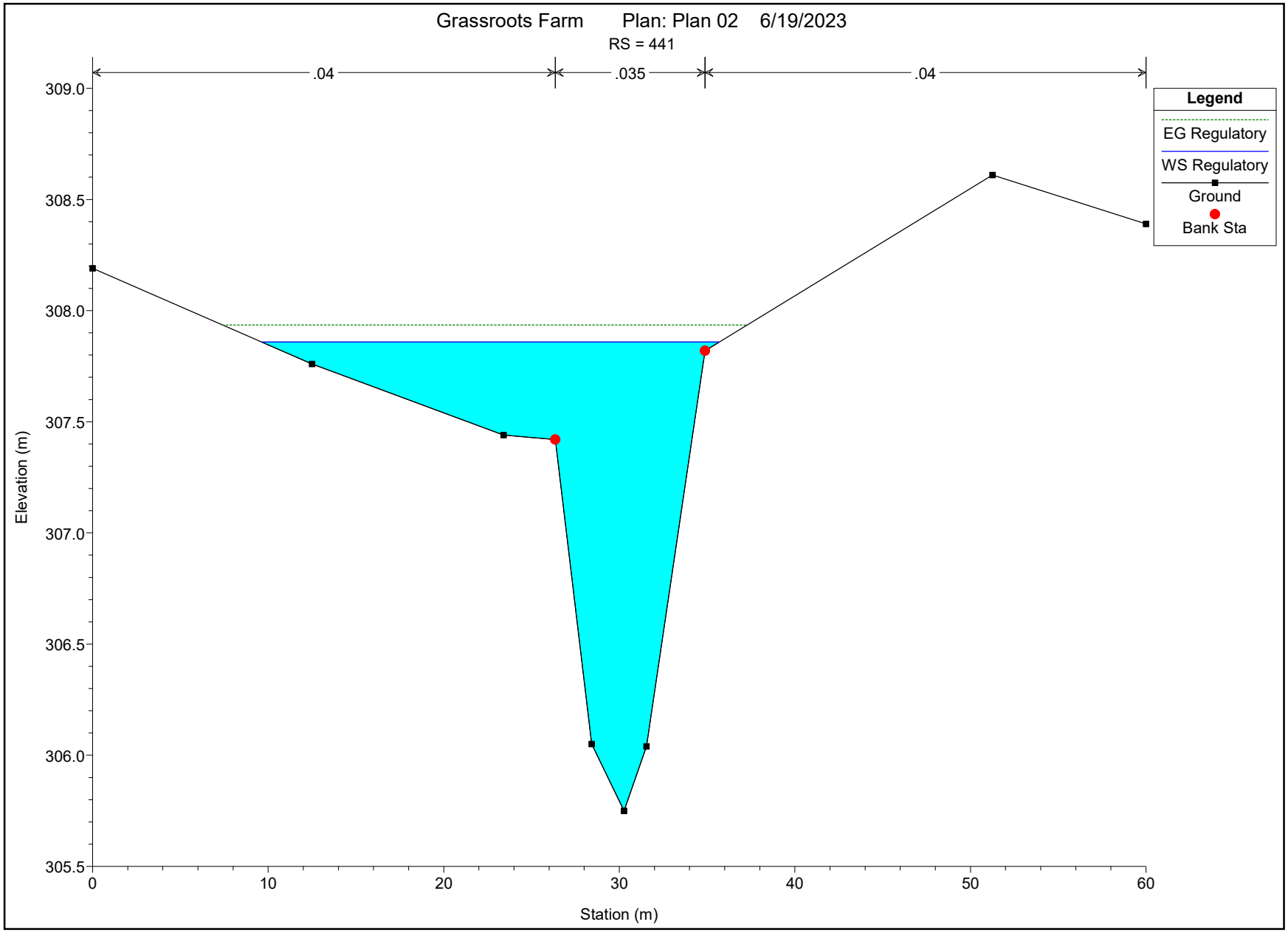
.035
.04
309.0
308.5
308.0
307.5
307.0
306.5
306.0
305.5
Elevation (m)
0
20
40
60
80
100
Station (m)
Legend
EG Regulatory
WS Regulatory
Ground
Bank Sta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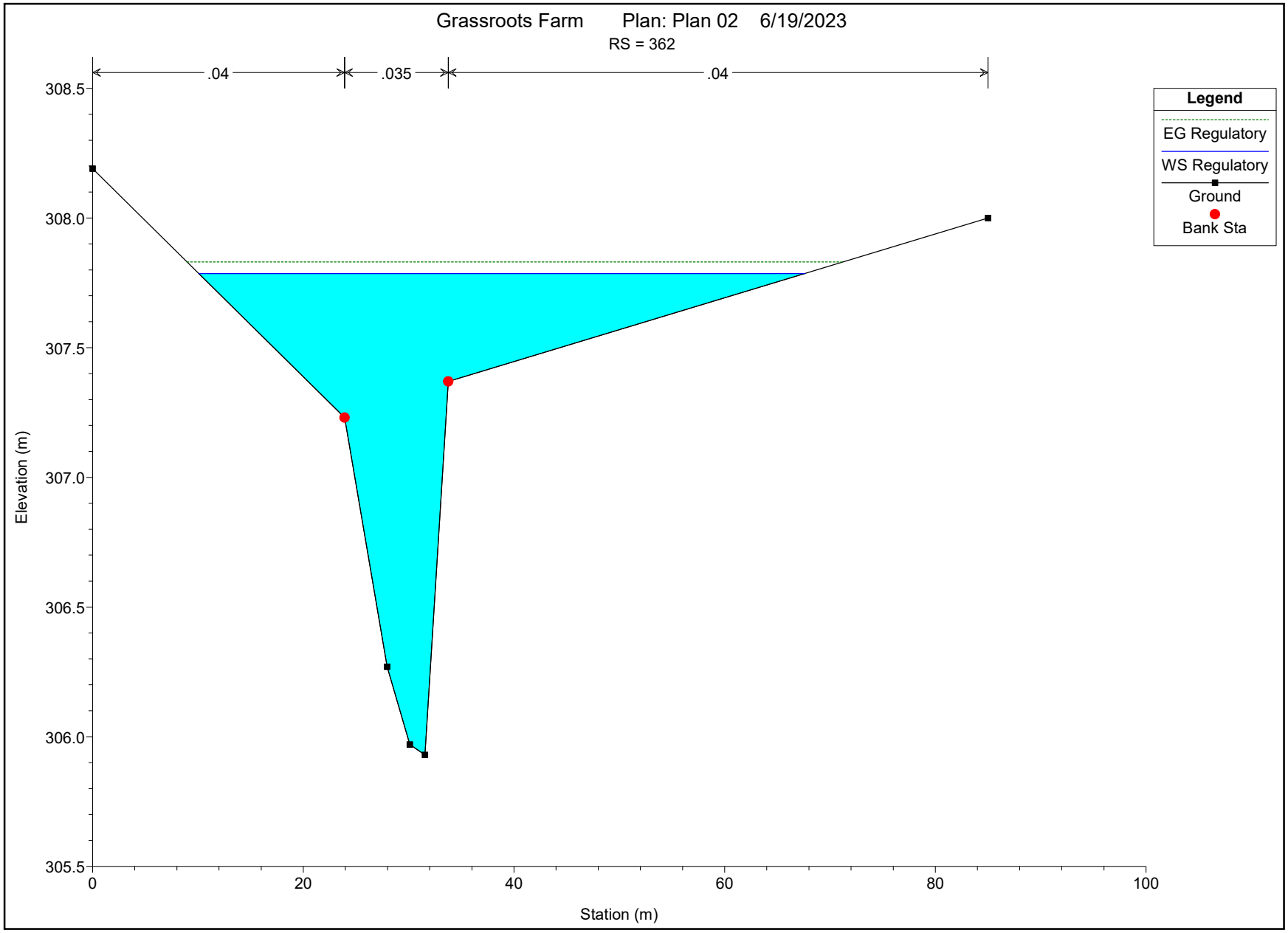
.04
Legend
EG Regulatory
WS Regulatory
Ground
Bank Sta
309.0
308.5
308.0
307.5
307.0
306.5
306.0
305.5
Elevation (m)
0
10
20
30
40
50
60
Station (m)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.04
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WS Regulatory
Ground
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Elevation (m)
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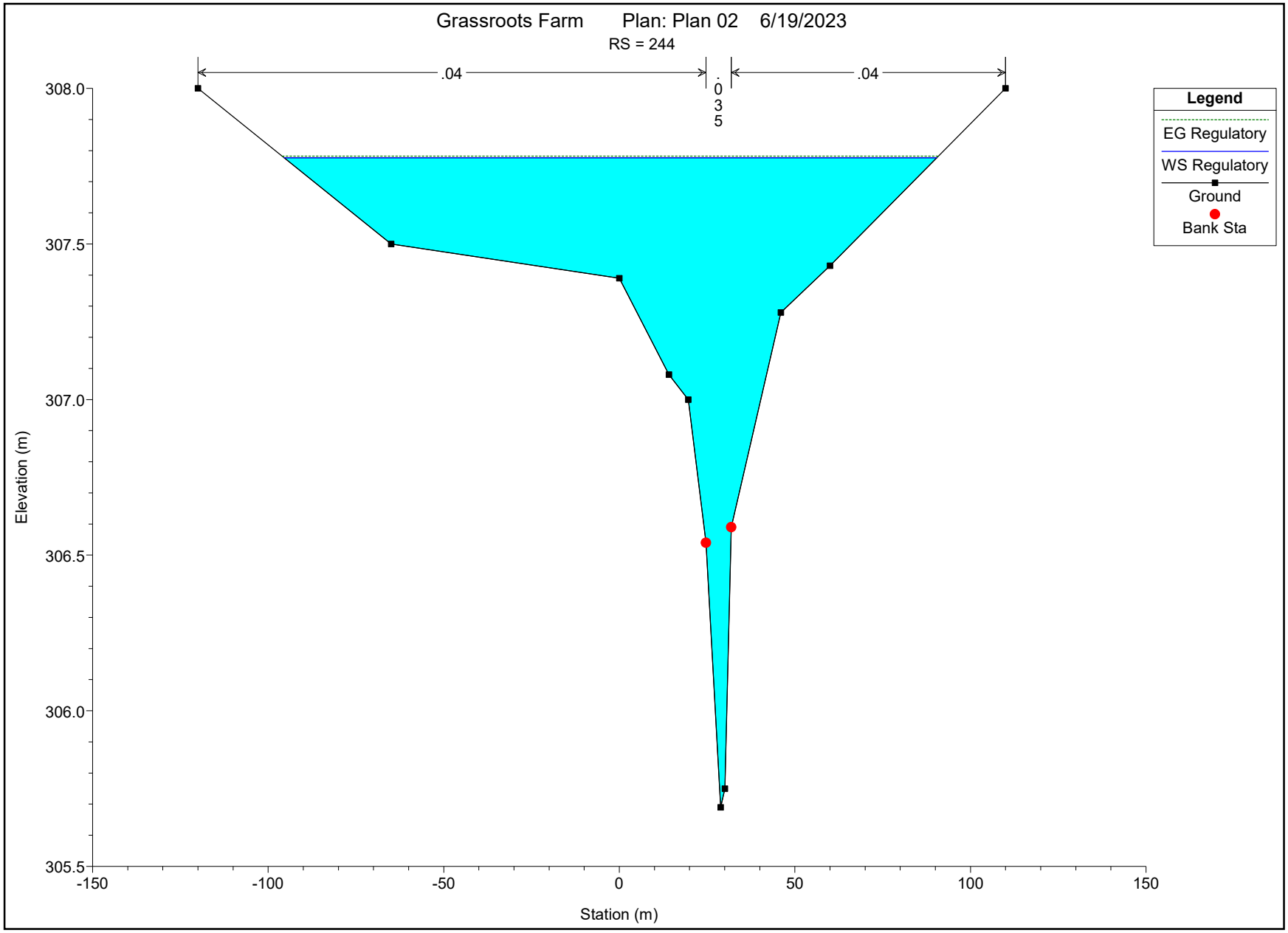
308.0
307.5
307.0
306.5
306.0
305.5
0
20
40
60
80
100
Station (m)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.035
.04
Legend
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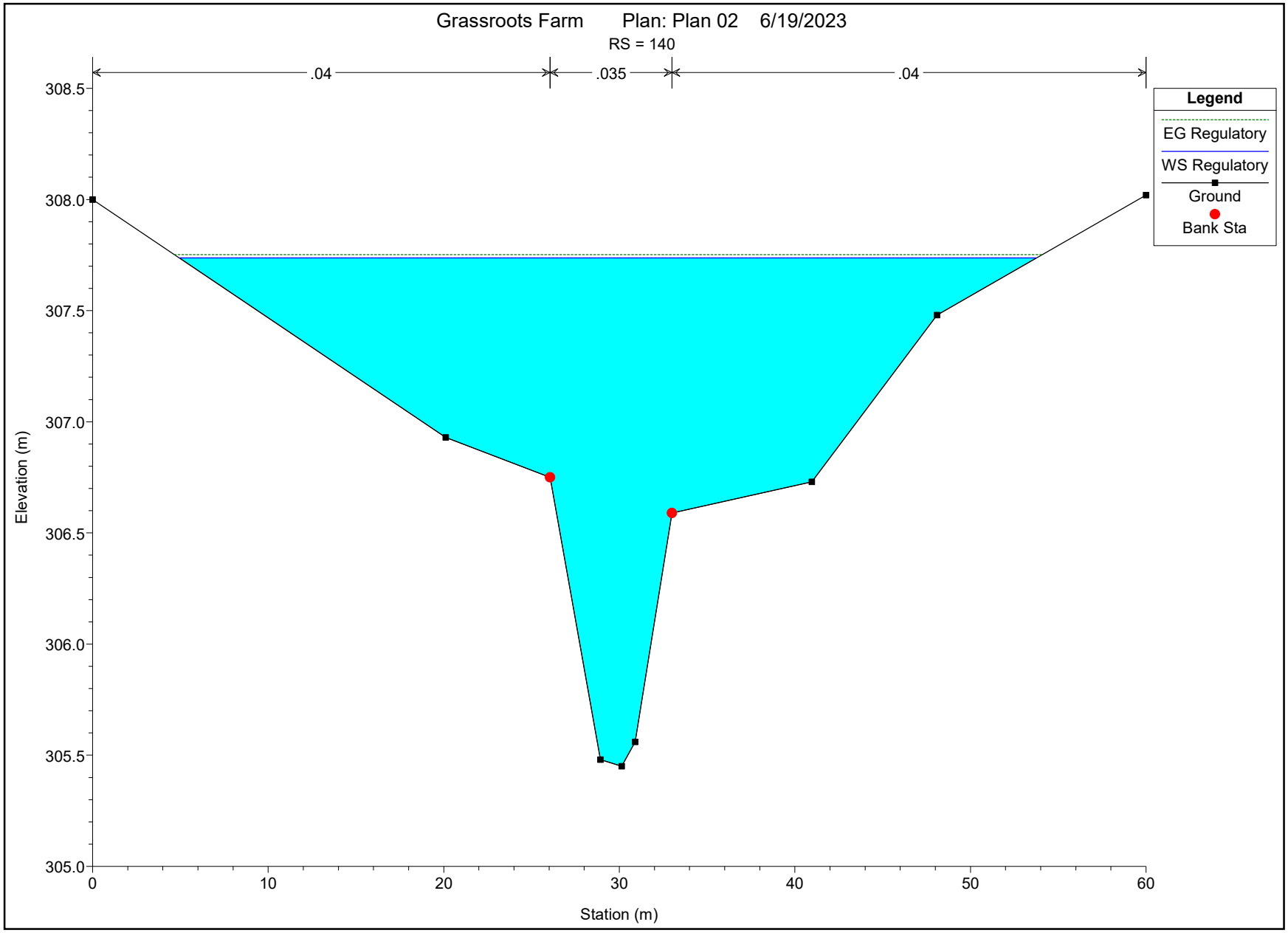
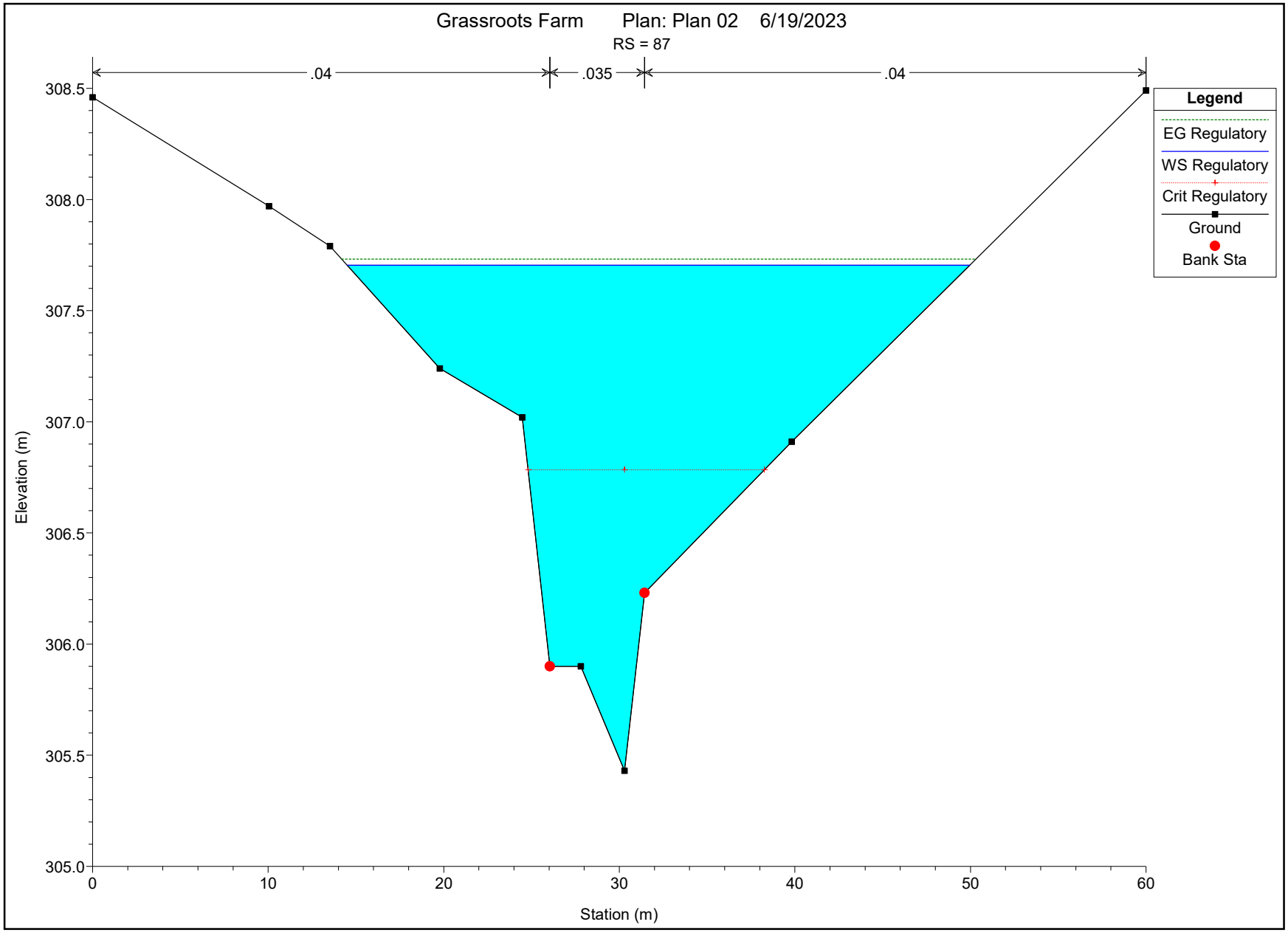
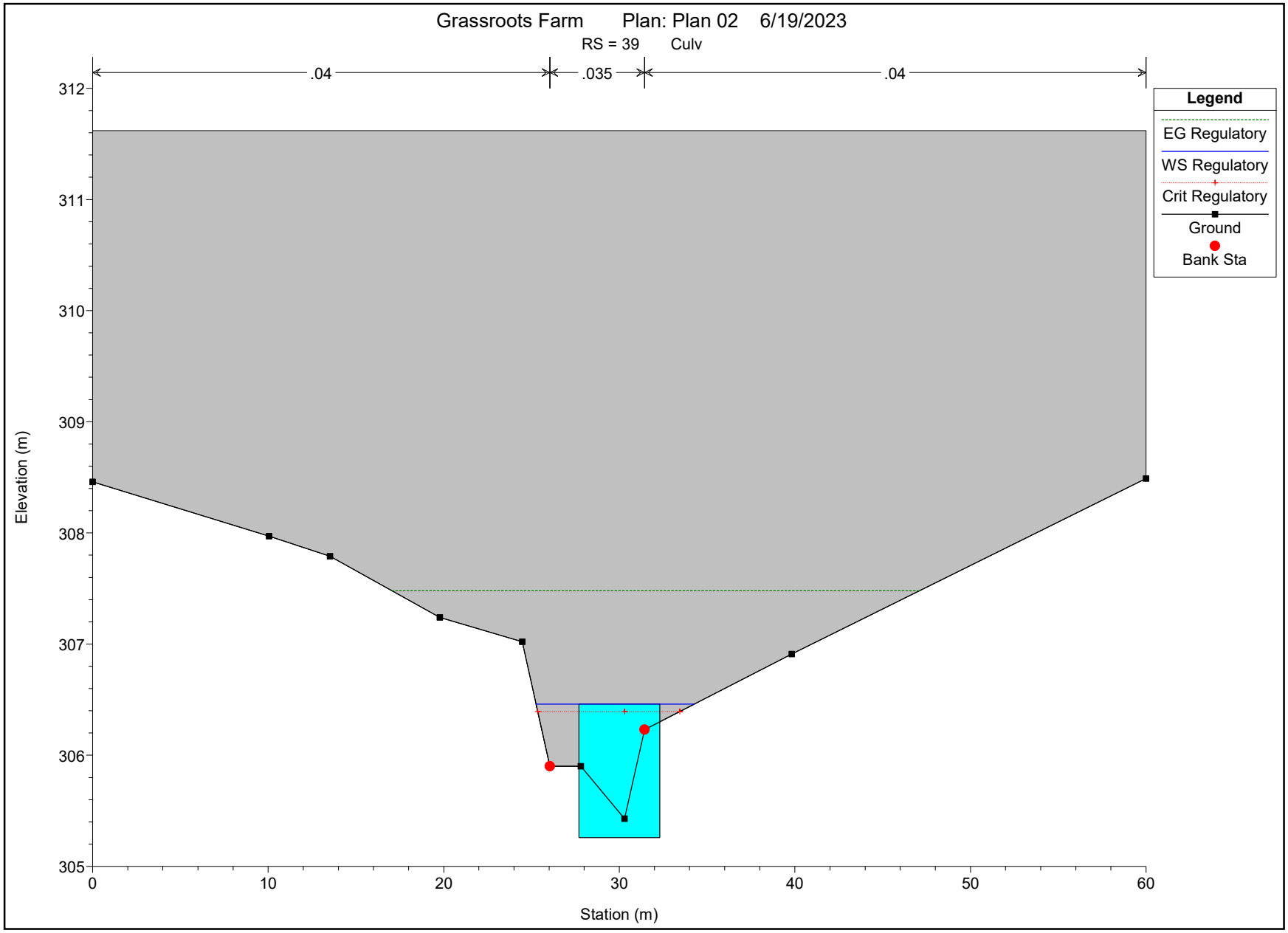
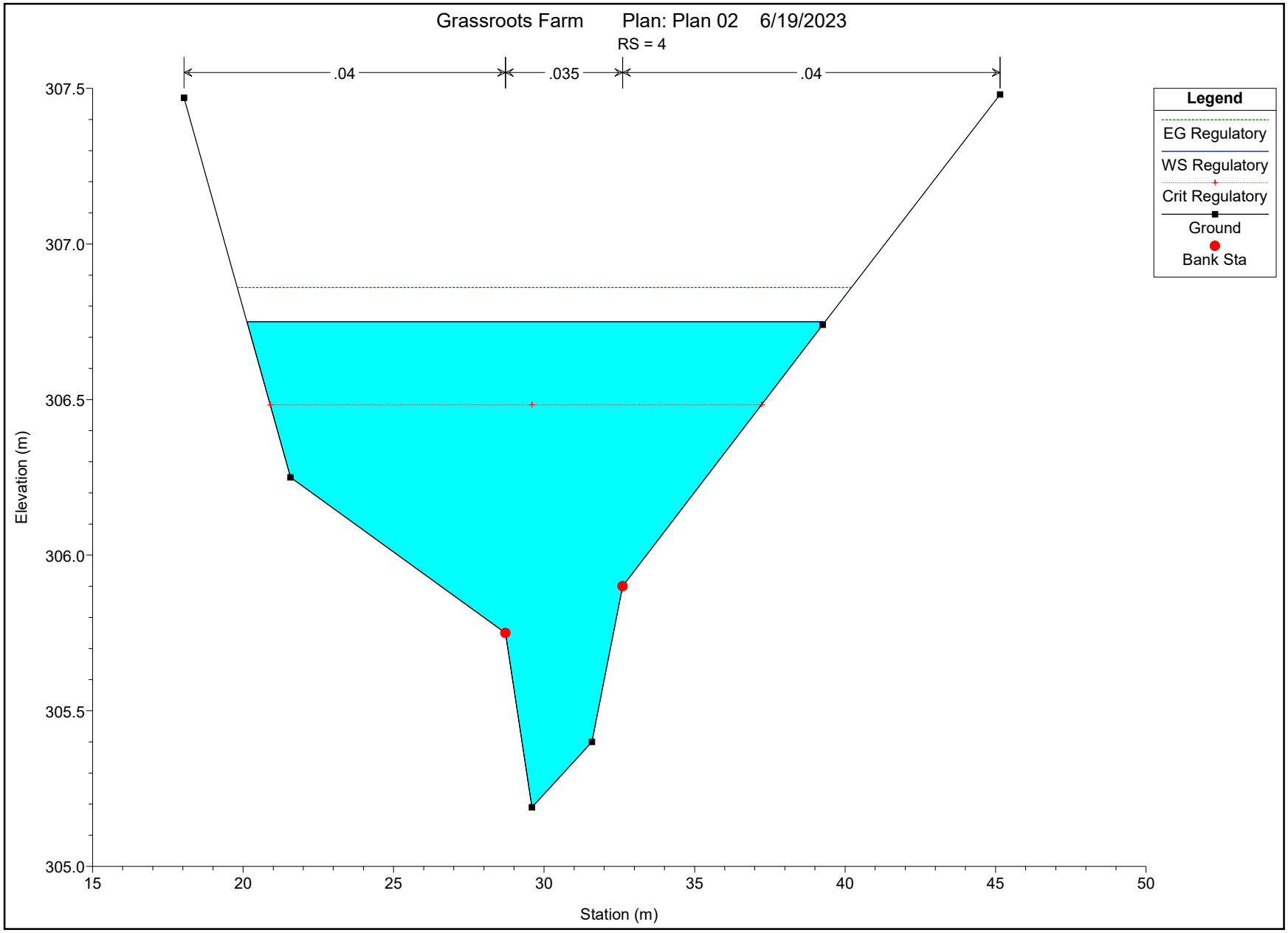
WS Regulatory
Ground
Bank Sta
308.0
307.5
307.0
306.5
306.0
305.5
Elevation (m)
-150
-100
-50
0
50
100
150
Station (m)

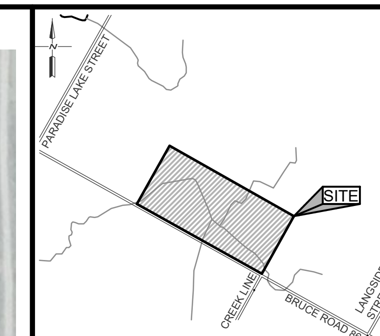

Grassroots Farm Plan: Plan 02 6/19/2023
RS = 140
.04
.035
.04
Legend
EG Regulatory
WS Regulatory
Ground
Bank Sta
Elevation (m)
Station (m)
308.5
308.0
307.5
307.0
306.5
306.0
305.5
305.0
0
10
20
30
40
50
60


Grassroots Farm Plan: Plan 02 6/19/2023
RS = 87
.04
.035
.04
Legend
EG Regulatory
WS Regulatory
Crit Regulatory
Ground
Bank Sta
Elevation (m)
308.5
308.0
307.5
307.0
306.5
306.0
305.5
305.0
0
10
20
30
40
50
60
Station (m)


Grassroots Farm Plan: Plan 02 6/19/2023
RS = 39 Culv
.04
.035
.04
Legend
EG Regulatory
WS Regulatory
Crit Regulatory
Ground
Bank Sta
Elevation (m)
312
311
310
309
308
307
306
305
0
10
20
30
40
50
60
Station (m)


Grassroots Farm Plan: Plan 02 6/19/2023
RS = 4
.04
.035
.04
Legend
EG Regulatory
WS Regulatory
Crit Regulatory
Ground
Bank Sta
Elevation (m)
307.5
307.0
306.5
306.0
305.5
305.0
15
20
25
30
35
40
45
50
Station (m)

APPENDIX ‘G’
HEC-RAS RESULTS
REGIONAL STORM INUNDATION MAP



TOWNSHIP OF HURON-KINLOSS

KEY PLAN

NOT TO SCALE

NOTES :

1. TOPOGRAPHIC AND EXISTING FEATURES SURVEY COMPLETED BY GM BLUEPLAN ENGINEERING, DATED MAY 30, 2023.

LEGEND:

- PROPERTY LINE
- BENCHMARK LOCATION
- WATERSHED BOUNDARY
- REGIONAL FLOOD AREA
- 307.69 REGIONAL FLOOD ELEVATION

20 10 0 20 40 60

1:1500 (m) ARCH D '24 X 36'

BENCH MARKS :

323029-1 , ELV = 307.112m

CUT CROSS ON THE TOP OF THE NORTHWEST CORNER OF THE CONCRETE CULVERT LOCATED +/- 50m FROM DRIVEWAY OF GRASSROADS FARM (760 BRUCE ROAD 86)

THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND 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 INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM.

NO.	MM/DD/YY	REVISION DESCRIPTION	CH'KD

GM BluePlan ENGINEERING

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA

975 WALLACE AVENUE NORTH, LISTOWEL, ON N4W 1M6

TEL. 519-291-9339 www.gmblueplan.ca

GRASSROADS FARM FLOODPLAIN STUDY

BLAIR MORRISON

TOWNSHIP OF HURON-KINLOSS

REGIONAL FLOODPLAIN

DRAWN BY :	APPROVED BY :	PROJECT NO. :	DRAWING NO. :
W.B.	--	323029	2
DESIGNED BY :	DATE :	SCALE :	
M.A.	JUNE 2023	AS NOTED	