Floodplain Hazard Assessment and Safe Access/Egress Analysis - Revision 2

112754 Grey Road 14, Township of Southgate

Submitted to:
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June 19, 2025
Project No. 2407640

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Record of Revisions

Identification	Date	Description of Issued and/or Revision
1st Submission	June 4, 2025	Revision #1 – Floodplain Hazard Assessment
2nd Submission	June 19, 2025	Revision #2 – Updated Floodplain Hazard Assessment

1. Objective

The objective of this analysis is to review the floodplain characteristics and the hydraulic conveyance of the existing watershed in the location of the subject property during the historical Regional and/or the 1:100-Year Design Storm Events.

In combination with the storm parameters noted above, the analysis estimates the limits of the floodwater and approximates the hydraulic effects of the floodplain within the area identified for development on the subject property in accordance with the current Saugeen Valley Conservation Authority (SVCA) development policies.

The analysis, results, and recommendations are based on the current SVCA established criteria:

- The greater of the 100-year, 24-Hour SCS Type II or the Regional Storm (Hurricane Hazel) peak runoff flow rate for the upstream watershed;
- A general review of the SVCA safe access and egress requirements for the existing site entrance; and
- Proposing any minor site grading and elevation adjustments required with minimal changes to the floodplain; should it be required.

2. Background Information Review

Based on the site plan provided, it is our understanding that the proposed development is to be located in the northeast corner of the 52 acres (+/-) site and will consist of a single-family residence, horse barn and several farm implement buildings, a sewage disposal system and new driveway.

A preliminary site plan for the development has been provided by Loft Planning Inc. dated May 21, 2024. This site plan is referenced as the limits of development for the scope of this report, and it is our understanding that there will be no future development outside the development limits established by this plan.

3. Site Description

The subject property is currently a 'Legal Lot of Record' and is legally described as Concession 16 Pt Lot 11 Pt Lot 12 in Southgate Township. The site is 128.86 ha (52.17 acres) in size and is located on the west side of Grey Road 14; approximately 12.9 km South of Flesherton and 8.5 km Southeast of Priceville.

We have enclosed Figure 1 – Site Location Map in Appendix A for reference.

The subject property consists almost entirely of natural area with much of the site being a mixture of wetlands and woodlands. Several tributaries of the Saugeen River traverse the central portion of the property flowing from the south to the north.

The site generally slopes from East-to-West, where there is a natural plateau of mildly sloping land (2% to 5%) located immediately west of Grey Road 14. This mildly sloping plateau terminates at the top of a river valley approximately 49.43 m (+/-) from the easterly property line. The existing slope conditions have previously been reviewed by a Geotechnical Engineer and is found to be stable at a maximum slope of 4:1 (H:V) or approximately 25%. Based on the site plan provided and the stability report, the proposed development is to be located on this plateau, and it is not anticipated to be affected by the existing river valley slope.

There is an existing 3 m wide laneway that traverses east-to-west through the northern half of the property, connecting the mildly sloping plateau near Grey Road 14 to a hardwood bush woodlot in the western portion of the property. The laneway is approximately 450 m long and spans across much of the site. Further, there is an existing 1800 mm Ø culvert crossing located approximately 350 m west of the existing entrance to the site and is utilized to access the western portion of the site.

As the proposed development area is limited to the upper plateau region of the site. The primary focus of this analysis is limited to the floodplain extents within the river valley and not specifically on the existing laneway traversing the property or the 1800 mm Ø culvert crossing.

We have enclosed Figure 2 – Site Plan Location in Appendix A for reference.

4. Catchment Area and Drainage Characteristics

Currently, the property is vacant and much of the property is located within the SVCA regulatory boundary. The property consists of low-lying marsh/wetland areas with dense wooded areas in the overbanks.

We have identified the overall drainage catchment surrounding the subject property as Catchment Area 100 (CA 100). This overall catchment included several small tributaries of the unnamed Tributary of Saugeen River and is approximately 694.46 ha (281.16 acres) in land area. More specifically, the site is bisected by a Main Tributary that connects the land east of Grey Road 14 to the lower river valley west of the proposed development by a large precast concrete box culvert beneath Grey Road 14.

The Overall Catchment (CA 100) can be further delineated by three (3) sub-catchments, each containing a minor tributary branch that supplies surface water runoff to the Main Tributary bisecting the site.
Catchment 200 (CA 200) is approximately 162.50 ha in land area and contains the minor tributary identified as Branch 'A'. Branch 'A' has been described as a seasonal watercourse based on the background information provided and our recent site inspections. Based on the topographical information obtained, Catchment 200 (CA 200) collects surface water runoff from the lands north of the site and directs into the Main Tributary through the overland flow routes and roadside ditches of Branch 'A'.

Catchment 201 (CA 201) is approximately 215.88 ha in land area and contains the minor tributary identified as Branch 'B'. Branch 'B' has been described as an intermittent watercourse based on the background information provided and our recent site inspections. It generally directs based flow and surface water runoff into the Main Tributary all year round. Based on the topographical information obtained Catchment 201 (CA 201) collects surface water runoff from the lands southwest of the subject site and directs into the Main Tributary through the overland flow route and farm ditches of Branch 'B'.

Catchment 202 (CA 202) is approximately 316.08 ha in land area and contains the Main Tributary that bisects the subject site. The Main Tributary has been described as year-round watercourse based on the background information provided and our recent site inspections. It generally directs based flow and surface water runoff into the Saugeen River all year round. Based on the topographical information obtained Catchment 202 (CA 202) collects surface water runoff from the lands agricultural, woodland and wetlands south and east of the subject site through overland flow, small/minor drainage features and roadside ditches.

Locations of Branches 'A' and 'B' along with the Main Tributary can be located in Figure 3 – Watershed Area Map in Appendix A for reference.

5. Catchment Land Use and Boundary Delineation

To define the boundaries of CA 100, CA 200, CA 201, and CA 202, a variety of sources have been reviewed and utilized to determine the catchment area and land use characteristics. Resources references include:

- Ontario Watershed Information Tool (OWIT) https://www.ontario.ca/page/ontario-watershed-information-tool-owit
- Ontario GeoHub: Ontario Digital Terrain Model (Lidar-Derived) https://geohub.lio.gov.on.ca/maps/776819a7a0de42f3b75e40527cc36a0a/explore?location=44.325873%2C-80.636615%2C11.49
- Aerial photographs provided by Grey County Maps, https://maps.grey.ca/ and Saugeen Valley Conservation Maps; https://www.saugeenconservation.ca/en/permits-and-planning/maps-and-gis.aspx
- Photographs & on-site Topographic Survey and Site Inspections conducted by GEI

Predominantly, the boundaries of these catchments have been determined based on the Ontario Watershed Information Tool (OWIT), in conjunction with on-site inspection, surveys and lidar to verify the boundaries of the catchment area.

Land use within the area consists of cash crop agricultural lands and pastures, treed areas with several locations of low-lying marsh/wetland areas within the reaches of the catchment.

Utilizing the various resources noted above, we have summarized the approximated catchment parameters in Table 1 below.

Table 1 – Existing (%) Land use by Catchment

Catchment ID	Land Use Parameters (%)				
	Woodland/ Forests	Pasture/ Unimproved	Crop/ Improved	Impervious	Wetland/ Lakes
100	4	36	36	3	21
200	5	70	16	3	6
201	20	10	49	1	20
202	18	30	29	3	20

These areas have been approximated through the use of aerial photographs and verified the use of Ontario Watershed Information Tool (OWIT).

6. Catchment Soils Information – Grey County Soils Survey

In preparation of the hydrological analysis and modeling, the Grey County Soil Survey Report No. 17 prepared by the Canadian Department of Agriculture and the Ontario Department of Agriculture was utilized to determine the Principal Soil Series, Soil Type and Hydrological Soil Groups contained within the overall catchment.

The overall catchment consists of Donnybrook Sandy Loam, Harrison Loam / Silty Loam, Listowel Silty Loam, Muck, Parkhill Loam. A description of the soil characteristics is as follows:

Donnybrook Sandy Loam generally consists of a thin layer of moss and decomposing organic matter followed by dark grey-brown to yellowish brown sandy loam, pale brown sand, with an underlying layer of very pale brown unsorted gravel. The majority of the soil is of the sandy loam type with unsorted gravels in the underlying layers. The soil is considered to be poorly draining in low slope conditions and have the characteristics of the Grey-Brown Podzolic Soils. This soil is of the hydrological soil type sandy/loam and is classified type AB.

Harrison Silty Loam generally consists of a very dark brown to yellowish brown silt loam followed by a brown clay loam with an underlying layer of yellowish brown moderately stony soil. The majority of the soil is silt loam with a moderately stony underlying layer. The soil is considered to have good drainage and has the profile characteristics of the Grey-Brown Podzolic Soils. The soil is of the hydrological soil type silty/loam and is classified as type BC.

Harrison Loam is of a similar soil structure to the Harrison Silty Loam with more stone fragments throughout. With the increased stone fragments this soil has an increased level of drainage and is of the hydrological soil type loam and is classified as type BC.

Listowel Silty Loam generally consists of a very dark grey silt loam followed by a yellowish brown loam. The soil ranges from few stones to stony in nature and is considered to be imperfectly draining. The soil is of the hydrological soil type silty/loam and is classified as type BC.

Parkhill Loam generally consists of very dark brown loam or silt loam followed by a greyish brown loam with an underlying layer of grey loam or clay loam. The soil ranges from few stones to moderately stony as depth increases. The soil is considered to have poor drainage and is of the hydrological soil type Silty/Loam and is classified as type BC.

Muck generally consists of black well decomposed organic material followed by decomposed organic materials with a fair percentage of woody residues with an underlying layer of clay, till sand or bedrock. The soil has very poor drainage and is usually saturated with vegetation consisting of elm, ash, white cedar, tamarack, and sedges. The soil is of the hydrological soil group muck and is classified as type B.

7. Hydrological (Visual OTTHYMO) Modelling

To estimate the peak runoff flow rates to sub-catchments CA 200, CA 201, and CA 202, a Visual OTTHYMO model has been developed based on the drainage catchment parameters presented in this report.

The Visual OTTHYMO Model parameters for these sub-catchments have been calculated based on the catchment parameters in Watershed Characteristic Section above and Intensity-Duration-Frequency (IDF) Curves obtained from the Mount Forest IDF Rainfall Station (ID 6145504), with 53 years of relevant rainfall data (1962-2020).

The 1:100-Year 24-Hour SCS Type II Rainfall Data calculated for the model has been calculated using the following intensity equation:

$$I = ATC^{B}$$

The IDF Curve information can viewed at the Government of Canada website *Engineering Climate Datasets - Climate - Environment and Climate Change Canada (weather.gc.ca)* and is enclose in Appendix B for reference.

To aid in to overall hydrologic and catchment analysis of the subject site and to determine the modelling parameters, watershed characteristics such as land slope, land use and soil type are utilized to estimate the peak runoff flow rate for the catchment. Table 2 below summarizes the estimated Catchment Parameters used within the OTTHYMO Model.

Table 2 – Catchment Parameters

Catchment ID:	Catchment Slope (%)	SCS Curve No. (CN)	Initial Abstraction (mm)	Time of Concentration (Tc. – Hours)	Time to Peak (Tp – Hours)
200	1.0	16.35	5.90	2.02	1.35
201	0.8	21.36	8.35	2.55	1.70
202	0.6	30.75	7.79	2.99	1.99

Tc – Airport Method

The calculations for each parameter are enclose in Appendix B for reference.

7.1. 100 Year and Regional Storm Peak Flows

The 100-Year (24-Hour SCS Type II) and the Regional Storm Event (Hurricane Hazel) Peak Runoff Flow Rate have been calculated and are summarized in Table 3 below.

Table 3 – Estimated Peak Runoff Flow Rates (m^3/s)

Design Storm	CA200 Flow Rate (m^3/s)	CA201 Flow Rate (m^3/s)	CA202 Flow Rate (m^3/s)	Peak Flow Out of Site (m^3/s)
100-Year - 24 Hour SCS Type II	1.26	1.83	3.68	6.64
Regional Storm (Hurricane Hazel)	4.18	6.35	12.01	22.34

8. HEC RAS Modelling Results

HEC-RAS Hydraulic Analysis program has been used to analyze the hydraulic function of the floodplain including the Main Tributary, Branch 'A' and Branch 'B', to estimate the anticipated maximum water surface elevations across the subject property under Regulatory Storm (Hurricane Hazel) peak runoff flow rate.

As indicated in the current SVCA Policies, the greater of the Regional Storm (Hurricane Hazel) or the 100-Year (24-Hour SCS Type II) return period rainfall shall be used to determine flow rates for the watershed.

A site-specific topographic survey of the subject property, watercourse and surrounding area has been completed by GEI. In addition, LIDAR data obtained from the Ontario Government's Open-Source website was used to supplement the site-specific information. The LIDAR elevation data was found to be consistent with the on-site geodetic topographic survey; with an approximate tolerance level of 0.05 m (+/-).

To estimate the flood depths and extents within the watershed in the immediate area of the proposed building site the Regional Storm flow rate for each catchment has been determined based on the hydrological parameters as previously determined in this design brief.

Further, the 'normal depth' was used downstream of the subject site at an average river slope respective to sub-catchment areas 200, 201, 202.

The Regional Storm water surface elevations for each Branch and the Main Tributary of the Saugeen River have been established through the select property and beyond. The maximum flood elevations in the immediate vicinity of the proposed development location under the Regional Storm Event (Hurricane Hazel) are in the range of 472.38 m to 472.31 m. Further, based on the modelling results, the estimated floodplain extents for the Main Tributary is contained within the main channel and the immediate overbank areas.

A summary of the Floodplain Regional Water Surface Elevations is summarized in Table 4 below.

Table 4 –Hydraulic Model Output Summary (HEC-RAS)

Branch ID No.	Cross-Section ID No.	Location of Station	Regional Storm (W.S. Elevation) (m)	Regional Storm Velocity (m/s)
Main Tributary	**896**	Upstream of the property	473.53	0.16
Main Tributary	**806**		473.53	0.05
Main Tributary	**683**		473.53	0.05
	Existing Box Culvert Under Grey Road 14			
Main Tributary	**651**	Vicinity of Proposed Development	472.38	0.45
Main Tributary	**611**		472.36	0.17
Main Tributary	**581**		472.35	0.11
Main Tributary	**466**		472.34	0.09
Main Tributary	**366**		472.34	0.23
Main Tributary	**244**		472.31	0.24
Main Tributary	**188**		**472.30**	0.13
Branch A	**111A**		**473.81**	0.81
Branch A	**85A**		473.55	0.81
Branch A	**68A**		473.51	0.38
Branch A	**49A**		473.50	0.18
Branch A	**44A**		473.50	0.13
	Existing 1800 mm Ø Culvert on-site			
Main Tributary	**178**	Downstream of the property	472.11	0.32
Branch A	**146A**		474.00	0.44
Main Tributary	**140**		472.07	0.73
Branch A	**129A**		473.94	0.59
Main Tributary	**68**		471.87	0.91
Main Tributary	**17**		471.62	1.24

8.1. HEC RAS Modelling Techniques and Modelling Discussions

The model includes a 1220 mm x 3650 mm (Rise vs. Span) box culvert conveying the runoff generated in CA 202 by the Main Tributary east of the subject site, flowing beneath Grey Road 14 to provide a more accurate analysis of the floodplain immediately west of the development site and within the upstream floodplain.

The floodplain in the vicinity of the development and traversing the subject property involves several hydraulic obstacles to generate a realistic hydraulic model of the floodplain. The complexity of the interconnected branches within the low-lying areas and the location of the man-made ditch features of Branch 'A' add complexities to the one-dimensional HEC RAS Model. Based on these complexities, hydraulic simplifications and assumptions have been employed to conservatively estimate & replicate the hydraulic conditions within the floodplain west of the proposed development site.

Catchment 200 - Branch 'A':

Branch 'A' within CA 200 directs runoff from north of the site southerly under the existing gravel laneway west of the proposed development. This flow enters a made-made ditch south of the exiting laneway and proceeds in a westerly direction connecting to the main tributary upstream of the 1800 mm Ø CSP culvert crossing (Cross-section 188).

Under a Regional Storm event, the 450 mm Ø CSP culvert crossing of Branch 'A' causes the regional storm to back up and spill to the west, reconnecting with the Main Tributary downstream of the property. This spill occurs north of the existing laneway at Cross-section 44A at an approximate ground surface elevation of 472.24 m and an approximate water surface elevation of 473.50 m (conservative elevation).

To simplify the hydraulic model, it is assumed that Branch 'A' (CA 200) does not spill, and the estimated peak runoff flow rate of 4.18 m^3/s is connected to the Main Tributary in the same location as Branch 'B' (CA 201) between cross-section 466 and cross-section 366 of the Main Tributary.

This modelling assumption is conservative in its approach as it diverts more runoff into the Main Tributary through the property in the vicinity of the development. In doing this, the model slightly over estimates the floodplain depths through cross-sections 366 and 244 of the Main Tributary; generating a conservative floodplain limit while modelling the eastern floodplain extents within the vicinity of the western limit of the proposed development envelope.

We have enclosed Figure 4 – Floodplain Map in Appendix A for reference. A copy of the previously submitted proposed site plan provided in Appendix D.

9. Safe Access Egress

Safe access and egress refer to the accessibility and capability of both vehicles and pedestrians to enter and exit a location during flood events and during emergency situations. It is essential to provide property access for the users to safely enter and exit a location within a floodplain. It is crucial to have safe passage out of the floodplain to areas not affected during the rise in water levels during storm events.

Currently, the SVCA Regulations Policy Manual (Amended April 1, 2024) requires the following criteria be met under the Regulatory Storm Event:

- A maximum depth of flooding of 0.80 m or 800 mm;
- A flow velocity not exceeding 1.0 m/s; and
- A product of depth and velocity not to exceed 0.4 m^2/s.

Based on the estimated floodplain extents contained herein, the location of the proposed development envelope and entire eastern property line of the development is outside of the estimated floodplain.

Safe access to the site is achieved for the proposed development by entering the existing driveway from the north end of Grey Road 14 and the intersection of Southgate Concession Road 24, north of the subject property.

10. Conclusion and Recommendations

GEI Consultants Canada Ltd. (GEI) has been retained by Southgate Metals (100033592 Ontario Inc.) to review the Saugeen Valley Conservation Authority's (SVCA) floodplain and safe access requirements for the proposed development located at 112754 Grey Road 14 int the Township of Southgate, County of Grey.

The floodplain in the vicinity of the development and traversing the subject property involves several hydraulic obstacles to generate a realistic hydraulic model of the floodplain. The complexity of the interconnected branches within the low-lying areas and the location of the man-made ditch features of Branch 'A' add complexities to the one-dimensional HEC RAS Model.

The estimated peak runoff flow rate modelled throughout the property under the Regional Design Storm (Hurricane Hazel) for the Main Tributary is 22.34 m^3/s, and the estimated peak runoff flow rate modelled for Branch 'A' is 4.18 m^3/s. Based on these estimated flow rate, the maximum anticipated water surface elevation within the vicinity of the proposed development is 473.81 m within cross-section 111A in Branch 'A'.

The estimated floodplain extents have been approximated based on the local hydrology and hydraulics of the surround catchment areas contributing peak runoff into the Main Tributary, and through Branch 'A' and Branch 'B'. The conservative assumptions and modelling approach approximate the floodplain limits to be between 106 m (+/-) and 72 m (+/-) west of the centreline of Grey Road 14 in the vicinity of the proposed building site.

We trust this is satisfactory for your needs at this time. Should you have any questions, please do not hesitate to contact our office.

CHECKED BY:
GEI Consultants Canada Ltd

Christopher Slocombe, B. Eng
Project Professional

CHECKED BY:
GEI Consultants Canada Ltd

LICENSED PROFESSIONAL ENGINEER
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Darren D. Hewgill, B.Eng., P.Eng.
Senior Project Manager

11. Limitations

The floodplain mapping provided aligns with the *Ontario Technical Bulletin – Flooding Hazards: Data Survey and Mapping Specifications* (Version 1.0, December 2023), and specifically conforms to the standards outlined in **Table 3-1: Recommended Minimum Accuracies by Risk Criteria Level for Flood Hazard Mapping.**

Due to the site's location in a rural location with densely vegetated slopes and topography, a substantial portion of the floodplain model was supplemented with LiDAR data. In accordance with the Technical Bulletin, the subject property has been classified as **Level 3** risk criteria. As per the guideline, Level 3 classification requires a minimum vertical accuracy of (+/-) 0.5 m and a horizontal accuracy of (+/-) 1.5 m.

The LiDAR dataset used for this project was provided by Ontario GeoHub and has a vertical tolerance of (+/-) 0.05 m when compared to the site-specific topographic survey. When combined with the Technical Bulletin's vertical accuracy threshold, the estimated overall vertical accuracy is **(+/-) 0.55 m**, while the horizontal accuracy is **(+/-) 1.5 m** for the delineated floodplain boundaries. Based on the quality of the LiDAR data, supporting survey information and hydraulic modeling, we are confident in the reliability of the delineated floodplain limits.

Please note that property boundaries shown in the floodplain mapping are provided by the County of Grey and may not align with the actual legal property boundaries or reference plan limits.

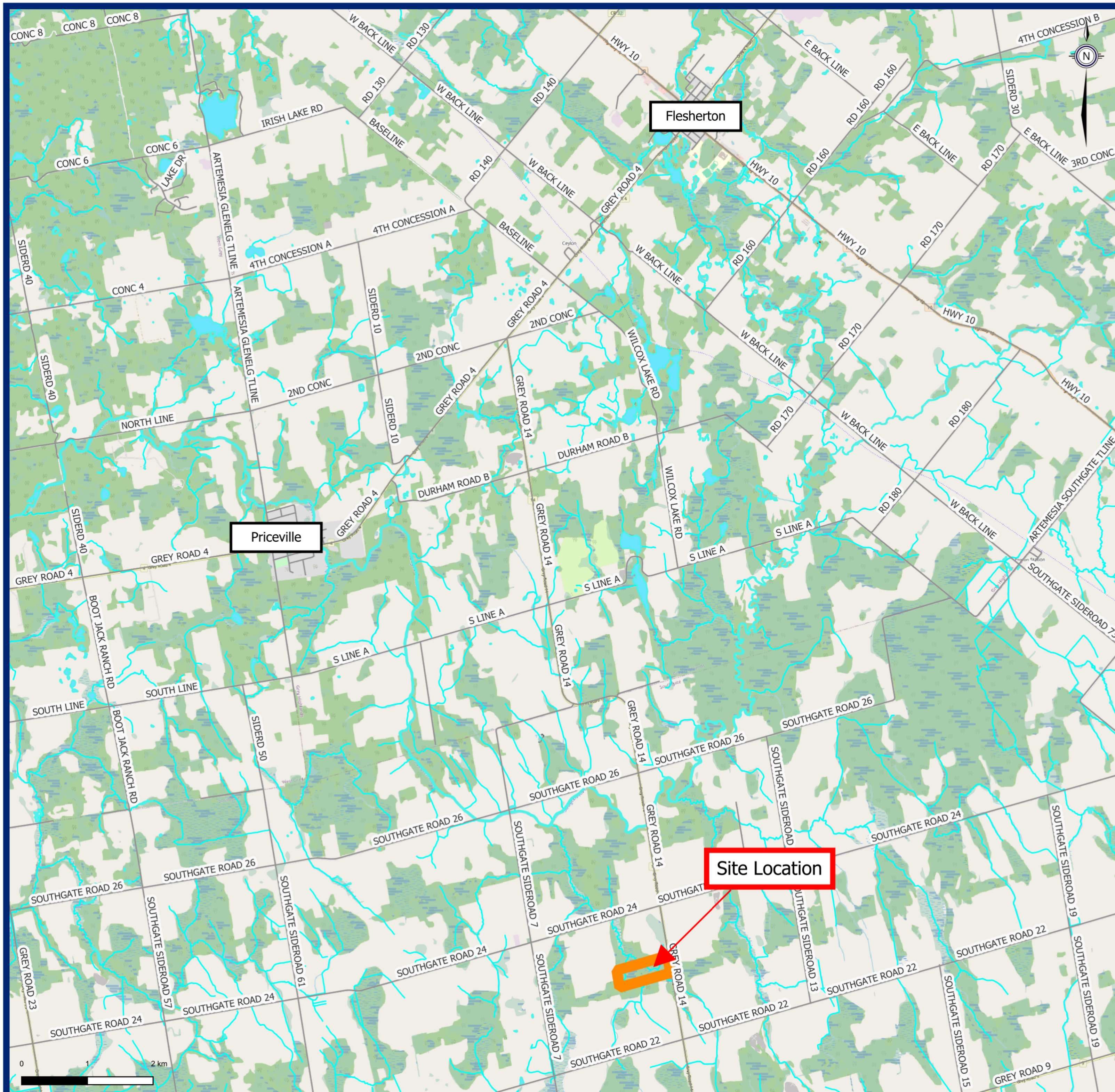
Given the inherent limitations of the data sources and the modeling process, **GEI Consultants Canada Ltd.** shall not be held liable for any direct, indirect, incidental, or consequential damages, claims, losses, or expenses arising out of the use or interpretation of this mapping, including but not limited to reliance on property boundary locations, floodplain limits, or hydraulic model outputs.

The Client agrees to indemnify, defend, and hold harmless **GEI Consultants Canada Ltd.,** its directors, officers, employees, agents, and subcontractors from and against any and all claims, damages, liabilities, costs, and expenses (including legal fees on a full indemnity basis) arising from or in connection with the misuse, misrepresentation, or unauthorized application of the floodplain mapping and related findings, or from third-party reliance on this information without the express written consent of **GEI Consultants Canada Ltd.**

This indemnity shall survive the termination or completion of the services provided and shall be governed by the laws of the Province of Ontario.

Appendix A Figures

A.1. Site Location Map



100033592 Ontario Inc.
112754 Grey Road 14 Southgate

Site Location
OHN_WATERBODY
OHN_WATERCOURSE
Wetland With Significance
GreyCounty_Roads

Figure 1

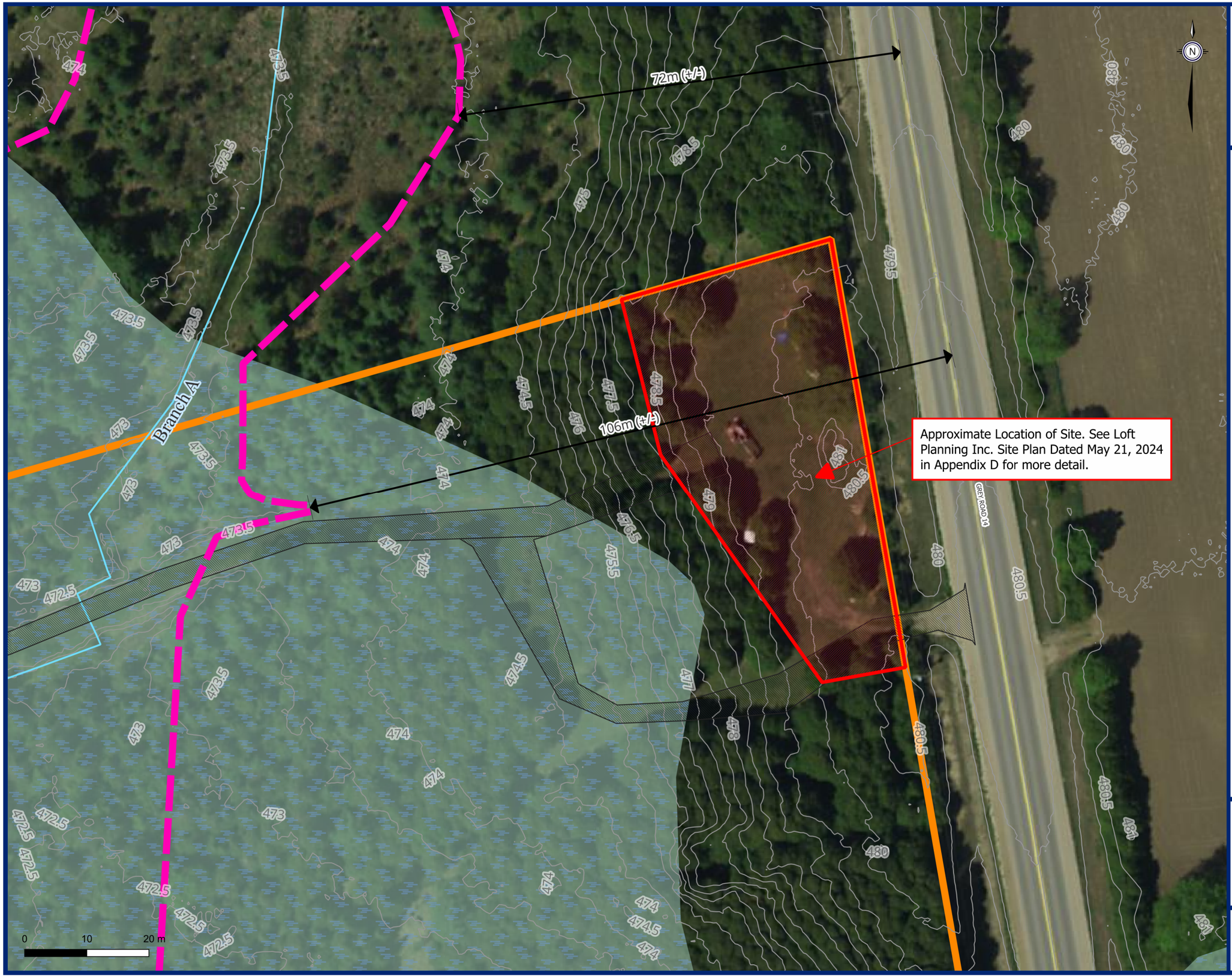
Site Location Map

112754 Grey Road 14 Southgate

GEI Consultants

June, 2025
2407640
Projection EPSG:2958

A.2. Site Plan Location



1000330592 Ontario Inc.
112754 Grey Road 14 Southgate

- Floodplain Extents
- Approximate Proposed Development
- Existing Laneway
- Surveyed Watercourses
- Lidar Contours
- Site Location
- Wetland With Significance
- Dimensions

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Figure 2

Site Plan Location

112754 Grey Road 14 Southgate

GEI Consultants

June, 2025
2407640
Projection EPSG:2958

A.3. Watershed Catchment Map

1000330592 Ontario Inc.
112754 Grey Road 14 Southgate

- Overall Watershed Area
- Catchment 200
- Catchment 201
- Site Location
- OHN_WATERBODY
- OHN_WATERCOURSE
- Wetland With Significance
- WOODED_AREA
- GreyCounty_Roads

Catchment #

Ha | CN

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Figure 3

Watershed Area Map

112754 Grey Road 14 Southgate

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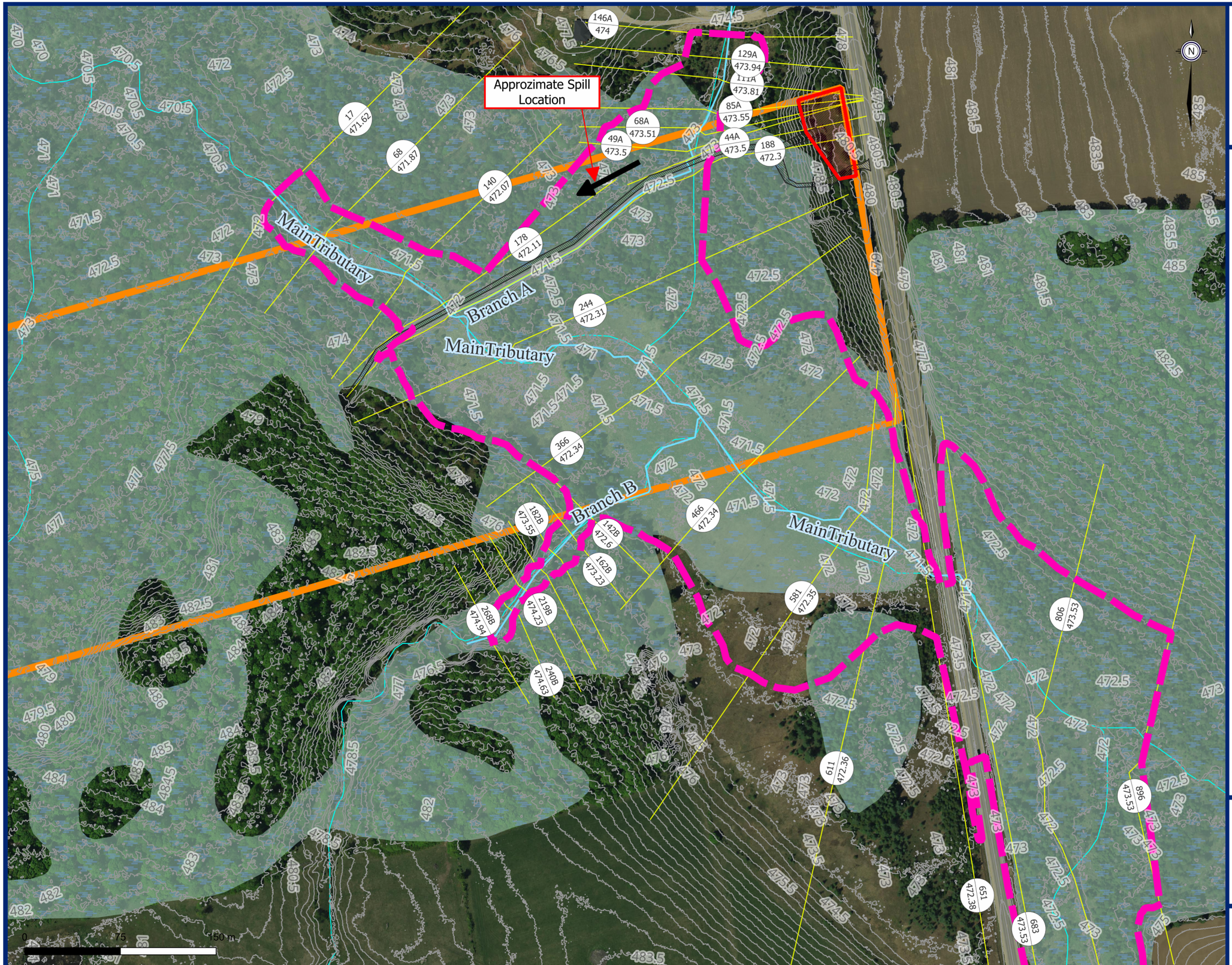
June, 2025
2407640
Projection EPSG:2958

A.4. Floodplain Map



1000330592 Ontario Inc.
112754 Grey Road 14 Southgate

- Floodplain Extents
- Approximate Proposed Development
- Existing Laneway
- Surveyed Watercourses
- Hec-Ras Cross Sections
- Lidar Contours
- Site Location
- Wetland With Significance

Approzimate location of non-quanitfied spill

Figure 4

Floodplain Map

112754 Grey Road 14 Southgate

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June, 2025
2407640
Projection EPSG:2958

Appendix B Hydrology

B.1. CN Calculations

Catchment #	100
Total Area (Ha) =	694.46

Project Name	112754 Grey Road 14
Project Number	2407640
Date	May, 2025
Designed	CS
Checked	DDH

					Crop and Other Improved			Pasture and other Unimproved			Woodland/Forest			Wetlands			Impervious			Average CN
Soil Type	Hydological Soil Group	Hydological Soil Group	Area (%)	Area (Ha)	Area (ha)	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	
Donnybrook 2	s l	AB	6.3%	43.56	15.7	36%	70	15.7	36%	62	1.7	4%	54	9.1	21%	50	1.3	3%	98	3.96
Harriston 1	l	BC	14.8%	102.69	37.0	36%	78	37.0	36%	71	4.1	4%	65	21.6	21%	50	3.1	3%	98	10.30
Harriston 2	si l	BC	30.1%	208.69	75.1	36%	78	75.1	36%	71	8.3	4%	65	43.8	21%	50	6.3	3%	98	20.94
Listowel 2	si l	BC	25.7%	178.55	64.3	36%	78	64.3	36%	71	7.1	4%	65	37.5	21%	50	5.4	3%	98	17.92
Muck	m	B	12.3%	85.27	30.7	36%	74	30.7	36%	65	3.4	4%	58	17.9	21%	50	2.6	3%	98	8.08
Parkhill 1	l	BC	10.9%	75.7	27.3	36%	78	27.3	36%	71	3.0	4%	65	15.9	21%	50	2.3	3%	98	7.60
			100%	694.46	100%															68.79

Initial Abstraction (Ia)	7.3 mm

Tc Calculations

Bransby - Williams Formula (For C > 0.4)			Airport Method (For C < 0.4)		
Maximum Catchment Elevation	491.52	m	Maximum Catchment Elevation	491.52	m
Minimum Catchment Elevation	470.11	m	Minimum Catchment Elevation	470.11	m
Catchment Length	3350.00	m	Catchment Length	3350.00	m
Catchment Slope	0.006		Catchment Slope	0.006	
Catchment Area	694.46	Ha	Catchment Area	694.46	Ha
Time of Concentration (Tc) (Minutes)	108.55	minutes	Time of Concentration (Tc) (Minutes)	179.36	minutes
Time of Concentration (Tc) (Hours)	1.81	Hours	Time of Concentration (Tc) (Hours)	2.99	Hours
Time to Peak (Tp)	1.21	hours	Time to Peak (Tp)	1.99	hours
Runoff coefficient used	**0.28**				

Catchment #	200
Total Area (Ha) =	162.50

Project Name	112754 Grey Road 14
Project Number	2407640
Date	May, 2025
Designed	CS
Checked	DDH

					Crop and Other Improved			Pasture and other Unimproved			Woodland/Forest			Wetlands			Impervious			Average CN
Soil Type	Hydological Soil Group	Hydological Soil Group	Area (%)	Area (Ha)	Area (ha)	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	
Donnybrook 2	s l	AB	17.8%	28.9	4.6	16%	70	20.2	70%	62	1.4	5%	54	1.7	6%	50	0.9	3%	98	2.63
Harriston 2	si l	BC	81.0%	131.6	21.1	16%	78	92.1	70%	71	6.6	5%	65	7.9	6%	50	3.9	3%	98	13.52
Muck	m	B	1.2%	2	0.3	16%	74	1.4	70%	65	0.1	5%	58	0.1	6%	50	0.1	3%	98	0.19
			100%	162.50	100%															16.35

Initial Abstraction (Ia)	5.9 mm

Tc Calculations

Bransby - Williams Formula (For C > 0.4)			Airport Method (For C < 0.4)		
Maximum Catchment Elevation	492.08	m	Maximum Catchment Elevation	492.08	m
Minimum Catchment Elevation	470.16	m	Minimum Catchment Elevation	470.16	m
Catchment Length	2140.00	m	Catchment Length	2140.00	m
Catchment Slope	0.010		Catchment Slope	0.010	
Catchment Area	162.50	Ha	Catchment Area	162.50	Ha
Time of Concentration (Tc) (Minutes)	72.97	minutes	Time of Concentration (Tc) (Minutes)	121.19	minutes
Time of Concentration (Tc) (Hours)	1.22	Hours	Time of Concentration (Tc) (Hours)	2.02	Hours
Time to Peak (Tp)	0.81	hours	Time to Peak (Tp)	1.35	hours
Runoff coefficient used	**0.29**				

Catchment #	201
Total Area (Ha) =	215.88

GEI Consultants

Project Name	112754 Grey Road 14
Project Number	2407640
Date	May, 2025
Designed	CS
Checked	DDH

					Crop and Other Improved			Pasture and other Unimproved			Woodland/Forest			Wetlands			Impervious			Average CN
Soil Type	Hydological Soil Group	Hydological Soil Group	Area (%)	Area (Ha)	Area (ha)	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	
Harriston 1	l	BC	22.4%	48.3	23.7	49%	78	4.8	10%	71	9.7	20%	65	9.7	20%	50	0.5	1%	98	4.82
Harriston 2	si l	BC	11.8%	25.4	12.4	49%	78	2.5	10%	71	5.1	20%	65	5.1	20%	50	0.3	1%	98	2.53
Listowel 2	si l	BC	47.6%	102.68	50.3	49%	78	10.3	10%	71	20.5	20%	65	20.5	20%	50	1.0	1%	98	10.25
Muck	m	B	14.8%	32	15.7	49%	74	3.2	10%	65	6.4	20%	58	6.4	20%	50	0.3	1%	98	3.01
Parkhill 1	l	BC	3.5%	7.5	3.7	49%	78	0.8	10%	71	1.5	20%	65	1.5	20%	50	0.1	1%	98	0.75
			100%	215.88	100%															21.36

Initial Abstraction (Ia)	8.35 mm

Tc Calculations					
Bransby - Williams Formula (For C > 0.4)			Airport Method (For C < 0.4)		
Maximum Catchment Elevation	492.09	m	Maximum Catchment Elevation	492.09	m
Minimum Catchment Elevation	470.84	m	Minimum Catchment Elevation	470.84	m
Catchment Length	2760.00	m	Catchment Length	2760.00	m
Catchment Slope	0.008		Catchment Slope	0.008	
Catchment Area	215.88	Ha	Catchment Area	215.88	Ha
Time of Concentration (Tc) (Minutes)	96.84	minutes	Time of Concentration (Tc) (Minutes)	153.09	minutes
Time of Concentration (Tc) (Hours)	1.61	Hours	Time of Concentration (Tc) (Hours)	2.55	Hours
Time to Peak (Tp)	1.08	hours	Time to Peak (Tp)	1.70	hours
Runoff coefficient used	0.28				

Catchment #	202
Total Area (Ha) =	316.08

GEI Consultants

Project Name	112754 Grey Road 14
Project Number	2407640
Date	May, 2025
Designed	CS
Checked	DDH

					Crop and Other Improved			Pasture and other Unimproved			Woodland/Forest			Wetlands			Impervious			Average CN
Soil Type	Hydological Soil Group	Hydological Soil Group	Area (%)	Area (Ha)	Area (ha)	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	Area	%age	CN	
Donnybrook 2	s l	AB	4.8%	15.2	4.4	29%	70	4.6	30%	62	2.7	18%	54	3.0	20%	50	0.5	3%	98	1.35
Harriston 1	l	BC	5.0%	15.8	4.6	29%	78	4.7	30%	71	2.8	18%	65	3.2	20%	50	0.5	3%	98	1.56
Harriston 2	si l	BC	15.6%	49.2	14.3	29%	78	14.8	30%	71	8.9	18%	65	9.8	20%	50	1.5	3%	98	4.86
Listowel 2	si l	BC	23.9%	75.6	21.9	29%	78	22.7	30%	71	13.6	18%	65	15.1	20%	50	2.3	3%	98	7.46
Muck	m	B	15.9%	50.4	14.6	29%	74	15.1	30%	65	9.1	18%	58	10.1	20%	50	1.5	3%	98	4.67
Parkhill 1	l	BC	34.8%	109.88	31.9	29%	78	33.0	30%	71	19.8	18%	65	22.0	20%	50	3.3	3%	98	10.85
			100%	316.08	100%															30.75

Initial Abstraction (Ia)	7.79 mm

Tc Calculations					
Bransby - Williams Formula (For C > 0.4)			Airport Method (For C < 0.4)		
Maximum Catchment Elevation	491.52	m	Maximum Catchment Elevation	491.52	m
Minimum Catchment Elevation	470.11	m	Minimum Catchment Elevation	470.11	m
Catchment Length	3350.00	m	Catchment Length	3350.00	m
Catchment Slope	0.006		Catchment Slope	0.006	
Catchment Area	316.08	Ha	Catchment Area	316.08	Ha
Time of Concentration (Tc) (Minutes)	117.44	minutes	Time of Concentration (Tc) (Minutes)	179.36	minutes
Time of Concentration (Tc) (Hours)	1.96	Hours	Time of Concentration (Tc) (Hours)	2.99	Hours
Time to Peak (Tp)	1.30	hours	Time to Peak (Tp)	1.99	hours
Runoff coefficient used	0.28				

B.2. Runoff Coefficient Calculations

Project Number: 2407640 **Location:** Grey Road 14 **Prepared By:** CS

Project Name: 112754 Grey Road 14 **Date:** May, 2025 **Checked By:** DDH

Runoff Coefficient Calculations

Catchments	Soil Texture	Woodland						Pasture/Meadows						Cultivated						Urban or Bare Rock							Lake and Wetland		Composite C Value	Total Area
		Flat (0% to 5%)		Rolling (5% to 10%)		Hilly (10% to 30%)		Flat (0% to 5%)		Rolling (5% to 10%)		Hilly (10% to 30%)		Flat (0% to 5%)		Rolling (5% to 10%)		Hilly (10% to 30%)		% Imperv.	Flat (0% to 5%)		Rolling (5% to 10%)		Hilly (10% to 30%)		A (ha)	C		
		A (ha)	C	A (ha)	C	A (ha)	C	A (ha)	C	A (ha)	C	A (ha)	C	A (ha)	C	A (ha)	C	A (ha)	C		A (ha)	C	A (ha)	C	A (ha)	C				(ha)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
CA200	Open Sand Loam		0.08		0.12	0	0.18		0.1	0	0.15	0	0.22		0.22	0	0.3	0	0.4	50		0.4	0	0.5	0	0.55				
	Loam or Silt Loam	8.0	0.25		0.3		0.35	112.4	0.28		0.35		0.4	25.7	0.35		0.45		0.65	0.5	4.8	0.55		0.65		0.7	9.7	0.05	0.29	162.500
	Clay Loam or Clay	0.1	0.35		0.42		0.52	1.4	0.4		0.45		0.55	0.3	0.55		0.6		0.7	0.7	0.1	0.75		0.8		0.95				
CA201	Open Sand Loam		0.08		0.12		0.18		0.1		0.15		0.22		0.22		0.3		0.4	50		0.4		0.5		0.55				
	Loam or Silt Loam	36.8	0.25		0.3		0.35	18.4	0.28		0.35		0.4	90.1	0.35		0.45		0.65	50	1.8	0.55		0.65		0.7	43.18	0.05	0.28	215.880
	Clay Loam or Clay	6.4	0.35		0.42		0.52	3.2	0.4		0.45		0.55	15.7	0.55		0.6		0.7	0.7	0.3	0.75		0.8		0.85				
CA202	Open Sand Loam		0.08		0.12		0.18		0.1		0.15		0.22		0.22		0.3		0.4	50		0.4		0.5		0.55				
	Loam or Silt Loam	47.8	0.25		0.3		0.35	79.7	0.28		0.35		0.4	77	0.35		0.45		0.65	0.5	8.0	0.55		0.65		0.7	63.28	0.05	0.28	316.08
	Clay Loam or Clay	9.1	0.35		0.42		0.52	15.1	0.4		0.45		0.55	14.6	0.55		0.6		0.7	0.7	1.5	0.75		0.8		0.85				
	Open Sand Loam		0.08		0.12		0.18		0.1		0.15		0.22		0.22		0.3		0.4	0.3		0.4		0.5		0.55				
	Loam or Silt Loam		0.25		0.3		0.35		0.28		0.35		0.4		0.35		0.45		0.65	50		0.55		0.65		0.7		0.05		
	Clay Loam or Clay		0.35		0.42		0.52		0.4		0.45		0.55		0.55		0.6		0.7	0.7		0.75		0.8		0.85				
	Open Sand Loam		0.08		0.12		0.18		0.1		0.15		0.22		0.22		0.3		0.4	0.3		0.4		0.5		0.55				
	Loam or Silt Loam		0.25		0.3		0.35		0.28		0.35		0.4		0.35		0.45		0.65	0.5		0.55		0.65		0.7		0.05		
	Clay Loam or Clay		0.35		0.42		0.52		0.4		0.45		0.55		0.55		0.6		0.7	0.7		0.75		0.8		0.85				

B.3. Mount Forest Rainfall Data

Environment and Climate Change Canada
Environnement et Changement climatique Canada

Short Duration Rainfall Intensity-Duration-Frequency Data
Données sur l'intensité, la durée et la fréquence des chutes de pluie de courte durée

Gumbel - Method of moments/Méthode des moments

2022/10/31

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MOUNT FOREST (AUT) ON 6145504

Latitude: 43 59'N Longitude: 80 45'W Elevation/Altitude: 414 m

Years/Années : 1962 - 2020 # Years/Années : 43

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Table 1 : Annual Maximum (mm)/Maximum annuel (mm)

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Year / Année	5 min	10 min	15 min	30 min	1 h	2 h	6 h	12 h	24 h
1962	10.4	14.7	18.0	18.0	19.6	23.9	33.0	38.9	45.0
1963	14.0	15.2	21.1	31.7	43.7	49.3	51.3	54.9	61.0
1964	10.4	12.2	14.7	25.7	28.4	29.5	35.3	37.6	61.2
1965	10.2	14.5	17.0	22.6	31.5	32.3	33.0	33.5	33.5
1966	9.9	15.2	19.3	21.1	24.6	27.2	28.2	38.1	56.1
1967	11.2	12.7	13.7	17.3	22.9	24.6	36.3	49.8	50.0
1968	8.4	13.5	17.8	28.7	43.4	52.1	74.4	74.7	83.8
1969	6.1	10.4	12.4	18.0	20.1	20.1	35.1	37.6	39.6
1970	8.6	13.2	13.5	15.7	19.0	20.1	36.8	53.6	56.9
1971	12.7	15.0	15.7	16.0	17.8	20.3	26.2	27.2	34.0
1972	6.9	10.2	13.0	18.0	22.4	33.3	45.2	47.5	50.3
1973	5.6	9.4	11.2	13.2	15.2	18.0	23.1	24.4	32.5
1974	5.3	7.1	9.7	19.0	35.6	40.6	42.7	42.7	42.7
1975	6.3	8.4	9.7	18.0	21.1	28.4	36.1	47.5	51.1
1976	9.1	13.5	16.5	19.0	27.7	33.8	35.8	35.8	43.4
1977	11.7	17.0	18.8	20.1	27.7	41.1	69.1	81.3	81.3
1978	14.8	15.4	18.0	21.2	21.6	25.6	40.3	43.7	52.5
1979	10.5	11.1	11.1	14.4	16.6	32.4	40.5	53.4	64.5
1980	8.9	16.3	19.3	25.4	34.3	43.5	48.3	49.4	49.4
1981	7.7	8.8	10.8	12.7	13.4	17.2	31.0	35.8	41.4
1982	6.9	10.9	13.9	18.6	24.6	29.6	30.4	30.6	32.6

1983	7.9	13.7	15.8	31.4	37.2	38.2	38.2	42.0	43.3
1984	6.8	9.2	11.2	14.6	14.6	20.2	25.2	32.8	33.0
1985	8.8	16.4	22.0	38.6	49.2	53.9	56.2	56.2	64.4
1986	8.2	12.7	15.7	22.7	27.2	39.8	46.8	64.4	93.3
2003	9.2	15.8	18.0	23.6	29.2	34.6	37.0	37.0	40.2
2004	8.4	13.0	16.0	20.0	22.4	25.0	39.0	39.4	39.4
2005	5.6	9.2	12.0	20.0	26.8	32.2	32.2	32.4	40.0
2006	8.6	15.2	20.0	21.0	23.2	34.0	48.8	55.2	55.4
2007	11.4	19.0	22.6	30.0	33.8	35.8	35.8	43.4	55.4
2008	9.8	12.8	14.0	19.0	23.2	33.4	47.0	53.0	78.4
2009	12.4	17.6	18.8	24.6	25.2	28.0	38.6	44.4	56.6
2010	8.0	11.6	12.2	17.6	22.8	31.4	59.2	64.8	65.4
2011	7.0	10.4	14.0	21.0	25.8	30.6	50.9	50.9	50.9
2012	6.8	7.8	8.2	12.4	17.0	20.8	34.8	45.4	53.8
2013	8.2	11.2	15.0	26.0	28.4	42.4	65.2	67.2	67.8
2014	9.8	15.4	18.0	25.4	28.0	29.2	33.2	40.2	40.6
2015	8.2	10.2	10.8	12.6	17.6	20.0	29.0	30.6	31.4
2016	9.0	12.0	15.8	24.4	44.4	51.2	52.2	53.8	54.2
2017	10.8	17.4	19.0	28.0	49.8	61.6	124.4	132.8	138.8
2018	8.6	15.0	19.8	25.2	34.0	39.2	43.2	54.4	66.8
2019	6.4	6.6	6.6	7.4	12.0	14.4	21.6	24.6	25.0
2020	6.8	12.0	16.0	20.0	22.4	24.2	42.8	45.0	59.6
# Yrs. Années	43	43	43	43	43	43	43	43	43
Mean Moyenne	8.9	12.8	15.3	20.9	26.6	32.2	42.6	47.6	53.9
Std. Dev. Écart-type	2.2	3.0	3.8	6.1	9.4	10.8	17.4	18.4	20.1
Skew. Dissymétrie	0.65	-0.11	-0.17	0.49	0.87	0.72	2.75	2.55	1.98
Kurtosis	3.37	2.45	2.57	3.90	3.50	3.39	14.00	13.18	9.57

*-99.9 Indicates Missing Data/Données manquantes

Warning: annual maximum amount greater than 100-yr return period amount
Avertissement : la quantité maximale annuelle excède la quantité pour une période de retour de 100 ans

Year/Année	Duration/Durée	Data/Données	100-yr/ans
2017	6 h	124.4	97.1
2017	12 h	132.8	105.3
2017	24 h	138.8	117.0

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Table 2a : Return Period Rainfall Amounts (mm)
Quantité de pluie (mm) par période de retour

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Duration/Durée	2 yr/ans	5 yr/ans	10 yr/ans	25 yr/ans	50 yr/ans	100 yr/ans	#Years Années
5 min	8.5	10.5	11.8	13.4	14.7	15.9	43
10 min	12.3	15.0	16.7	19.0	20.7	22.3	43
15 min	14.6	18.0	20.3	23.1	25.2	27.2	43
30 min	19.9	25.3	28.8	33.3	36.6	39.9	43
1 h	25.1	33.4	38.8	45.7	50.9	56.0	43
2 h	30.4	39.9	46.3	54.3	60.2	66.1	43
6 h	39.8	55.1	65.3	78.1	87.6	97.1	43
12 h	44.6	60.8	71.6	85.2	95.3	105.3	43
24 h	50.6	68.3	80.1	95.0	106.0	117.0	43

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Table 2b :

Return Period Rainfall Rates (mm/h) - 95% Confidence limits
Intensité de la pluie (mm/h) par période de retour - Limites de confiance de 95%

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Duration/Durée	2 yr/ans	5 yr/ans	10 yr/ans	25 yr/ans	50 yr/ans	100 yr/ans	#Years Années
5 min	102.3	125.9	141.5	161.3	175.9	190.4	43
	+/- 7.3	+/- 12.3	+/- 16.7	+/- 22.5	+/- 26.9	+/- 31.3	43
10 min	73.6	89.7	100.4	113.9	123.9	133.9	43
	+/- 5.0	+/- 8.4	+/- 11.4	+/- 15.4	+/- 18.4	+/- 21.4	43
15 min	58.6	72.1	81.0	92.3	100.7	109.0	43
	+/- 4.2	+/- 7.1	+/- 9.5	+/- 12.9	+/- 15.4	+/- 17.9	43
30 min	39.9	50.6	57.7	66.6	73.3	79.9	43
	+/- 3.3	+/- 5.6	+/- 7.6	+/- 10.2	+/- 12.2	+/- 14.2	43
1 h	25.1	33.4	38.8	45.7	50.9	56.0	43
	+/- 2.6	+/- 4.3	+/- 5.8	+/- 7.9	+/- 9.4	+/- 11.0	43
2 h	15.2	20.0	23.1	27.1	30.1	33.0	43
	+/- 1.5	+/- 2.5	+/- 3.4	+/- 4.5	+/- 5.4	+/- 6.3	43
6 h	6.6	9.2	10.9	13.0	14.6	16.2	43
	+/- 0.8	+/- 1.3	+/- 1.8	+/- 2.4	+/- 2.9	+/- 3.4	43
12 h	3.7	5.1	6.0	7.1	7.9	8.8	43
	+/- 0.4	+/- 0.7	+/- 1.0	+/- 1.3	+/- 1.5	+/- 1.8	43
24 h	2.1	2.8	3.3	4.0	4.4	4.9	43
	+/- 0.2	+/- 0.4	+/- 0.5	+/- 0.7	+/- 0.8	+/- 1.0	43

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Table 3 : Interpolation Equation / Équation d'interpolation: R = A*T^B

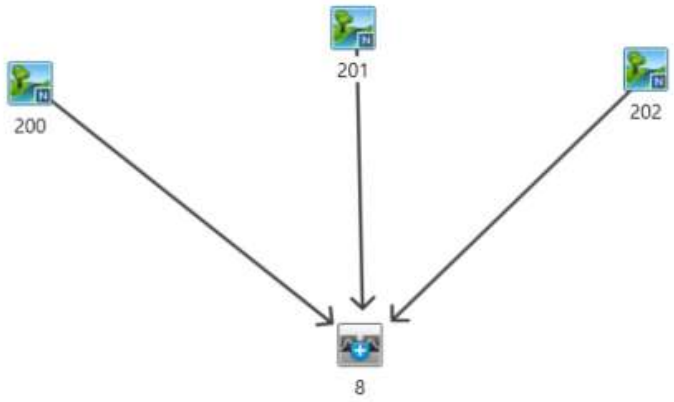
R = Interpolated Rainfall rate (mm/h)/Intensité interpolée de la pluie (mm/h)
RR = Rainfall rate (mm/h) / Intensité de la pluie (mm/h)
T = Rainfall duration (h) / Durée de la pluie (h)

****

Statistics/Statistiques	2 yr/ans	5 yr/ans	10 yr/ans	25 yr/ans	50 yr/ans	100 yr/ans
Mean of RR/Moyenne de RR	36.3	45.4	51.4	59.0	64.6	70.2
Std. Dev. /Écart-type (RR)	35.2	42.9	48.0	54.4	59.2	63.9
Std. Error/Erreur-type	8.3	10.0	11.1	12.6	13.8	14.9
Coefficient (A)	22.0	28.4	32.7	38.0	41.9	45.9
Exponent/Exposant (B)	-0.694	-0.671	-0.661	-0.652	-0.646	-0.642
Mean % Error/% erreur moyenne	9.4	10.2	10.8	11.3	11.7	11.9

B.4. OTTHYO Schematic

Project:	112754 Grey Road 14, Southgate
File No.:	2407640
Date:	May 30, 2025
Designed	CS
Checked:	DHH
Subject:	Otthymo Schematic



B.5. OTTHYMO Output

```
************************************************************
** SIMULATION:100yr 24hr 15min SCS Type II (Mount Forest) **
************************************************************

--------------------
|    READ STORM    |    Filename: C:\Users\chrslo4129\AppD
|                  |              ata\Local\Temp\
|                  |              615f0147-7b04-47b0-b8d0-45b1afcd0420\b1f201e4
| Ptotal=143.20 mm |    Comments: 100yr 24hr 15min SCS Type II (Mount Fore
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	6.25	2.58	12.50	20.62	18.75	2.58
0.25	1.58	6.50	2.58	12.75	10.60	19.00	2.58
0.50	1.58	6.75	2.58	13.00	10.60	19.25	2.58
0.75	1.58	7.00	2.58	13.25	7.73	19.50	2.58
1.00	1.58	7.25	3.15	13.50	7.73	19.75	2.58
1.25	1.58	7.50	3.15	13.75	6.01	20.00	2.58
1.50	1.58	7.75	3.15	14.00	6.01	20.25	1.72
1.75	1.58	8.00	3.15	14.25	4.30	20.50	1.72
2.00	1.58	8.25	3.72	14.50	4.30	20.75	1.72
2.25	1.86	8.50	3.72	14.75	4.30	21.00	1.72
2.50	1.86	8.75	4.01	15.00	4.30	21.25	1.72
2.75	1.86	9.00	4.01	15.25	4.30	21.50	1.72
3.00	1.86	9.25	4.58	15.50	4.30	21.75	1.72
3.25	1.86	9.50	4.58	15.75	4.30	22.00	1.72
3.50	1.86	9.75	5.16	16.00	4.30	22.25	1.72
3.75	1.86	10.00	5.16	16.25	2.58	22.50	1.72
4.00	1.86	10.25	6.59	16.50	2.58	22.75	1.72
4.25	2.29	10.50	6.59	16.75	2.58	23.00	1.72
4.50	2.29	10.75	8.88	17.00	2.58	23.25	1.72
4.75	2.29	11.00	8.88	17.25	2.58	23.50	1.72
5.00	2.29	11.25	13.75	17.50	2.58	23.75	1.72
5.25	2.29	11.50	13.75	17.75	2.58	24.00	1.72
5.50	2.29	11.75	42.39	18.00	2.58		
5.75	2.29	12.00	175.28	18.25	2.58		
6.00	2.29	12.25	20.62	18.50	2.58		

```
--------------------
| CALIB            |
| NASHYD   (  0200)|   Area    (ha)= 162.50   Curve Number   (CN)= 16.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.35

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.29	12.250	175.28	18.33	2.58
0.167	0.00	6.250	2.29	12.333	20.64	18.42	2.58
0.250	0.00	6.333	2.58	12.417	20.62	18.50	2.58
0.333	1.58	6.417	2.58	12.500	20.62	18.58	2.58
0.417	1.58	6.500	2.58	12.583	20.62	18.67	2.58
0.500	1.58	6.583	2.58	12.667	20.62	18.75	2.58
0.583	1.58	6.667	2.58	12.750	20.62	18.83	2.58
0.667	1.58	6.750	2.58	12.833	10.60	18.92	2.58
0.750	1.58	6.833	2.58	12.917	10.60	19.00	2.58
0.833	1.58	6.917	2.58	13.000	10.60	19.08	2.58
0.917	1.58	7.000	2.58	13.083	10.60	19.17	2.58
1.000	1.58	7.083	2.58	13.167	10.60	19.25	2.58
1.083	1.58	7.167	2.58	13.250	10.60	19.33	2.58
1.167	1.58	7.250	2.58	13.333	7.73	19.42	2.58
1.250	1.58	7.333	3.15	13.417	7.73	19.50	2.58
1.333	1.58	7.417	3.15	13.500	7.73	19.58	2.58
1.417	1.58	7.500	3.15	13.583	7.73	19.67	2.58
1.500	1.58	7.583	3.15	13.667	7.73	19.75	2.58
1.583	1.58	7.667	3.15	13.750	7.73	19.83	2.58
1.667	1.58	7.750	3.15	13.833	6.01	19.92	2.58
1.750	1.58	7.833	3.15	13.917	6.01	20.00	2.58
1.833	1.58	7.917	3.15	14.000	6.01	20.08	2.58
1.917	1.58	8.000	3.15	14.083	6.01	20.17	2.58
2.000	1.58	8.083	3.15	14.167	6.01	20.25	2.58
2.083	1.58	8.167	3.15	14.250	6.01	20.33	1.72
2.167	1.58	8.250	3.15	14.333	4.30	20.42	1.72
2.250	1.58	8.333	3.72	14.417	4.30	20.50	1.72
2.333	1.86	8.417	3.72	14.500	4.30	20.58	1.72
2.417	1.86	8.500	3.72	14.583	4.30	20.67	1.72
2.500	1.86	8.583	3.72	14.667	4.30	20.75	1.72
2.583	1.86	8.667	3.72	14.750	4.30	20.83	1.72
2.667	1.86	8.750	3.72	14.833	4.30	20.92	1.72
2.750	1.86	8.833	4.01	14.917	4.30	21.00	1.72
2.833	1.86	8.917	4.01	15.000	4.30	21.08	1.72
2.917	1.86	9.000	4.01	15.083	4.30	21.17	1.72
3.000	1.86	9.083	4.01	15.167	4.30	21.25	1.72
3.083	1.86	9.167	4.01	15.250	4.30	21.33	1.72
3.167	1.86	9.250	4.01	15.333	4.30	21.42	1.72
3.250	1.86	9.333	4.58	15.417	4.30	21.50	1.72
3.333	1.86	9.417	4.58	15.500	4.30	21.58	1.72
3.417	1.86	9.500	4.58	15.583	4.30	21.67	1.72
3.500	1.86	9.583	4.58	15.667	4.30	21.75	1.72
3.583	1.86	9.667	4.58	15.750	4.30	21.83	1.72
3.667	1.86	9.750	4.58	15.833	4.30	21.92	1.72
3.750	1.86	9.833	5.16	15.917	4.30	22.00	1.72
3.833	1.86	9.917	5.16	16.000	4.30	22.08	1.72
3.917	1.86	10.000	5.16	16.083	4.30	22.17	1.72
4.000	1.86	10.083	5.16	16.167	4.30	22.25	1.72

4.083	1.86	10.167	5.16	16.250	4.30	22.33	1.72
4.167	1.86	10.250	5.16	16.333	2.58	22.42	1.72
4.250	1.86	10.333	6.59	16.417	2.58	22.50	1.72
4.333	2.29	10.417	6.59	16.500	2.58	22.58	1.72
4.417	2.29	10.500	6.59	16.583	2.58	22.67	1.72
4.500	2.29	10.583	6.59	16.667	2.58	22.75	1.72
4.583	2.29	10.667	6.59	16.750	2.58	22.83	1.72
4.667	2.29	10.750	6.59	16.833	2.58	22.92	1.72
4.750	2.29	10.833	8.88	16.917	2.58	23.00	1.72
4.833	2.29	10.917	8.88	17.000	2.58	23.08	1.72
4.917	2.29	11.000	8.88	17.083	2.58	23.17	1.72
5.000	2.29	11.083	8.88	17.167	2.58	23.25	1.72
5.083	2.29	11.167	8.88	17.250	2.58	23.33	1.72
5.167	2.29	11.250	8.88	17.333	2.58	23.42	1.72
5.250	2.29	11.333	13.75	17.417	2.58	23.50	1.72
5.333	2.29	11.417	13.75	17.500	2.58	23.58	1.72
5.417	2.29	11.500	13.75	17.583	2.58	23.67	1.72
5.500	2.29	11.583	13.75	17.667	2.58	23.75	1.72
5.583	2.29	11.667	13.75	17.750	2.58	23.83	1.72
5.667	2.29	11.750	13.75	17.833	2.58	23.92	1.72
5.750	2.29	11.833	42.38	17.917	2.58	24.00	1.72
5.833	2.29	11.917	42.39	18.000	2.58	24.08	1.72
5.917	2.29	12.000	42.39	18.083	2.58	24.17	1.72
6.000	2.29	12.083	175.26	18.167	2.58	24.25	1.72
6.083	2.29	12.167	175.28	18.250	2.58		

Unit Hyd Qpeak (cms)= 4.598

PEAK FLOW (cms)= 1.260 (i)
TIME TO PEAK (hrs)= 13.667
RUNOFF VOLUME (mm)= 13.120
TOTAL RAINFALL (mm)= 143.200
RUNOFF COEFFICIENT = 0.092

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0201) ID= 1 DT= 5.0 min	Area (ha)= 215.88	Curve Number (CN)= 21.4
	Ia (mm)= 8.35	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.70	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.29	12.250	175.28	18.33	2.58

0.167	0.00	6.250	2.29	12.333	20.64	18.42	2.58
0.250	0.00	6.333	2.58	12.417	20.62	18.50	2.58
0.333	1.58	6.417	2.58	12.500	20.62	18.58	2.58
0.417	1.58	6.500	2.58	12.583	20.62	18.67	2.58
0.500	1.58	6.583	2.58	12.667	20.62	18.75	2.58
0.583	1.58	6.667	2.58	12.750	20.62	18.83	2.58
0.667	1.58	6.750	2.58	12.833	10.60	18.92	2.58
0.750	1.58	6.833	2.58	12.917	10.60	19.00	2.58
0.833	1.58	6.917	2.58	13.000	10.60	19.08	2.58
0.917	1.58	7.000	2.58	13.083	10.60	19.17	2.58
1.000	1.58	7.083	2.58	13.167	10.60	19.25	2.58
1.083	1.58	7.167	2.58	13.250	10.60	19.33	2.58
1.167	1.58	7.250	2.58	13.333	7.73	19.42	2.58
1.250	1.58	7.333	3.15	13.417	7.73	19.50	2.58
1.333	1.58	7.417	3.15	13.500	7.73	19.58	2.58
1.417	1.58	7.500	3.15	13.583	7.73	19.67	2.58
1.500	1.58	7.583	3.15	13.667	7.73	19.75	2.58
1.583	1.58	7.667	3.15	13.750	7.73	19.83	2.58
1.667	1.58	7.750	3.15	13.833	6.01	19.92	2.58
1.750	1.58	7.833	3.15	13.917	6.01	20.00	2.58
1.833	1.58	7.917	3.15	14.000	6.01	20.08	2.58
1.917	1.58	8.000	3.15	14.083	6.01	20.17	2.58
2.000	1.58	8.083	3.15	14.167	6.01	20.25	2.58
2.083	1.58	8.167	3.15	14.250	6.01	20.33	1.72
2.167	1.58	8.250	3.15	14.333	4.30	20.42	1.72
2.250	1.58	8.333	3.72	14.417	4.30	20.50	1.72
2.333	1.86	8.417	3.72	14.500	4.30	20.58	1.72
2.417	1.86	8.500	3.72	14.583	4.30	20.67	1.72
2.500	1.86	8.583	3.72	14.667	4.30	20.75	1.72
2.583	1.86	8.667	3.72	14.750	4.30	20.83	1.72
2.667	1.86	8.750	3.72	14.833	4.30	20.92	1.72
2.750	1.86	8.833	4.01	14.917	4.30	21.00	1.72
2.833	1.86	8.917	4.01	15.000	4.30	21.08	1.72
2.917	1.86	9.000	4.01	15.083	4.30	21.17	1.72
3.000	1.86	9.083	4.01	15.167	4.30	21.25	1.72
3.083	1.86	9.167	4.01	15.250	4.30	21.33	1.72
3.167	1.86	9.250	4.01	15.333	4.30	21.42	1.72
3.250	1.86	9.333	4.58	15.417	4.30	21.50	1.72
3.333	1.86	9.417	4.58	15.500	4.30	21.58	1.72
3.417	1.86	9.500	4.58	15.583	4.30	21.67	1.72
3.500	1.86	9.583	4.58	15.667	4.30	21.75	1.72
3.583	1.86	9.667	4.58	15.750	4.30	21.83	1.72
3.667	1.86	9.750	4.58	15.833	4.30	21.92	1.72
3.750	1.86	9.833	5.16	15.917	4.30	22.00	1.72
3.833	1.86	9.917	5.16	16.000	4.30	22.08	1.72
3.917	1.86	10.000	5.16	16.083	4.30	22.17	1.72
4.000	1.86	10.083	5.16	16.167	4.30	22.25	1.72
4.083	1.86	10.167	5.16	16.250	4.30	22.33	1.72
4.167	1.86	10.250	5.16	16.333	2.58	22.42	1.72
4.250	1.86	10.333	6.59	16.417	2.58	22.50	1.72

4.333	2.29	10.417	6.59	16.500	2.58	22.58	1.72
4.417	2.29	10.500	6.59	16.583	2.58	22.67	1.72
4.500	2.29	10.583	6.59	16.667	2.58	22.75	1.72
4.583	2.29	10.667	6.59	16.750	2.58	22.83	1.72
4.667	2.29	10.750	6.59	16.833	2.58	22.92	1.72
4.750	2.29	10.833	8.88	16.917	2.58	23.00	1.72
4.833	2.29	10.917	8.88	17.000	2.58	23.08	1.72
4.917	2.29	11.000	8.88	17.083	2.58	23.17	1.72
5.000	2.29	11.083	8.88	17.167	2.58	23.25	1.72
5.083	2.29	11.167	8.88	17.250	2.58	23.33	1.72
5.167	2.29	11.250	8.88	17.333	2.58	23.42	1.72
5.250	2.29	11.333	13.75	17.417	2.58	23.50	1.72
5.333	2.29	11.417	13.75	17.500	2.58	23.58	1.72
5.417	2.29	11.500	13.75	17.583	2.58	23.67	1.72
5.500	2.29	11.583	13.75	17.667	2.58	23.75	1.72
5.583	2.29	11.667	13.75	17.750	2.58	23.83	1.72
5.667	2.29	11.750	13.75	17.833	2.58	23.92	1.72
5.750	2.29	11.833	42.38	17.917	2.58	24.00	1.72
5.833	2.29	11.917	42.39	18.000	2.58	24.08	1.72
5.917	2.29	12.000	42.39	18.083	2.58	24.17	1.72
6.000	2.29	12.083	175.26	18.167	2.58	24.25	1.72
6.083	2.29	12.167	175.28	18.250	2.58		

Unit Hyd Qpeak (cms)= 4.850

PEAK FLOW (cms)= 1.832 (i)
TIME TO PEAK (hrs)= 14.167
RUNOFF VOLUME (mm)= 16.995
TOTAL RAINFALL (mm)= 143.200
RUNOFF COEFFICIENT = 0.119

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB			
NASHYD (0202)	Area (ha)= 316.08	Curve Number (CN)= 30.8	
ID= 1 DT= 5.0 min	Ia (mm)= 7.79	# of Linear Res.(N)= 3.00	
	U.H. Tp(hrs)= 1.99		

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.29	12.250	175.28	18.33	2.58
0.167	0.00	6.250	2.29	12.333	20.64	18.42	2.58
0.250	0.00	6.333	2.58	12.417	20.62	18.50	2.58
0.333	1.58	6.417	2.58	12.500	20.62	18.58	2.58

0.417	1.58	6.500	2.58	12.583	20.62	18.67	2.58
0.500	1.58	6.583	2.58	12.667	20.62	18.75	2.58
0.583	1.58	6.667	2.58	12.750	20.62	18.83	2.58
0.667	1.58	6.750	2.58	12.833	10.60	18.92	2.58
0.750	1.58	6.833	2.58	12.917	10.60	19.00	2.58
0.833	1.58	6.917	2.58	13.000	10.60	19.08	2.58
0.917	1.58	7.000	2.58	13.083	10.60	19.17	2.58
1.000	1.58	7.083	2.58	13.167	10.60	19.25	2.58
1.083	1.58	7.167	2.58	13.250	10.60	19.33	2.58
1.167	1.58	7.250	2.58	13.333	7.73	19.42	2.58
1.250	1.58	7.333	3.15	13.417	7.73	19.50	2.58
1.333	1.58	7.417	3.15	13.500	7.73	19.58	2.58
1.417	1.58	7.500	3.15	13.583	7.73	19.67	2.58
1.500	1.58	7.583	3.15	13.667	7.73	19.75	2.58
1.583	1.58	7.667	3.15	13.750	7.73	19.83	2.58
1.667	1.58	7.750	3.15	13.833	6.01	19.92	2.58
1.750	1.58	7.833	3.15	13.917	6.01	20.00	2.58
1.833	1.58	7.917	3.15	14.000	6.01	20.08	2.58
1.917	1.58	8.000	3.15	14.083	6.01	20.17	2.58
2.000	1.58	8.083	3.15	14.167	6.01	20.25	2.58
2.083	1.58	8.167	3.15	14.250	6.01	20.33	1.72
2.167	1.58	8.250	3.15	14.333	4.30	20.42	1.72
2.250	1.58	8.333	3.72	14.417	4.30	20.50	1.72
2.333	1.86	8.417	3.72	14.500	4.30	20.58	1.72
2.417	1.86	8.500	3.72	14.583	4.30	20.67	1.72
2.500	1.86	8.583	3.72	14.667	4.30	20.75	1.72
2.583	1.86	8.667	3.72	14.750	4.30	20.83	1.72
2.667	1.86	8.750	3.72	14.833	4.30	20.92	1.72
2.750	1.86	8.833	4.01	14.917	4.30	21.00	1.72
2.833	1.86	8.917	4.01	15.000	4.30	21.08	1.72
2.917	1.86	9.000	4.01	15.083	4.30	21.17	1.72
3.000	1.86	9.083	4.01	15.167	4.30	21.25	1.72
3.083	1.86	9.167	4.01	15.250	4.30	21.33	1.72
3.167	1.86	9.250	4.01	15.333	4.30	21.42	1.72
3.250	1.86	9.333	4.58	15.417	4.30	21.50	1.72
3.333	1.86	9.417	4.58	15.500	4.30	21.58	1.72
3.417	1.86	9.500	4.58	15.583	4.30	21.67	1.72
3.500	1.86	9.583	4.58	15.667	4.30	21.75	1.72
3.583	1.86	9.667	4.58	15.750	4.30	21.83	1.72
3.667	1.86	9.750	4.58	15.833	4.30	21.92	1.72
3.750	1.86	9.833	5.16	15.917	4.30	22.00	1.72
3.833	1.86	9.917	5.16	16.000	4.30	22.08	1.72
3.917	1.86	10.000	5.16	16.083	4.30	22.17	1.72
4.000	1.86	10.083	5.16	16.167	4.30	22.25	1.72
4.083	1.86	10.167	5.16	16.250	4.30	22.33	1.72
4.167	1.86	10.250	5.16	16.333	2.58	22.42	1.72
4.250	1.86	10.333	6.59	16.417	2.58	22.50	1.72
4.333	2.29	10.417	6.59	16.500	2.58	22.58	1.72
4.417	2.29	10.500	6.59	16.583	2.58	22.67	1.72
4.500	2.29	10.583	6.59	16.667	2.58	22.75	1.72

4.583	2.29	10.667	6.59	16.750	2.58	22.83	1.72
4.667	2.29	10.750	6.59	16.833	2.58	22.92	1.72
4.750	2.29	10.833	8.88	16.917	2.58	23.00	1.72
4.833	2.29	10.917	8.88	17.000	2.58	23.08	1.72
4.917	2.29	11.000	8.88	17.083	2.58	23.17	1.72
5.000	2.29	11.083	8.88	17.167	2.58	23.25	1.72
5.083	2.29	11.167	8.88	17.250	2.58	23.33	1.72
5.167	2.29	11.250	8.88	17.333	2.58	23.42	1.72
5.250	2.29	11.333	13.75	17.417	2.58	23.50	1.72
5.333	2.29	11.417	13.75	17.500	2.58	23.58	1.72
5.417	2.29	11.500	13.75	17.583	2.58	23.67	1.72
5.500	2.29	11.583	13.75	17.667	2.58	23.75	1.72
5.583	2.29	11.667	13.75	17.750	2.58	23.83	1.72
5.667	2.29	11.750	13.75	17.833	2.58	23.92	1.72
5.750	2.29	11.833	42.38	17.917	2.58	24.00	1.72
5.833	2.29	11.917	42.39	18.000	2.58	24.08	1.72
5.917	2.29	12.000	42.39	18.083	2.58	24.17	1.72
6.000	2.29	12.083	175.26	18.167	2.58	24.25	1.72
6.083	2.29	12.167	175.28	18.250	2.58		

Unit Hyd Qpeak (cms)= 6.067

PEAK FLOW (cms)= 3.680 (i)
TIME TO PEAK (hrs)= 14.500
RUNOFF VOLUME (mm)= 25.919
TOTAL RAINFALL (mm)= 143.200
RUNOFF COEFFICIENT = 0.181

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0008)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0200):	162.50	1.260	13.67	13.12
+ ID2= 2 (0201):	215.88	1.832	14.17	17.00
ID = 3 (0008):	378.38	3.055	13.92	15.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0008)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0008):	378.38	3.055	13.92	15.33
+ ID2= 2 (0202):	316.08	3.680	14.50	25.92

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        ==================================================
        ID = 1 (  0008):   694.46   6.641    14.17    20.15

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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** SIMULATION:Hazel           **
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|    READ STORM    |    Filename: C:\Users\chrslo4129\AppD
|                  |              ata\Local\Temp\
|                  |              615f0147-7b04-47b0-b8d0-45b1afcd0420\7f48bf57
| Ptotal=284.98 mm |    Comments: Hazel
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.03 | 12.00    2.03 | 24.00    2.03 | 36.00    6.00
                1.00    2.03 | 13.00    2.03 | 25.00    2.03 | 37.00    4.00
                2.00    2.03 | 14.00    2.03 | 26.00    2.03 | 38.00    6.00
                3.00    2.03 | 15.00    2.03 | 27.00    2.03 | 39.00   13.00
                4.00    2.03 | 16.00    2.03 | 28.00    2.03 | 40.00   17.00
                5.00    2.03 | 17.00    2.03 | 29.00    2.03 | 41.00   13.00
                6.00    2.03 | 18.00    2.03 | 30.00    2.03 | 42.00   23.00
                7.00    2.03 | 19.00    2.03 | 31.00    2.03 | 43.00   13.00
                8.00    2.03 | 20.00    2.03 | 32.00    2.03 | 44.00   13.00
                9.00    2.03 | 21.00    2.03 | 33.00    2.03 | 45.00   53.00
               10.00    2.03 | 22.00    2.03 | 34.00    2.03 | 46.00   38.00
               11.00    2.03 | 23.00    2.03 | 35.00    2.00 | 47.00   13.00

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| CALIB            |
| NASHYD   (  0200)|   Area    (ha)= 162.50   Curve Number   (CN)= 16.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.35

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.03 |12.083    2.03 |24.083    2.03 | 36.08    6.00
               0.167    2.03 |12.167    2.03 |24.167    2.03 | 36.17    6.00
               0.250    2.03 |12.250    2.03 |24.250    2.03 | 36.25    6.00
               0.333    2.03 |12.333    2.03 |24.333    2.03 | 36.33    6.00
               0.417    2.03 |12.417    2.03 |24.417    2.03 | 36.42    6.00
               0.500    2.03 |12.500    2.03 |24.500    2.03 | 36.50    6.00
```

0.583	2.03	12.583	2.03	24.583	2.03	36.58	6.00
0.667	2.03	12.667	2.03	24.667	2.03	36.67	6.00
0.750	2.03	12.750	2.03	24.750	2.03	36.75	6.00
0.833	2.03	12.833	2.03	24.833	2.03	36.83	6.00
0.917	2.03	12.917	2.03	24.917	2.03	36.92	6.00
1.000	2.03	13.000	2.03	25.000	2.03	37.00	6.00
1.083	2.03	13.083	2.03	25.083	2.03	37.08	4.00
1.167	2.03	13.167	2.03	25.167	2.03	37.17	4.00
1.250	2.03	13.250	2.03	25.250	2.03	37.25	4.00
1.333	2.03	13.333	2.03	25.333	2.03	37.33	4.00
1.417	2.03	13.417	2.03	25.417	2.03	37.42	4.00
1.500	2.03	13.500	2.03	25.500	2.03	37.50	4.00
1.583	2.03	13.583	2.03	25.583	2.03	37.58	4.00
1.667	2.03	13.667	2.03	25.667	2.03	37.67	4.00
1.750	2.03	13.750	2.03	25.750	2.03	37.75	4.00
1.833	2.03	13.833	2.03	25.833	2.03	37.83	4.00
1.917	2.03	13.917	2.03	25.917	2.03	37.92	4.00
2.000	2.03	14.000	2.03	26.000	2.03	38.00	4.00
2.083	2.03	14.083	2.03	26.083	2.03	38.08	6.00
2.167	2.03	14.167	2.03	26.167	2.03	38.17	6.00
2.250	2.03	14.250	2.03	26.250	2.03	38.25	6.00
2.333	2.03	14.333	2.03	26.333	2.03	38.33	6.00
2.417	2.03	14.417	2.03	26.417	2.03	38.42	6.00
2.500	2.03	14.500	2.03	26.500	2.03	38.50	6.00
2.583	2.03	14.583	2.03	26.583	2.03	38.58	6.00
2.667	2.03	14.667	2.03	26.667	2.03	38.67	6.00
2.750	2.03	14.750	2.03	26.750	2.03	38.75	6.00
2.833	2.03	14.833	2.03	26.833	2.03	38.83	6.00
2.917	2.03	14.917	2.03	26.917	2.03	38.92	6.00
3.000	2.03	15.000	2.03	27.000	2.03	39.00	6.00
3.083	2.03	15.083	2.03	27.083	2.03	39.08	13.00
3.167	2.03	15.167	2.03	27.167	2.03	39.17	13.00
3.250	2.03	15.250	2.03	27.250	2.03	39.25	13.00
3.333	2.03	15.333	2.03	27.333	2.03	39.33	13.00
3.417	2.03	15.417	2.03	27.417	2.03	39.42	13.00
3.500	2.03	15.500	2.03	27.500	2.03	39.50	13.00
3.583	2.03	15.583	2.03	27.583	2.03	39.58	13.00
3.667	2.03	15.667	2.03	27.667	2.03	39.67	13.00
3.750	2.03	15.750	2.03	27.750	2.03	39.75	13.00
3.833	2.03	15.833	2.03	27.833	2.03	39.83	13.00
3.917	2.03	15.917	2.03	27.917	2.03	39.92	13.00
4.000	2.03	16.000	2.03	28.000	2.03	40.00	13.00
4.083	2.03	16.083	2.03	28.083	2.03	40.08	17.00
4.167	2.03	16.167	2.03	28.167	2.03	40.17	17.00
4.250	2.03	16.250	2.03	28.250	2.03	40.25	17.00
4.333	2.03	16.333	2.03	28.333	2.03	40.33	17.00
4.417	2.03	16.417	2.03	28.417	2.03	40.42	17.00
4.500	2.03	16.500	2.03	28.500	2.03	40.50	17.00
4.583	2.03	16.583	2.03	28.583	2.03	40.58	17.00
4.667	2.03	16.667	2.03	28.667	2.03	40.67	17.00

4.750	2.03	16.750	2.03	28.750	2.03	40.75	17.00
4.833	2.03	16.833	2.03	28.833	2.03	40.83	17.00
4.917	2.03	16.917	2.03	28.917	2.03	40.92	17.00
5.000	2.03	17.000	2.03	29.000	2.03	41.00	17.00
5.083	2.03	17.083	2.03	29.083	2.03	41.08	13.00
5.167	2.03	17.167	2.03	29.167	2.03	41.17	13.00
5.250	2.03	17.250	2.03	29.250	2.03	41.25	13.00
5.333	2.03	17.333	2.03	29.333	2.03	41.33	13.00
5.417	2.03	17.417	2.03	29.417	2.03	41.42	13.00
5.500	2.03	17.500	2.03	29.500	2.03	41.50	13.00
5.583	2.03	17.583	2.03	29.583	2.03	41.58	13.00
5.667	2.03	17.667	2.03	29.667	2.03	41.67	13.00
5.750	2.03	17.750	2.03	29.750	2.03	41.75	13.00
5.833	2.03	17.833	2.03	29.833	2.03	41.83	13.00
5.917	2.03	17.917	2.03	29.917	2.03	41.92	13.00
6.000	2.03	18.000	2.03	30.000	2.03	42.00	13.00
6.083	2.03	18.083	2.03	30.083	2.03	42.08	22.99
6.167	2.03	18.167	2.03	30.167	2.03	42.17	23.00
6.250	2.03	18.250	2.03	30.250	2.03	42.25	23.00
6.333	2.03	18.333	2.03	30.333	2.03	42.33	23.00
6.417	2.03	18.417	2.03	30.417	2.03	42.42	23.00
6.500	2.03	18.500	2.03	30.500	2.03	42.50	23.00
6.583	2.03	18.583	2.03	30.583	2.03	42.58	23.00
6.667	2.03	18.667	2.03	30.667	2.03	42.67	23.00
6.750	2.03	18.750	2.03	30.750	2.03	42.75	23.00
6.833	2.03	18.833	2.03	30.833	2.03	42.83	23.00
6.917	2.03	18.917	2.03	30.917	2.03	42.92	23.00
7.000	2.03	19.000	2.03	31.000	2.03	43.00	23.00
7.083	2.03	19.083	2.03	31.083	2.03	43.08	13.01
7.167	2.03	19.167	2.03	31.167	2.03	43.17	13.00
7.250	2.03	19.250	2.03	31.250	2.03	43.25	13.00
7.333	2.03	19.333	2.03	31.333	2.03	43.33	13.00
7.417	2.03	19.417	2.03	31.417	2.03	43.42	13.00
7.500	2.03	19.500	2.03	31.500	2.03	43.50	13.00
7.583	2.03	19.583	2.03	31.583	2.03	43.58	13.00
7.667	2.03	19.667	2.03	31.667	2.03	43.67	13.00
7.750	2.03	19.750	2.03	31.750	2.03	43.75	13.00
7.833	2.03	19.833	2.03	31.833	2.03	43.83	13.00
7.917	2.03	19.917	2.03	31.917	2.03	43.92	13.00
8.000	2.03	20.000	2.03	32.000	2.03	44.00	13.00
8.083	2.03	20.083	2.03	32.083	2.03	44.08	13.00
8.167	2.03	20.167	2.03	32.167	2.03	44.17	13.00
8.250	2.03	20.250	2.03	32.250	2.03	44.25	13.00
8.333	2.03	20.333	2.03	32.333	2.03	44.33	13.00
8.417	2.03	20.417	2.03	32.417	2.03	44.42	13.00
8.500	2.03	20.500	2.03	32.500	2.03	44.50	13.00
8.583	2.03	20.583	2.03	32.583	2.03	44.58	13.00
8.667	2.03	20.667	2.03	32.667	2.03	44.67	13.00
8.750	2.03	20.750	2.03	32.750	2.03	44.75	13.00
8.833	2.03	20.833	2.03	32.833	2.03	44.83	13.00

8.917	2.03	20.917	2.03	32.917	2.03	44.92	13.00
9.000	2.03	21.000	2.03	33.000	2.03	45.00	13.00
9.083	2.03	21.083	2.03	33.083	2.03	45.08	52.95
9.167	2.03	21.167	2.03	33.167	2.03	45.17	53.00
9.250	2.03	21.250	2.03	33.250	2.03	45.25	53.00
9.333	2.03	21.333	2.03	33.333	2.03	45.33	53.00
9.417	2.03	21.417	2.03	33.417	2.03	45.42	53.00
9.500	2.03	21.500	2.03	33.500	2.03	45.50	53.00
9.583	2.03	21.583	2.03	33.583	2.03	45.58	53.00
9.667	2.03	21.667	2.03	33.667	2.03	45.67	53.00
9.750	2.03	21.750	2.03	33.750	2.03	45.75	53.00
9.833	2.03	21.833	2.03	33.833	2.03	45.83	53.00
9.917	2.03	21.917	2.03	33.917	2.03	45.92	53.00
10.000	2.03	22.000	2.03	34.000	2.03	46.00	53.00
10.083	2.03	22.083	2.03	34.083	2.03	46.08	38.02
10.167	2.03	22.167	2.03	34.167	2.03	46.17	38.00
10.250	2.03	22.250	2.03	34.250	2.03	46.25	38.00
10.333	2.03	22.333	2.03	34.333	2.03	46.33	38.00
10.417	2.03	22.417	2.03	34.417	2.03	46.42	38.00
10.500	2.03	22.500	2.03	34.500	2.03	46.50	38.00
10.583	2.03	22.583	2.03	34.583	2.03	46.58	38.00
10.667	2.03	22.667	2.03	34.667	2.03	46.67	38.00
10.750	2.03	22.750	2.03	34.750	2.03	46.75	38.00
10.833	2.03	22.833	2.03	34.833	2.03	46.83	38.00
10.917	2.03	22.917	2.03	34.917	2.03	46.92	38.00
11.000	2.03	23.000	2.03	35.000	2.03	47.00	38.00
11.083	2.03	23.083	2.03	35.083	2.00	47.08	13.04
11.167	2.03	23.167	2.03	35.167	2.00	47.17	13.00
11.250	2.03	23.250	2.03	35.250	2.00	47.25	13.00
11.333	2.03	23.333	2.03	35.333	2.00	47.33	13.00
11.417	2.03	23.417	2.03	35.417	2.00	47.42	13.00
11.500	2.03	23.500	2.03	35.500	2.00	47.50	13.00
11.583	2.03	23.583	2.03	35.583	2.00	47.58	13.00
11.667	2.03	23.667	2.03	35.667	2.00	47.67	13.00
11.750	2.03	23.750	2.03	35.750	2.00	47.75	13.00
11.833	2.03	23.833	2.03	35.833	2.00	47.83	13.00
11.917	2.03	23.917	2.03	35.917	2.00	47.92	13.00
12.000	2.03	24.000	2.03	36.000	2.00	48.00	13.00

Unit Hyd Qpeak (cms)= 4.598

PEAK FLOW (cms)= 4.180 (i)
TIME TO PEAK (hrs)= 47.583
RUNOFF VOLUME (mm)= 49.339
TOTAL RAINFALL (mm)= 284.981
RUNOFF COEFFICIENT = 0.173

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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| CALIB            |
| NASHYD   (  0201)|   Area    (ha)= 215.88   Curve Number   (CN)= 21.4
|ID= 1 DT= 5.0 min |   Ia      (mm)=   8.35   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   1.70

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
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---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.03	12.083	2.03	24.083	2.03	36.08	6.00
0.167	2.03	12.167	2.03	24.167	2.03	36.17	6.00
0.250	2.03	12.250	2.03	24.250	2.03	36.25	6.00
0.333	2.03	12.333	2.03	24.333	2.03	36.33	6.00
0.417	2.03	12.417	2.03	24.417	2.03	36.42	6.00
0.500	2.03	12.500	2.03	24.500	2.03	36.50	6.00
0.583	2.03	12.583	2.03	24.583	2.03	36.58	6.00
0.667	2.03	12.667	2.03	24.667	2.03	36.67	6.00
0.750	2.03	12.750	2.03	24.750	2.03	36.75	6.00
0.833	2.03	12.833	2.03	24.833	2.03	36.83	6.00
0.917	2.03	12.917	2.03	24.917	2.03	36.92	6.00
1.000	2.03	13.000	2.03	25.000	2.03	37.00	6.00
1.083	2.03	13.083	2.03	25.083	2.03	37.08	4.00
1.167	2.03	13.167	2.03	25.167	2.03	37.17	4.00
1.250	2.03	13.250	2.03	25.250	2.03	37.25	4.00
1.333	2.03	13.333	2.03	25.333	2.03	37.33	4.00
1.417	2.03	13.417	2.03	25.417	2.03	37.42	4.00
1.500	2.03	13.500	2.03	25.500	2.03	37.50	4.00
1.583	2.03	13.583	2.03	25.583	2.03	37.58	4.00
1.667	2.03	13.667	2.03	25.667	2.03	37.67	4.00
1.750	2.03	13.750	2.03	25.750	2.03	37.75	4.00
1.833	2.03	13.833	2.03	25.833	2.03	37.83	4.00
1.917	2.03	13.917	2.03	25.917	2.03	37.92	4.00
2.000	2.03	14.000	2.03	26.000	2.03	38.00	4.00
2.083	2.03	14.083	2.03	26.083	2.03	38.08	6.00
2.167	2.03	14.167	2.03	26.167	2.03	38.17	6.00
2.250	2.03	14.250	2.03	26.250	2.03	38.25	6.00
2.333	2.03	14.333	2.03	26.333	2.03	38.33	6.00
2.417	2.03	14.417	2.03	26.417	2.03	38.42	6.00
2.500	2.03	14.500	2.03	26.500	2.03	38.50	6.00
2.583	2.03	14.583	2.03	26.583	2.03	38.58	6.00
2.667	2.03	14.667	2.03	26.667	2.03	38.67	6.00
2.750	2.03	14.750	2.03	26.750	2.03	38.75	6.00
2.833	2.03	14.833	2.03	26.833	2.03	38.83	6.00
2.917	2.03	14.917	2.03	26.917	2.03	38.92	6.00
3.000	2.03	15.000	2.03	27.000	2.03	39.00	6.00
3.083	2.03	15.083	2.03	27.083	2.03	39.08	13.00
3.167	2.03	15.167	2.03	27.167	2.03	39.17	13.00

3.250	2.03	15.250	2.03	27.250	2.03	39.25	13.00
3.333	2.03	15.333	2.03	27.333	2.03	39.33	13.00
3.417	2.03	15.417	2.03	27.417	2.03	39.42	13.00
3.500	2.03	15.500	2.03	27.500	2.03	39.50	13.00
3.583	2.03	15.583	2.03	27.583	2.03	39.58	13.00
3.667	2.03	15.667	2.03	27.667	2.03	39.67	13.00
3.750	2.03	15.750	2.03	27.750	2.03	39.75	13.00
3.833	2.03	15.833	2.03	27.833	2.03	39.83	13.00
3.917	2.03	15.917	2.03	27.917	2.03	39.92	13.00
4.000	2.03	16.000	2.03	28.000	2.03	40.00	13.00
4.083	2.03	16.083	2.03	28.083	2.03	40.08	17.00
4.167	2.03	16.167	2.03	28.167	2.03	40.17	17.00
4.250	2.03	16.250	2.03	28.250	2.03	40.25	17.00
4.333	2.03	16.333	2.03	28.333	2.03	40.33	17.00
4.417	2.03	16.417	2.03	28.417	2.03	40.42	17.00
4.500	2.03	16.500	2.03	28.500	2.03	40.50	17.00
4.583	2.03	16.583	2.03	28.583	2.03	40.58	17.00
4.667	2.03	16.667	2.03	28.667	2.03	40.67	17.00
4.750	2.03	16.750	2.03	28.750	2.03	40.75	17.00
4.833	2.03	16.833	2.03	28.833	2.03	40.83	17.00
4.917	2.03	16.917	2.03	28.917	2.03	40.92	17.00
5.000	2.03	17.000	2.03	29.000	2.03	41.00	17.00
5.083	2.03	17.083	2.03	29.083	2.03	41.08	13.00
5.167	2.03	17.167	2.03	29.167	2.03	41.17	13.00
5.250	2.03	17.250	2.03	29.250	2.03	41.25	13.00
5.333	2.03	17.333	2.03	29.333	2.03	41.33	13.00
5.417	2.03	17.417	2.03	29.417	2.03	41.42	13.00
5.500	2.03	17.500	2.03	29.500	2.03	41.50	13.00
5.583	2.03	17.583	2.03	29.583	2.03	41.58	13.00
5.667	2.03	17.667	2.03	29.667	2.03	41.67	13.00
5.750	2.03	17.750	2.03	29.750	2.03	41.75	13.00
5.833	2.03	17.833	2.03	29.833	2.03	41.83	13.00
5.917	2.03	17.917	2.03	29.917	2.03	41.92	13.00
6.000	2.03	18.000	2.03	30.000	2.03	42.00	13.00
6.083	2.03	18.083	2.03	30.083	2.03	42.08	22.99
6.167	2.03	18.167	2.03	30.167	2.03	42.17	23.00
6.250	2.03	18.250	2.03	30.250	2.03	42.25	23.00
6.333	2.03	18.333	2.03	30.333	2.03	42.33	23.00
6.417	2.03	18.417	2.03	30.417	2.03	42.42	23.00
6.500	2.03	18.500	2.03	30.500	2.03	42.50	23.00
6.583	2.03	18.583	2.03	30.583	2.03	42.58	23.00
6.667	2.03	18.667	2.03	30.667	2.03	42.67	23.00
6.750	2.03	18.750	2.03	30.750	2.03	42.75	23.00
6.833	2.03	18.833	2.03	30.833	2.03	42.83	23.00
6.917	2.03	18.917	2.03	30.917	2.03	42.92	23.00
7.000	2.03	19.000	2.03	31.000	2.03	43.00	23.00
7.083	2.03	19.083	2.03	31.083	2.03	43.08	13.01
7.167	2.03	19.167	2.03	31.167	2.03	43.17	13.00
7.250	2.03	19.250	2.03	31.250	2.03	43.25	13.00
7.333	2.03	19.333	2.03	31.333	2.03	43.33	13.00

7.417	2.03	19.417	2.03	31.417	2.03	43.42	13.00
7.500	2.03	19.500	2.03	31.500	2.03	43.50	13.00
7.583	2.03	19.583	2.03	31.583	2.03	43.58	13.00
7.667	2.03	19.667	2.03	31.667	2.03	43.67	13.00
7.750	2.03	19.750	2.03	31.750	2.03	43.75	13.00
7.833	2.03	19.833	2.03	31.833	2.03	43.83	13.00
7.917	2.03	19.917	2.03	31.917	2.03	43.92	13.00
8.000	2.03	20.000	2.03	32.000	2.03	44.00	13.00
8.083	2.03	20.083	2.03	32.083	2.03	44.08	13.00
8.167	2.03	20.167	2.03	32.167	2.03	44.17	13.00
8.250	2.03	20.250	2.03	32.250	2.03	44.25	13.00
8.333	2.03	20.333	2.03	32.333	2.03	44.33	13.00
8.417	2.03	20.417	2.03	32.417	2.03	44.42	13.00
8.500	2.03	20.500	2.03	32.500	2.03	44.50	13.00
8.583	2.03	20.583	2.03	32.583	2.03	44.58	13.00
8.667	2.03	20.667	2.03	32.667	2.03	44.67	13.00
8.750	2.03	20.750	2.03	32.750	2.03	44.75	13.00
8.833	2.03	20.833	2.03	32.833	2.03	44.83	13.00
8.917	2.03	20.917	2.03	32.917	2.03	44.92	13.00
9.000	2.03	21.000	2.03	33.000	2.03	45.00	13.00
9.083	2.03	21.083	2.03	33.083	2.03	45.08	52.95
9.167	2.03	21.167	2.03	33.167	2.03	45.17	53.00
9.250	2.03	21.250	2.03	33.250	2.03	45.25	53.00
9.333	2.03	21.333	2.03	33.333	2.03	45.33	53.00
9.417	2.03	21.417	2.03	33.417	2.03	45.42	53.00
9.500	2.03	21.500	2.03	33.500	2.03	45.50	53.00
9.583	2.03	21.583	2.03	33.583	2.03	45.58	53.00
9.667	2.03	21.667	2.03	33.667	2.03	45.67	53.00
9.750	2.03	21.750	2.03	33.750	2.03	45.75	53.00
9.833	2.03	21.833	2.03	33.833	2.03	45.83	53.00
9.917	2.03	21.917	2.03	33.917	2.03	45.92	53.00
10.000	2.03	22.000	2.03	34.000	2.03	46.00	53.00
10.083	2.03	22.083	2.03	34.083	2.03	46.08	38.02
10.167	2.03	22.167	2.03	34.167	2.03	46.17	38.00
10.250	2.03	22.250	2.03	34.250	2.03	46.25	38.00
10.333	2.03	22.333	2.03	34.333	2.03	46.33	38.00
10.417	2.03	22.417	2.03	34.417	2.03	46.42	38.00
10.500	2.03	22.500	2.03	34.500	2.03	46.50	38.00
10.583	2.03	22.583	2.03	34.583	2.03	46.58	38.00
10.667	2.03	22.667	2.03	34.667	2.03	46.67	38.00
10.750	2.03	22.750	2.03	34.750	2.03	46.75	38.00
10.833	2.03	22.833	2.03	34.833	2.03	46.83	38.00
10.917	2.03	22.917	2.03	34.917	2.03	46.92	38.00
11.000	2.03	23.000	2.03	35.000	2.03	47.00	38.00
11.083	2.03	23.083	2.03	35.083	2.00	47.08	13.04
11.167	2.03	23.167	2.03	35.167	2.00	47.17	13.00
11.250	2.03	23.250	2.03	35.250	2.00	47.25	13.00
11.333	2.03	23.333	2.03	35.333	2.00	47.33	13.00
11.417	2.03	23.417	2.03	35.417	2.00	47.42	13.00
11.500	2.03	23.500	2.03	35.500	2.00	47.50	13.00

11.583	2.03	23.583	2.03	35.583	2.00	47.58	13.00
11.667	2.03	23.667	2.03	35.667	2.00	47.67	13.00
11.750	2.03	23.750	2.03	35.750	2.00	47.75	13.00
11.833	2.03	23.833	2.03	35.833	2.00	47.83	13.00
11.917	2.03	23.917	2.03	35.917	2.00	47.92	13.00
12.000	2.03	24.000	2.03	36.000	2.00	48.00	13.00

Unit Hyd Qpeak (cms)= 4.850

PEAK FLOW (cms)= 6.349 (i)
TIME TO PEAK (hrs)= 47.917
RUNOFF VOLUME (mm)= 63.151
TOTAL RAINFALL (mm)= 284.981
RUNOFF COEFFICIENT = 0.222

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

CALIB NASHYD (0202)	Area (ha)= 316.08	Curve Number (CN)= 30.8
ID= 1 DT= 5.0 min	Ia (mm)= 7.79	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 1.99	

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.03	12.083	2.03	24.083	2.03	36.08	6.00
0.167	2.03	12.167	2.03	24.167	2.03	36.17	6.00
0.250	2.03	12.250	2.03	24.250	2.03	36.25	6.00
0.333	2.03	12.333	2.03	24.333	2.03	36.33	6.00
0.417	2.03	12.417	2.03	24.417	2.03	36.42	6.00
0.500	2.03	12.500	2.03	24.500	2.03	36.50	6.00
0.583	2.03	12.583	2.03	24.583	2.03	36.58	6.00
0.667	2.03	12.667	2.03	24.667	2.03	36.67	6.00
0.750	2.03	12.750	2.03	24.750	2.03	36.75	6.00
0.833	2.03	12.833	2.03	24.833	2.03	36.83	6.00
0.917	2.03	12.917	2.03	24.917	2.03	36.92	6.00
1.000	2.03	13.000	2.03	25.000	2.03	37.00	6.00
1.083	2.03	13.083	2.03	25.083	2.03	37.08	4.00
1.167	2.03	13.167	2.03	25.167	2.03	37.17	4.00
1.250	2.03	13.250	2.03	25.250	2.03	37.25	4.00
1.333	2.03	13.333	2.03	25.333	2.03	37.33	4.00
1.417	2.03	13.417	2.03	25.417	2.03	37.42	4.00
1.500	2.03	13.500	2.03	25.500	2.03	37.50	4.00
1.583	2.03	13.583	2.03	25.583	2.03	37.58	4.00
1.667	2.03	13.667	2.03	25.667	2.03	37.67	4.00

1.750	2.03	13.750	2.03	25.750	2.03	37.75	4.00
1.833	2.03	13.833	2.03	25.833	2.03	37.83	4.00
1.917	2.03	13.917	2.03	25.917	2.03	37.92	4.00
2.000	2.03	14.000	2.03	26.000	2.03	38.00	4.00
2.083	2.03	14.083	2.03	26.083	2.03	38.08	6.00
2.167	2.03	14.167	2.03	26.167	2.03	38.17	6.00
2.250	2.03	14.250	2.03	26.250	2.03	38.25	6.00
2.333	2.03	14.333	2.03	26.333	2.03	38.33	6.00
2.417	2.03	14.417	2.03	26.417	2.03	38.42	6.00
2.500	2.03	14.500	2.03	26.500	2.03	38.50	6.00
2.583	2.03	14.583	2.03	26.583	2.03	38.58	6.00
2.667	2.03	14.667	2.03	26.667	2.03	38.67	6.00
2.750	2.03	14.750	2.03	26.750	2.03	38.75	6.00
2.833	2.03	14.833	2.03	26.833	2.03	38.83	6.00
2.917	2.03	14.917	2.03	26.917	2.03	38.92	6.00
3.000	2.03	15.000	2.03	27.000	2.03	39.00	6.00
3.083	2.03	15.083	2.03	27.083	2.03	39.08	13.00
3.167	2.03	15.167	2.03	27.167	2.03	39.17	13.00
3.250	2.03	15.250	2.03	27.250	2.03	39.25	13.00
3.333	2.03	15.333	2.03	27.333	2.03	39.33	13.00
3.417	2.03	15.417	2.03	27.417	2.03	39.42	13.00
3.500	2.03	15.500	2.03	27.500	2.03	39.50	13.00
3.583	2.03	15.583	2.03	27.583	2.03	39.58	13.00
3.667	2.03	15.667	2.03	27.667	2.03	39.67	13.00
3.750	2.03	15.750	2.03	27.750	2.03	39.75	13.00
3.833	2.03	15.833	2.03	27.833	2.03	39.83	13.00
3.917	2.03	15.917	2.03	27.917	2.03	39.92	13.00
4.000	2.03	16.000	2.03	28.000	2.03	40.00	13.00
4.083	2.03	16.083	2.03	28.083	2.03	40.08	17.00
4.167	2.03	16.167	2.03	28.167	2.03	40.17	17.00
4.250	2.03	16.250	2.03	28.250	2.03	40.25	17.00
4.333	2.03	16.333	2.03	28.333	2.03	40.33	17.00
4.417	2.03	16.417	2.03	28.417	2.03	40.42	17.00
4.500	2.03	16.500	2.03	28.500	2.03	40.50	17.00
4.583	2.03	16.583	2.03	28.583	2.03	40.58	17.00
4.667	2.03	16.667	2.03	28.667	2.03	40.67	17.00
4.750	2.03	16.750	2.03	28.750	2.03	40.75	17.00
4.833	2.03	16.833	2.03	28.833	2.03	40.83	17.00
4.917	2.03	16.917	2.03	28.917	2.03	40.92	17.00
5.000	2.03	17.000	2.03	29.000	2.03	41.00	17.00
5.083	2.03	17.083	2.03	29.083	2.03	41.08	13.00
5.167	2.03	17.167	2.03	29.167	2.03	41.17	13.00
5.250	2.03	17.250	2.03	29.250	2.03	41.25	13.00
5.333	2.03	17.333	2.03	29.333	2.03	41.33	13.00
5.417	2.03	17.417	2.03	29.417	2.03	41.42	13.00
5.500	2.03	17.500	2.03	29.500	2.03	41.50	13.00
5.583	2.03	17.583	2.03	29.583	2.03	41.58	13.00
5.667	2.03	17.667	2.03	29.667	2.03	41.67	13.00
5.750	2.03	17.750	2.03	29.750	2.03	41.75	13.00
5.833	2.03	17.833	2.03	29.833	2.03	41.83	13.00

5.917	2.03	17.917	2.03	29.917	2.03	41.92	13.00
6.000	2.03	18.000	2.03	30.000	2.03	42.00	13.00
6.083	2.03	18.083	2.03	30.083	2.03	42.08	22.99
6.167	2.03	18.167	2.03	30.167	2.03	42.17	23.00
6.250	2.03	18.250	2.03	30.250	2.03	42.25	23.00
6.333	2.03	18.333	2.03	30.333	2.03	42.33	23.00
6.417	2.03	18.417	2.03	30.417	2.03	42.42	23.00
6.500	2.03	18.500	2.03	30.500	2.03	42.50	23.00
6.583	2.03	18.583	2.03	30.583	2.03	42.58	23.00
6.667	2.03	18.667	2.03	30.667	2.03	42.67	23.00
6.750	2.03	18.750	2.03	30.750	2.03	42.75	23.00
6.833	2.03	18.833	2.03	30.833	2.03	42.83	23.00
6.917	2.03	18.917	2.03	30.917	2.03	42.92	23.00
7.000	2.03	19.000	2.03	31.000	2.03	43.00	23.00
7.083	2.03	19.083	2.03	31.083	2.03	43.08	13.01
7.167	2.03	19.167	2.03	31.167	2.03	43.17	13.00
7.250	2.03	19.250	2.03	31.250	2.03	43.25	13.00
7.333	2.03	19.333	2.03	31.333	2.03	43.33	13.00
7.417	2.03	19.417	2.03	31.417	2.03	43.42	13.00
7.500	2.03	19.500	2.03	31.500	2.03	43.50	13.00
7.583	2.03	19.583	2.03	31.583	2.03	43.58	13.00
7.667	2.03	19.667	2.03	31.667	2.03	43.67	13.00
7.750	2.03	19.750	2.03	31.750	2.03	43.75	13.00
7.833	2.03	19.833	2.03	31.833	2.03	43.83	13.00
7.917	2.03	19.917	2.03	31.917	2.03	43.92	13.00
8.000	2.03	20.000	2.03	32.000	2.03	44.00	13.00
8.083	2.03	20.083	2.03	32.083	2.03	44.08	13.00
8.167	2.03	20.167	2.03	32.167	2.03	44.17	13.00
8.250	2.03	20.250	2.03	32.250	2.03	44.25	13.00
8.333	2.03	20.333	2.03	32.333	2.03	44.33	13.00
8.417	2.03	20.417	2.03	32.417	2.03	44.42	13.00
8.500	2.03	20.500	2.03	32.500	2.03	44.50	13.00
8.583	2.03	20.583	2.03	32.583	2.03	44.58	13.00
8.667	2.03	20.667	2.03	32.667	2.03	44.67	13.00
8.750	2.03	20.750	2.03	32.750	2.03	44.75	13.00
8.833	2.03	20.833	2.03	32.833	2.03	44.83	13.00
8.917	2.03	20.917	2.03	32.917	2.03	44.92	13.00
9.000	2.03	21.000	2.03	33.000	2.03	45.00	13.00
9.083	2.03	21.083	2.03	33.083	2.03	45.08	52.95
9.167	2.03	21.167	2.03	33.167	2.03	45.17	53.00
9.250	2.03	21.250	2.03	33.250	2.03	45.25	53.00
9.333	2.03	21.333	2.03	33.333	2.03	45.33	53.00
9.417	2.03	21.417	2.03	33.417	2.03	45.42	53.00
9.500	2.03	21.500	2.03	33.500	2.03	45.50	53.00
9.583	2.03	21.583	2.03	33.583	2.03	45.58	53.00
9.667	2.03	21.667	2.03	33.667	2.03	45.67	53.00
9.750	2.03	21.750	2.03	33.750	2.03	45.75	53.00
9.833	2.03	21.833	2.03	33.833	2.03	45.83	53.00
9.917	2.03	21.917	2.03	33.917	2.03	45.92	53.00
10.000	2.03	22.000	2.03	34.000	2.03	46.00	53.00

10.083	2.03	22.083	2.03	34.083	2.03	46.08	38.02
10.167	2.03	22.167	2.03	34.167	2.03	46.17	38.00
10.250	2.03	22.250	2.03	34.250	2.03	46.25	38.00
10.333	2.03	22.333	2.03	34.333	2.03	46.33	38.00
10.417	2.03	22.417	2.03	34.417	2.03	46.42	38.00
10.500	2.03	22.500	2.03	34.500	2.03	46.50	38.00
10.583	2.03	22.583	2.03	34.583	2.03	46.58	38.00
10.667	2.03	22.667	2.03	34.667	2.03	46.67	38.00
10.750	2.03	22.750	2.03	34.750	2.03	46.75	38.00
10.833	2.03	22.833	2.03	34.833	2.03	46.83	38.00
10.917	2.03	22.917	2.03	34.917	2.03	46.92	38.00
11.000	2.03	23.000	2.03	35.000	2.03	47.00	38.00
11.083	2.03	23.083	2.03	35.083	2.00	47.08	13.04
11.167	2.03	23.167	2.03	35.167	2.00	47.17	13.00
11.250	2.03	23.250	2.03	35.250	2.00	47.25	13.00
11.333	2.03	23.333	2.03	35.333	2.00	47.33	13.00
11.417	2.03	23.417	2.03	35.417	2.00	47.42	13.00
11.500	2.03	23.500	2.03	35.500	2.00	47.50	13.00
11.583	2.03	23.583	2.03	35.583	2.00	47.58	13.00
11.667	2.03	23.667	2.03	35.667	2.00	47.67	13.00
11.750	2.03	23.750	2.03	35.750	2.00	47.75	13.00
11.833	2.03	23.833	2.03	35.833	2.00	47.83	13.00
11.917	2.03	23.917	2.03	35.917	2.00	47.92	13.00
12.000	2.03	24.000	2.03	36.000	2.00	48.00	13.00

Unit Hyd Qpeak (cms)= 6.067

PEAK FLOW (cms)= 12.012 (i)
TIME TO PEAK (hrs)= 48.167
RUNOFF VOLUME (mm)= 90.478
TOTAL RAINFALL (mm)= 284.981
RUNOFF COEFFICIENT = 0.317

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0008)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0200):	162.50	4.180	47.58	49.34
+ ID2= 2 (0201):	215.88	6.349	47.92	63.15
ID = 3 (0008):	378.38	10.472	47.75	57.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0008)|
| 3 + 2 = 1 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0008):	378.38	10.472	47.75	57.22
+ ID2= 2 (0202):	316.08	12.012	48.17	90.48
ID = 1 (0008):	694.46	22.341	47.92	72.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

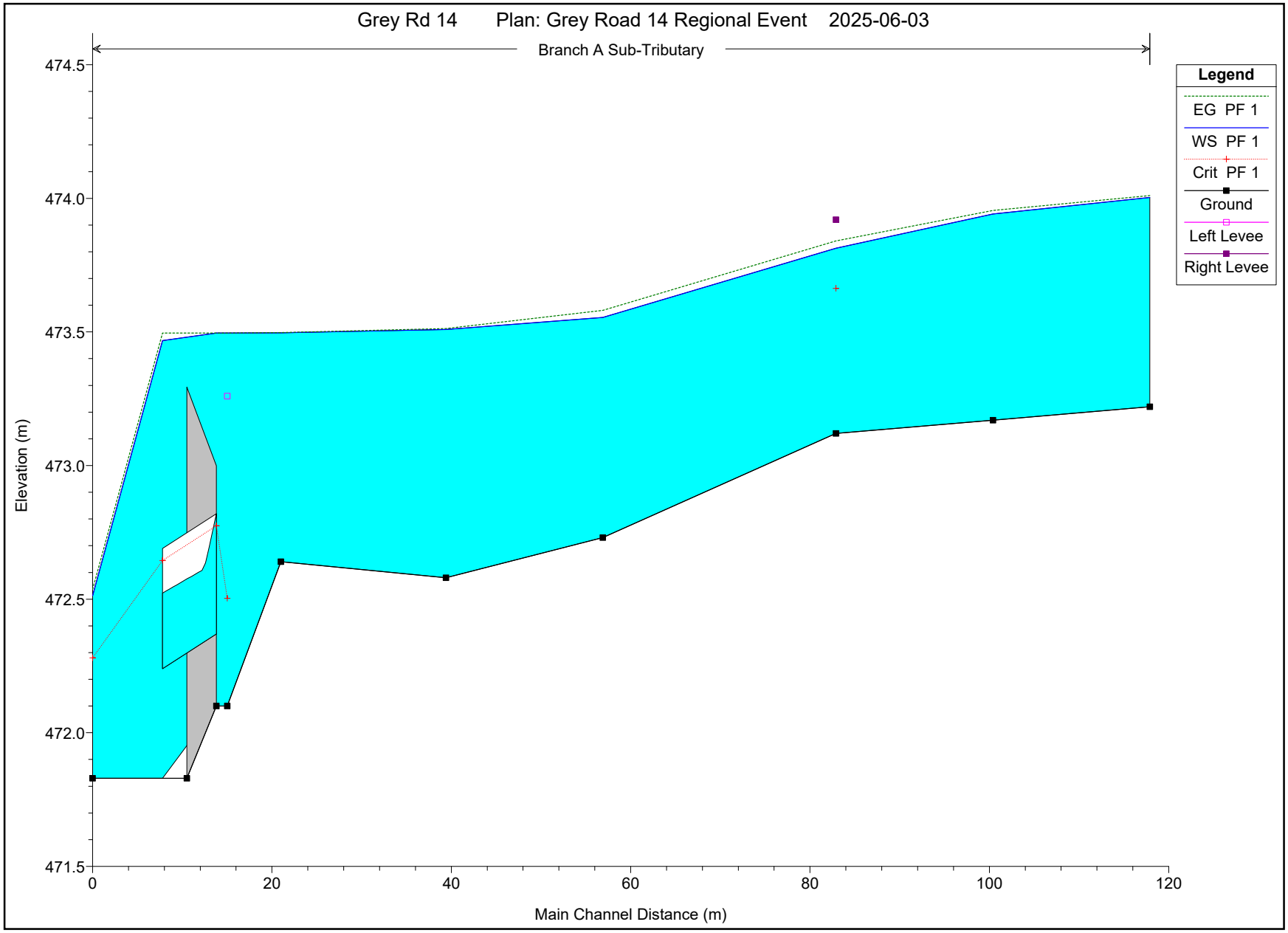
Appendix C HEC-RAS Output

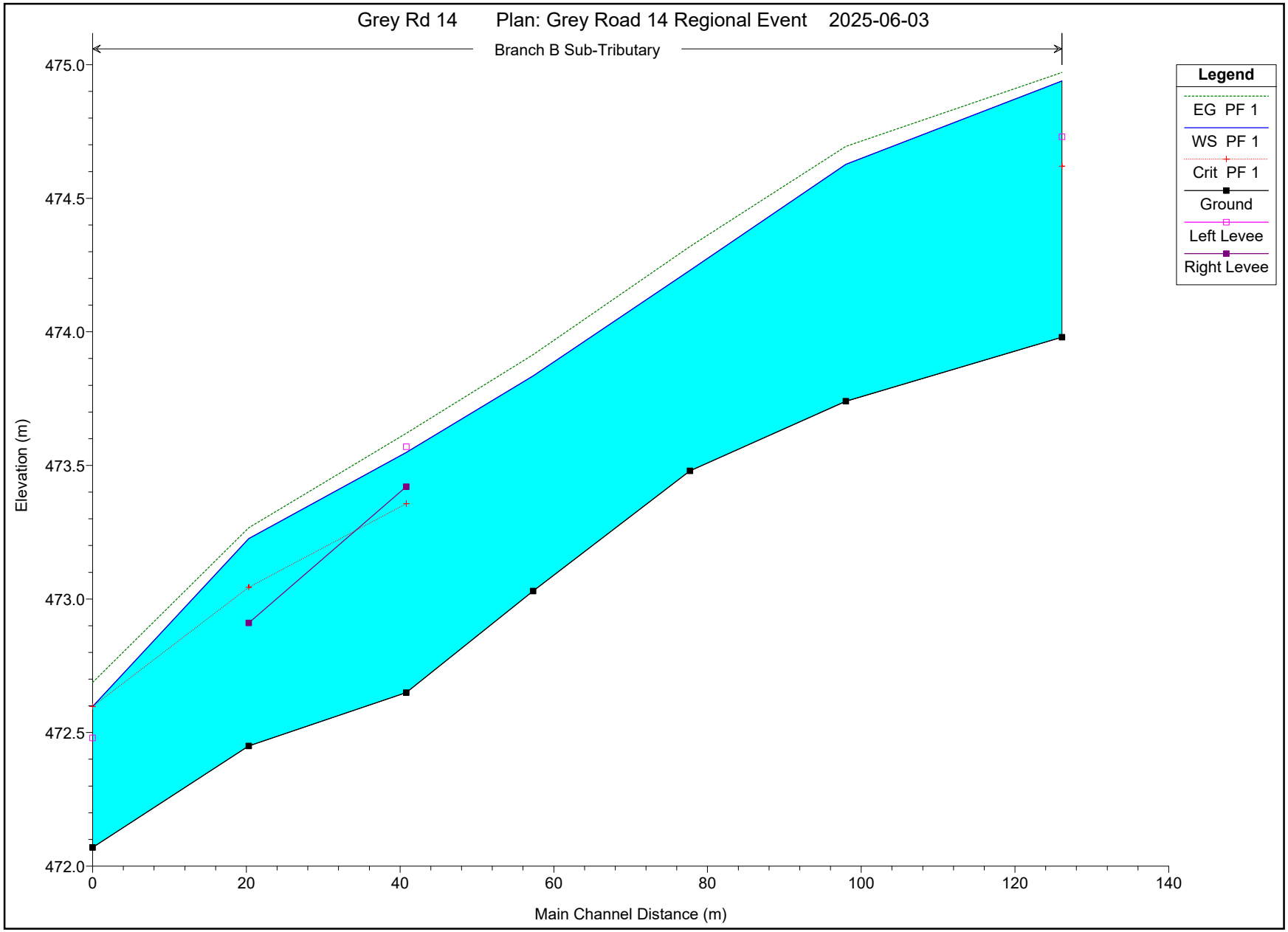
C.1. Hec-Ras Cross-sections Table

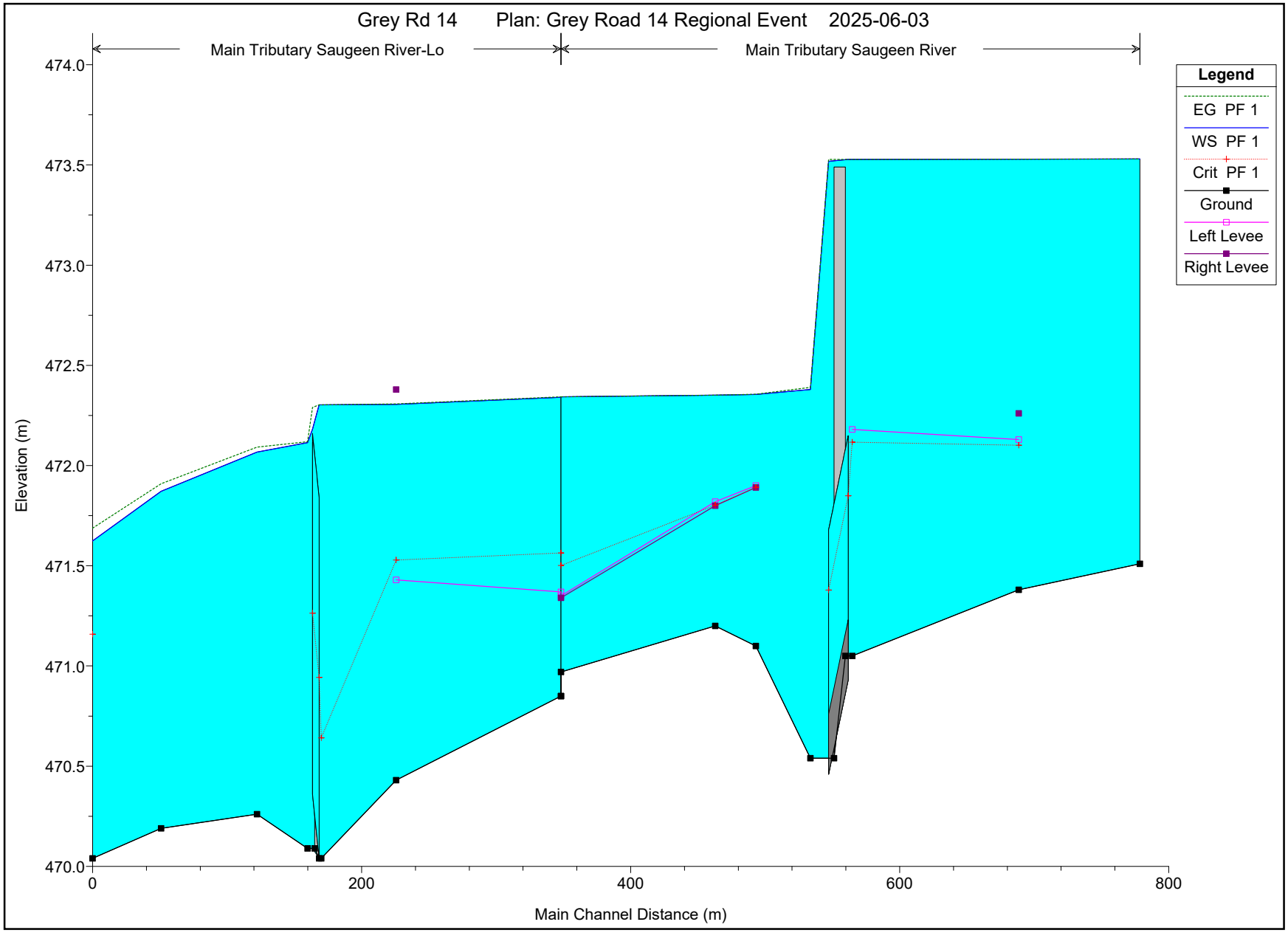
HEC-RAS Plan: Regional #2 Profile: PF 1

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Main Tributary	Saugeen River	896	PF 1	12.01	471.51	473.53		473.53	0.000067	0.16	163.07	220.89	0.04
Main Tributary	Saugeen River	806	PF 1	12.01	471.38	473.53	472.10	473.53	0.000006	0.05	471.03	493.21	0.01
Main Tributary	Saugeen River	683	PF 1	12.01	471.05	473.53	472.12	473.53	0.000006	0.05	471.01	484.86	0.01
Main Tributary	Saugeen River	664		Culvert									
Main Tributary	Saugeen River	651	PF 1	12.01	470.54	472.38		472.39	0.003621	0.45	30.19	124.98	0.23
Main Tributary	Saugeen River	611	PF 1	12.01	471.10	472.36	471.89	472.36	0.000299	0.17	77.43	167.89	0.07
Main Tributary	Saugeen River	581	PF 1	12.01	471.20	472.35	471.80	472.35	0.000096	0.11	133.17	245.07	0.04
Main Tributary	Saugeen River	466	PF 1	12.01	470.97	472.34	471.50	472.34	0.000056	0.09	148.22	201.82	0.03
Main Tributary	Saugeen River-Lo	366	PF 1	22.34	470.85	472.34	471.56	472.34	0.000301	0.23	130.36	194.46	0.08
Main Tributary	Saugeen River-Lo	244	PF 1	22.34	470.43	472.31	471.53	472.31	0.000273	0.24	137.54	192.43	0.08
Main Tributary	Saugeen River-Lo	188	PF 1	22.34	470.04	472.30	470.64	472.30	0.000032	0.13	286.53	234.63	0.03
Main Tributary	Saugeen River-Lo	183		Culvert									
Main Tributary	Saugeen River-Lo	178	PF 1	22.34	470.09	472.11		472.12	0.000270	0.32	90.31	83.79	0.08
Main Tributary	Saugeen River-Lo	140	PF 1	22.34	470.26	472.07		472.09	0.002036	0.73	39.39	59.30	0.21
Main Tributary	Saugeen River-Lo	68	PF 1	22.34	470.19	471.87		471.91	0.003241	0.91	30.96	45.06	0.27
Main Tributary	Saugeen River-Lo	17	PF 1	22.34	470.04	471.62	471.16	471.69	0.006008	1.24	26.64	47.55	0.36
Branch B	Sub-Tributary	268	PF 1	6.35	473.98	474.94	474.62	474.97	0.006891	0.87	9.26	20.35	0.35
Branch B	Sub-Tributary	240	PF 1	6.35	473.74	474.63		474.69	0.014806	1.25	6.38	14.82	0.51
Branch B	Sub-Tributary	219	PF 1	6.35	473.48	474.23		474.32	0.023355	1.32	4.80	10.00	0.61
Branch B	Sub-Tributary	199	PF 1	6.35	473.03	473.84		473.91	0.016933	1.28	5.74	15.71	0.54
Branch B	Sub-Tributary	182	PF 1	6.35	472.65	473.55	473.36	473.62	0.018651	1.24	6.34	23.27	0.55
Branch B	Sub-Tributary	162	PF 1	6.35	472.45	473.23	473.04	473.27	0.015161	1.05	8.27	26.70	0.49
Branch B	Sub-Tributary	142	PF 1	6.35	472.07	472.60	472.60	472.69	0.070040	1.65	5.80	31.72	0.98
Branch A	Sub-Tributary	146	PF 1	4.18	473.22	474.00		474.01	0.002377	0.44	15.10	53.13	0.20
Branch A	Sub-Tributary	129	PF 1	4.18	473.17	473.94		473.95	0.004329	0.59	11.05	44.35	0.27
Branch A	Sub-Tributary	111	PF 1	4.18	473.12	473.81	473.66	473.84	0.010225	0.81	7.95	45.67	0.40
Branch A	Sub-Tributary	85	PF 1	4.18	472.73	473.55		473.58	0.009764	0.81	8.73	68.12	0.39
Branch A	Sub-Tributary	68	PF 1	4.18	472.58	473.51		473.51	0.001778	0.38	21.23	95.92	0.17
Branch A	Sub-Tributary	49	PF 1	4.18	472.64	473.50		473.50	0.000448	0.18	33.76	86.18	0.08
Branch A	Sub-Tributary	44	PF 1	4.18	472.10	473.50	472.50	473.50	0.000076	0.13	54.46	89.43	0.04
Branch A	Sub-Tributary	36		Culvert									
Branch A	Sub-Tributary	29	PF 1	4.18	471.83	472.51	472.28	472.54	0.008013	0.72	6.66	20.17	0.35

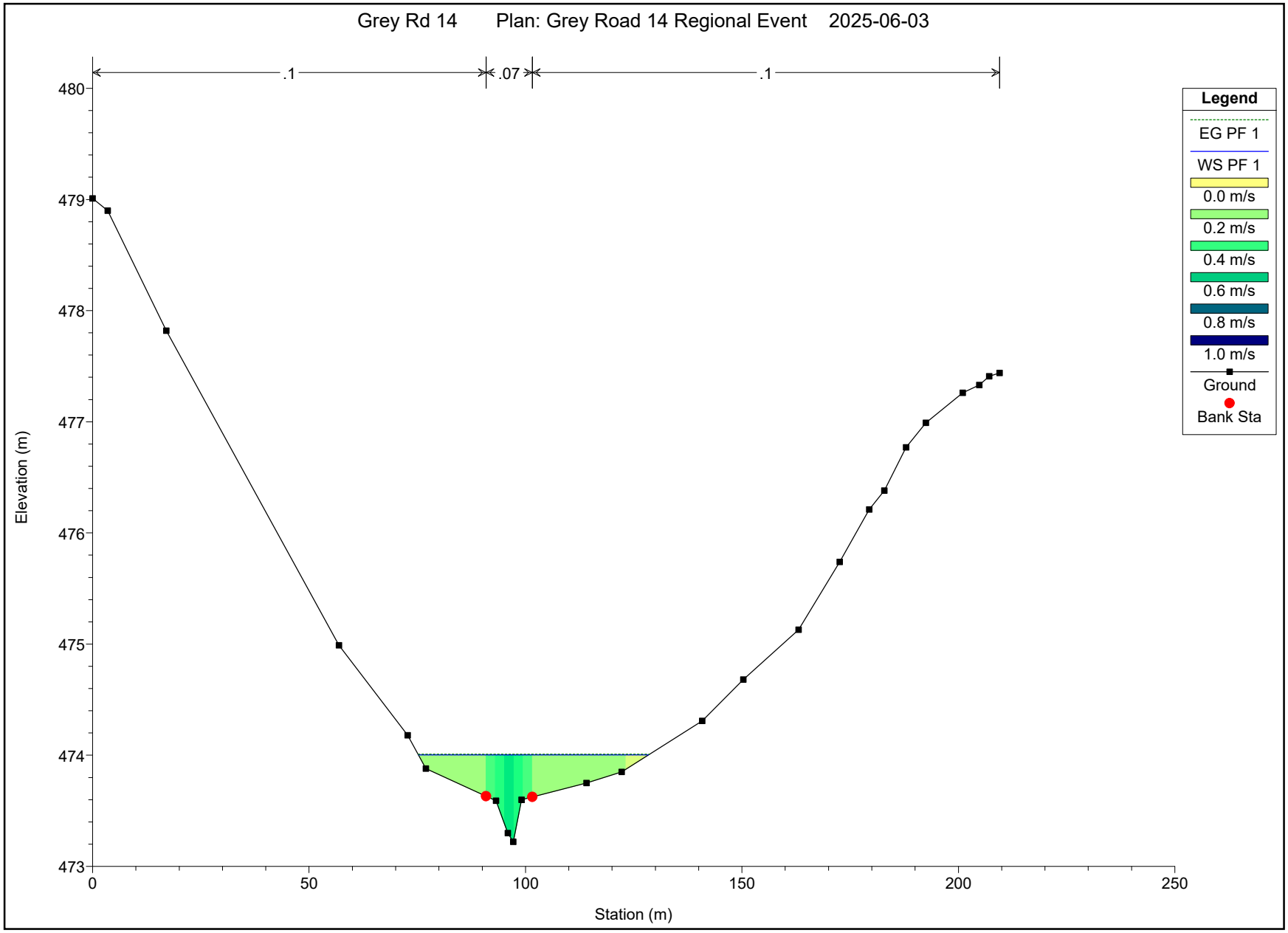
C.2. Hec-Ras Tributary Profile

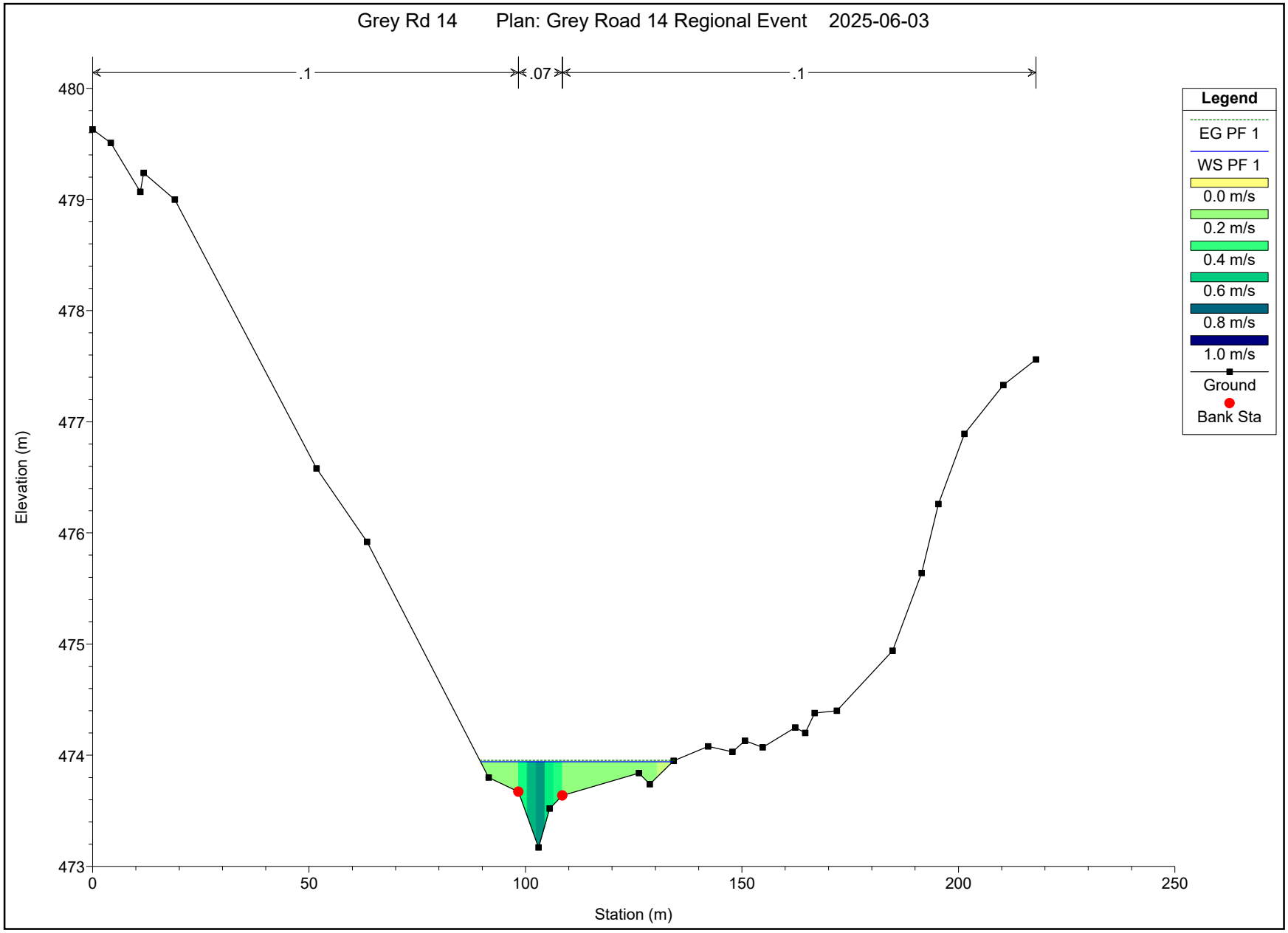

Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
Branch A Sub-Tributary
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Left Levee
Right Levee
Elevation (m)
474.5
474.0
473.5
473.0
472.5
472.0
471.5
0
20
40
60
80
100
120
Main Channel Distance (m)

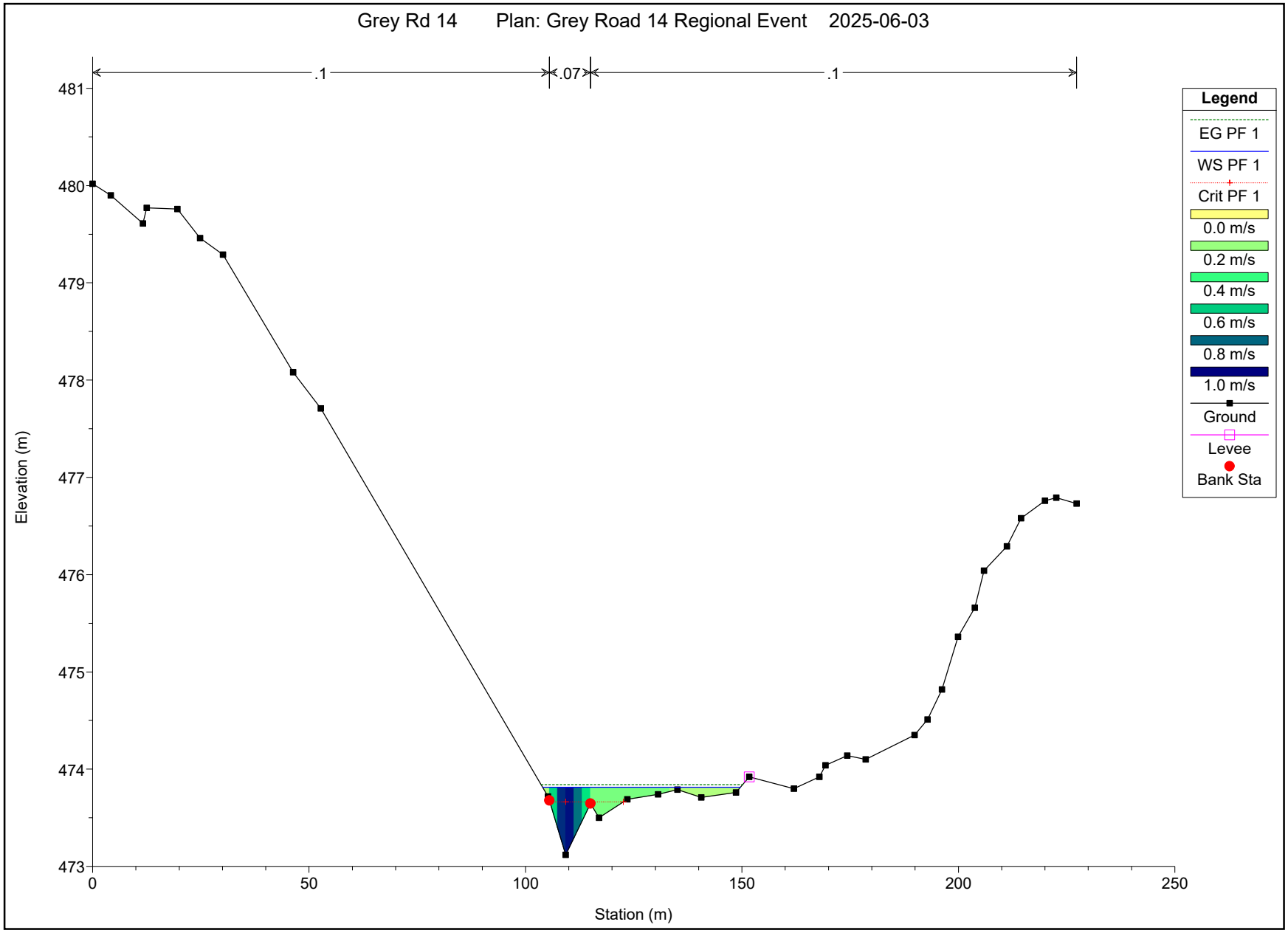

Grey Rd 14
Plan: Grey Road 14 Regional Event
2025-06-03
Branch B Sub-Tributary
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Left Levee
Right Levee
Elevation (m)
475.0
474.5
474.0
473.5
473.0
472.5
472.0
0
20
40
60
80
100
120
140
Main Channel Distance (m)

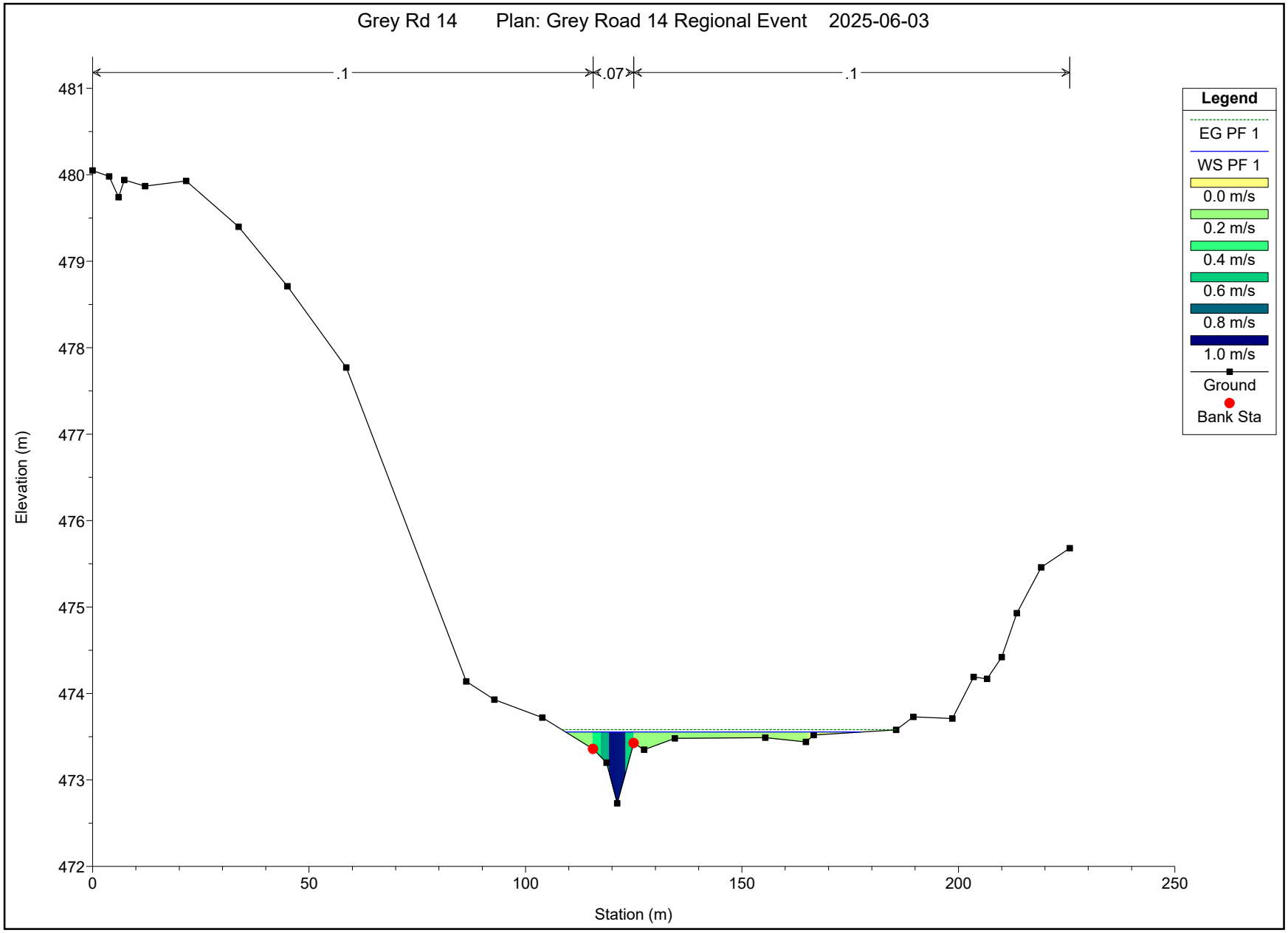

Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
Main Tributary Saugeen River-Lo
Main Tributary Saugeen River
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Left Levee
Right Levee
Elevation (m)
474.0
473.5
473.0
472.5
472.0
471.5
471.0
470.5
470.0
0
200
400
600
800
Main Channel Distance (m)

C.3. Hec-Ras Cross-sections


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
480
479
478
477
476
475
474
473
Elevation (m)
0
50
100
150
200
250
Station (m)
Legend
EG PF 1
WS PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Bank Sta


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
480
479
478
477
476
475
474
473
Elevation (m)
0
50
100
150
200
250
Station (m)
Legend
EG PF 1
WS PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Bank Sta


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
Legend
EG PF 1
WS PF 1
Crit PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Levee
Bank Sta
Elevation (m)
481
480
479
478
477
476
475
474
473
0
50
100
150
200
250
Station (m)


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
Legend
EG PF 1
WS PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Bank Sta
Elevation (m)
481
480
479
478
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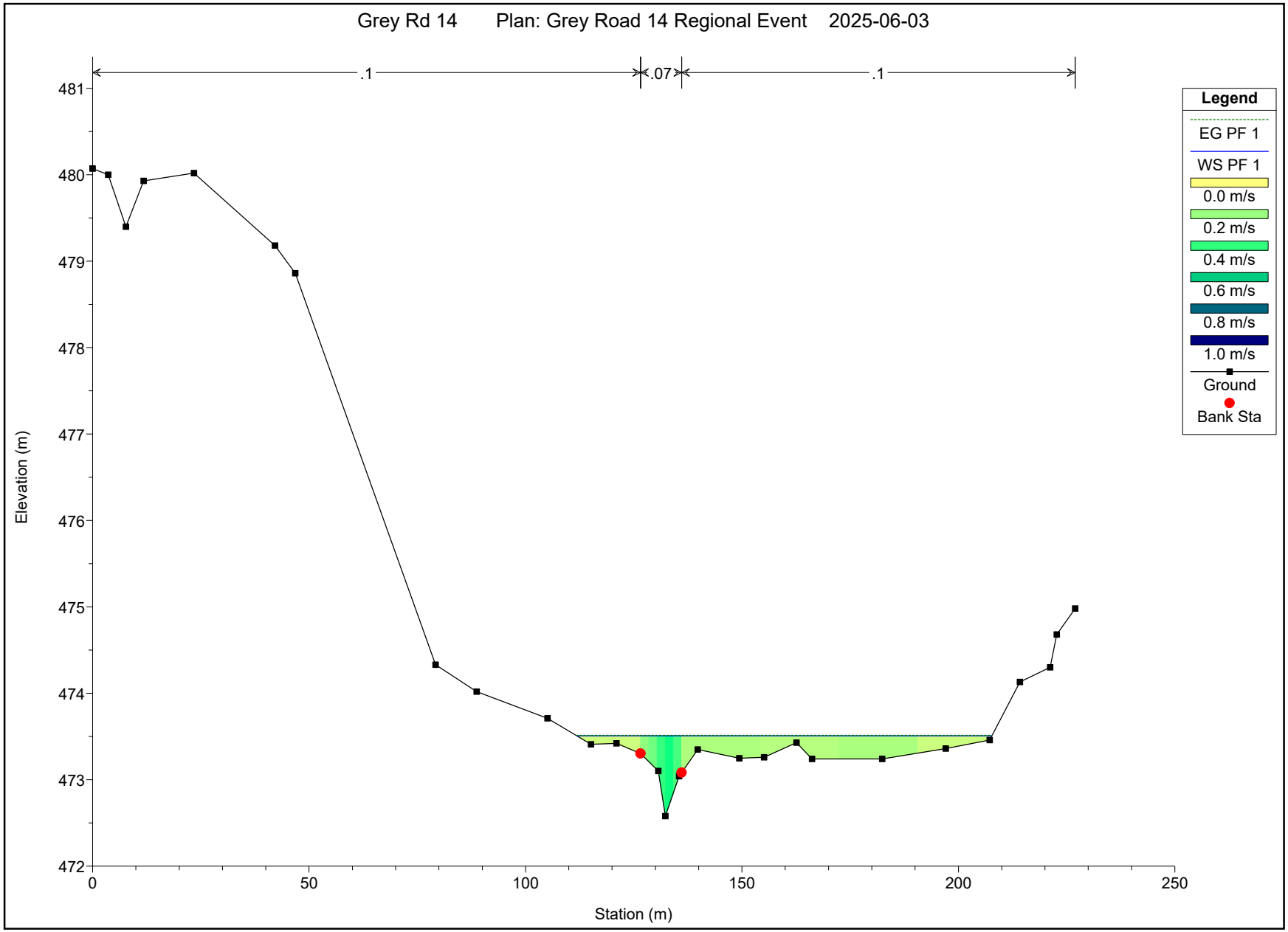
476
475
474
473
472
0
50
100
150
200
250
Station (m)


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
Legend
EG PF 1
WS PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Bank Sta
Elevation (m)
481
480
479
478
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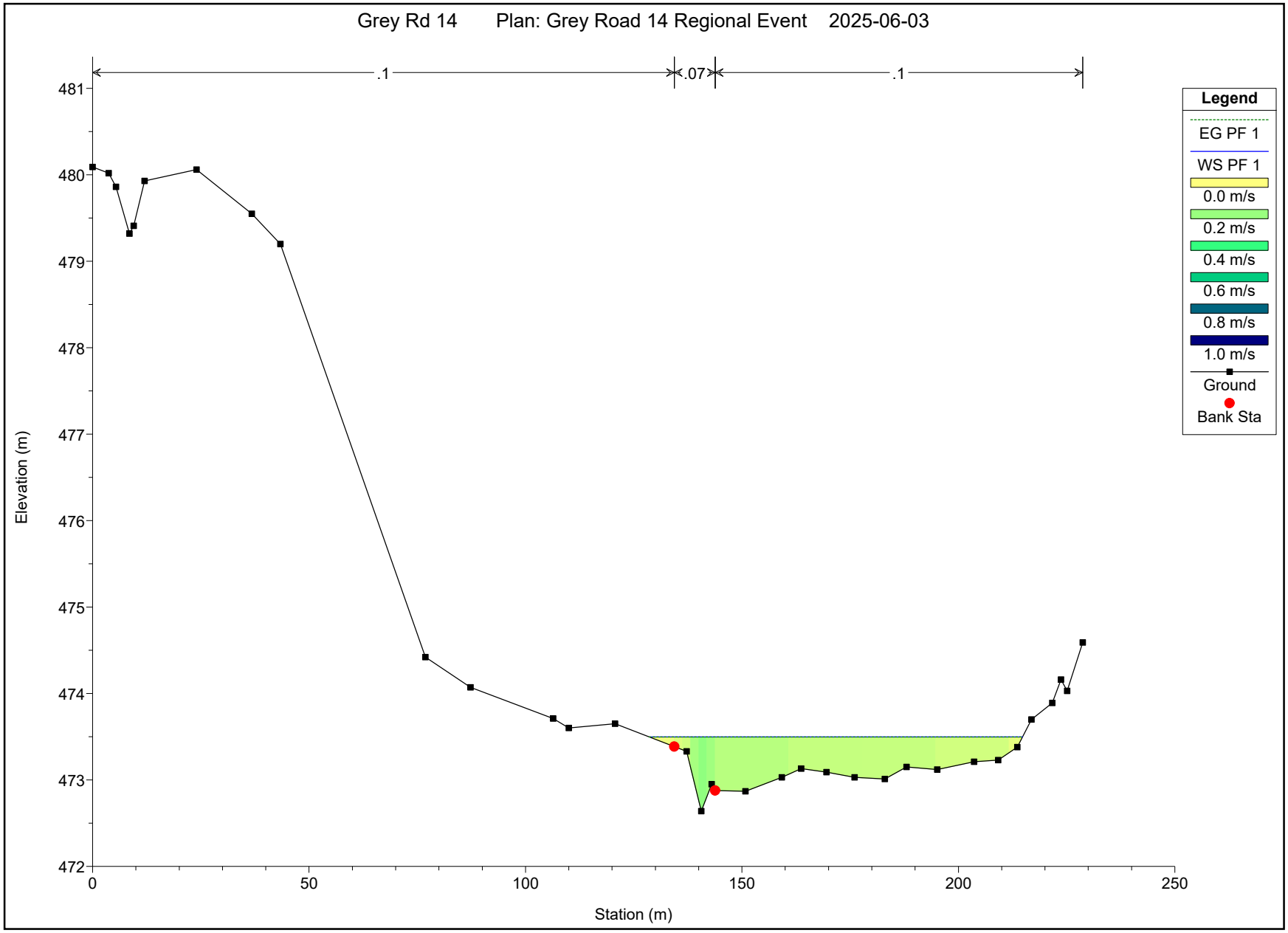
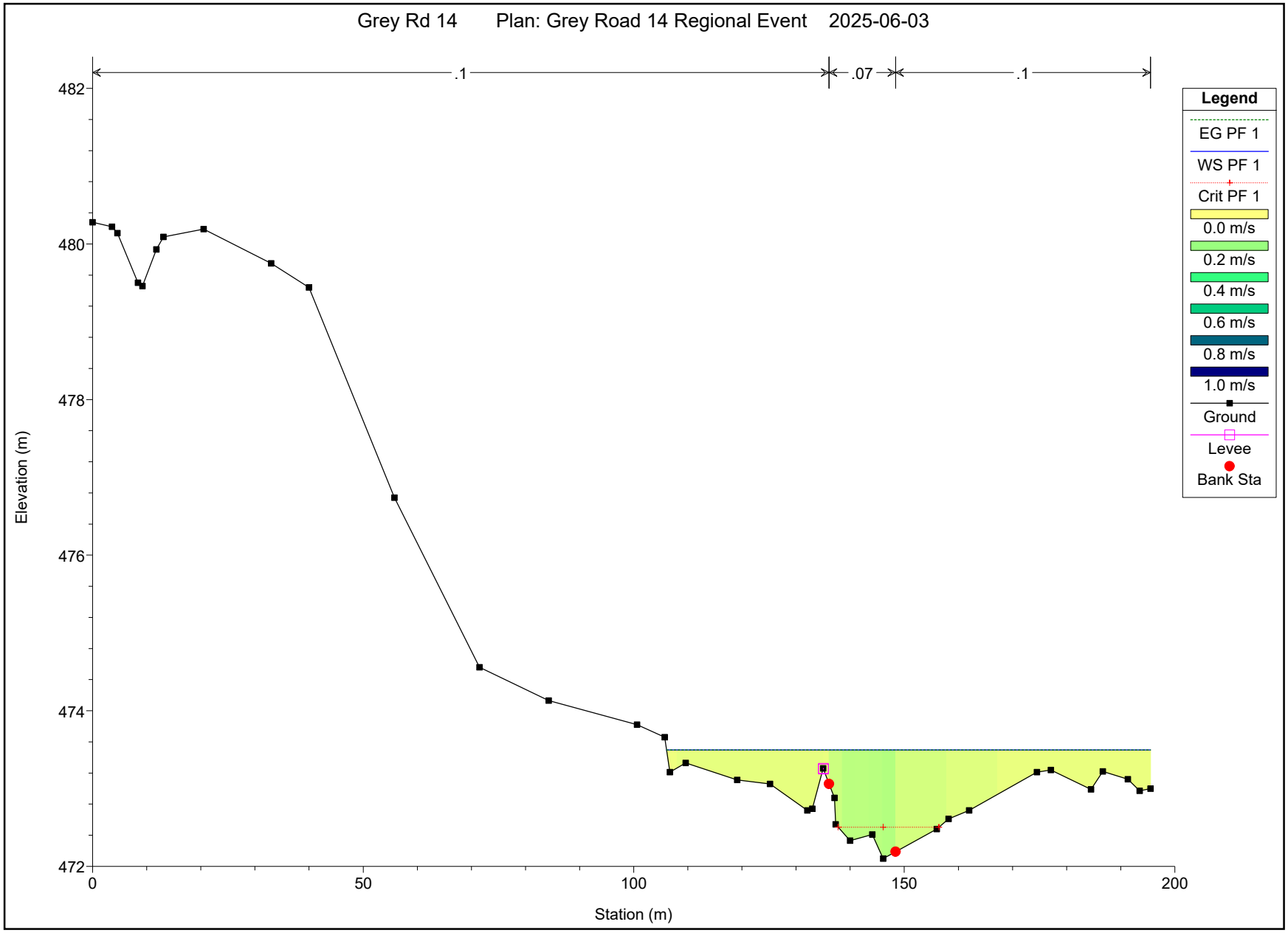
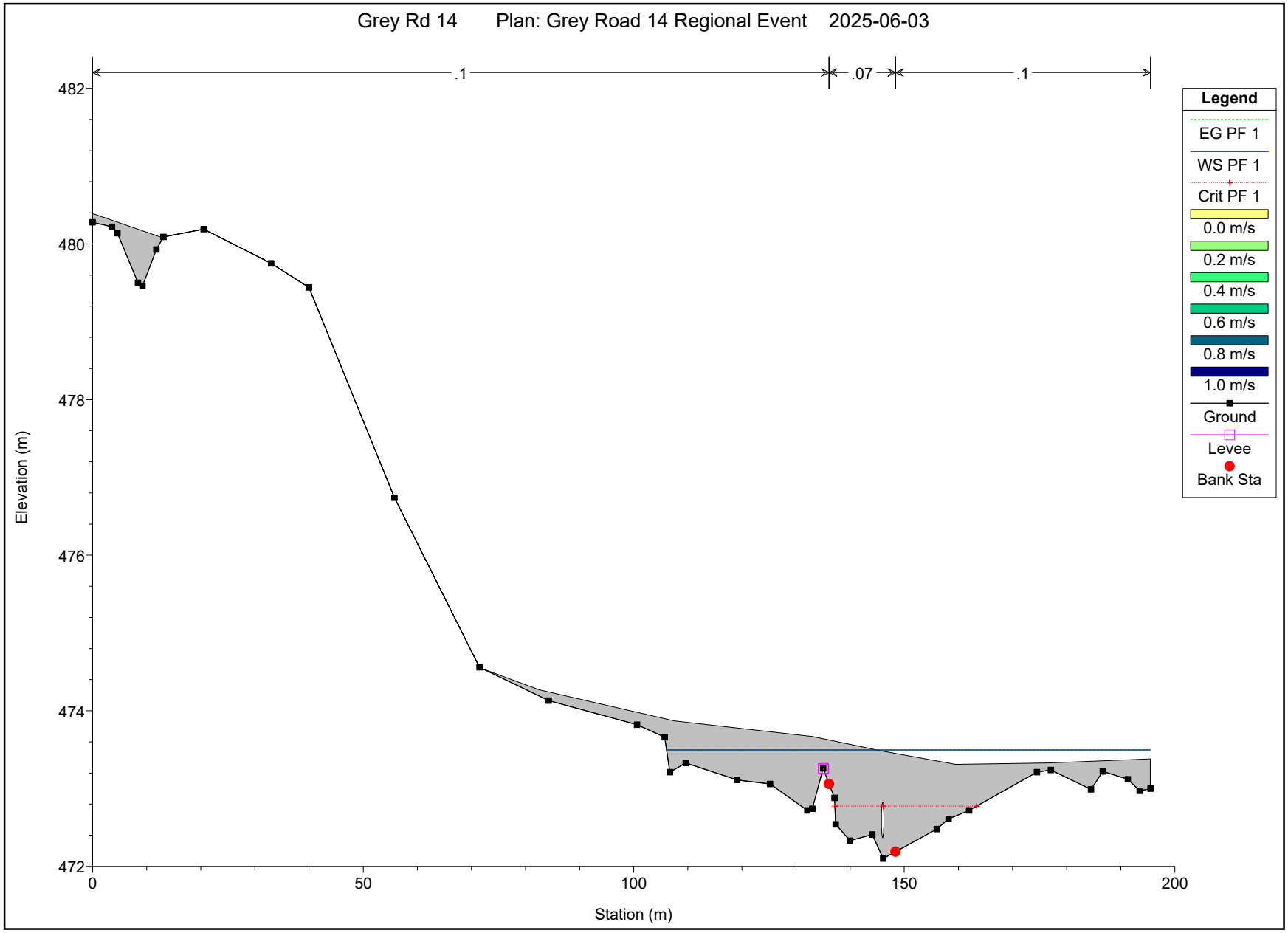
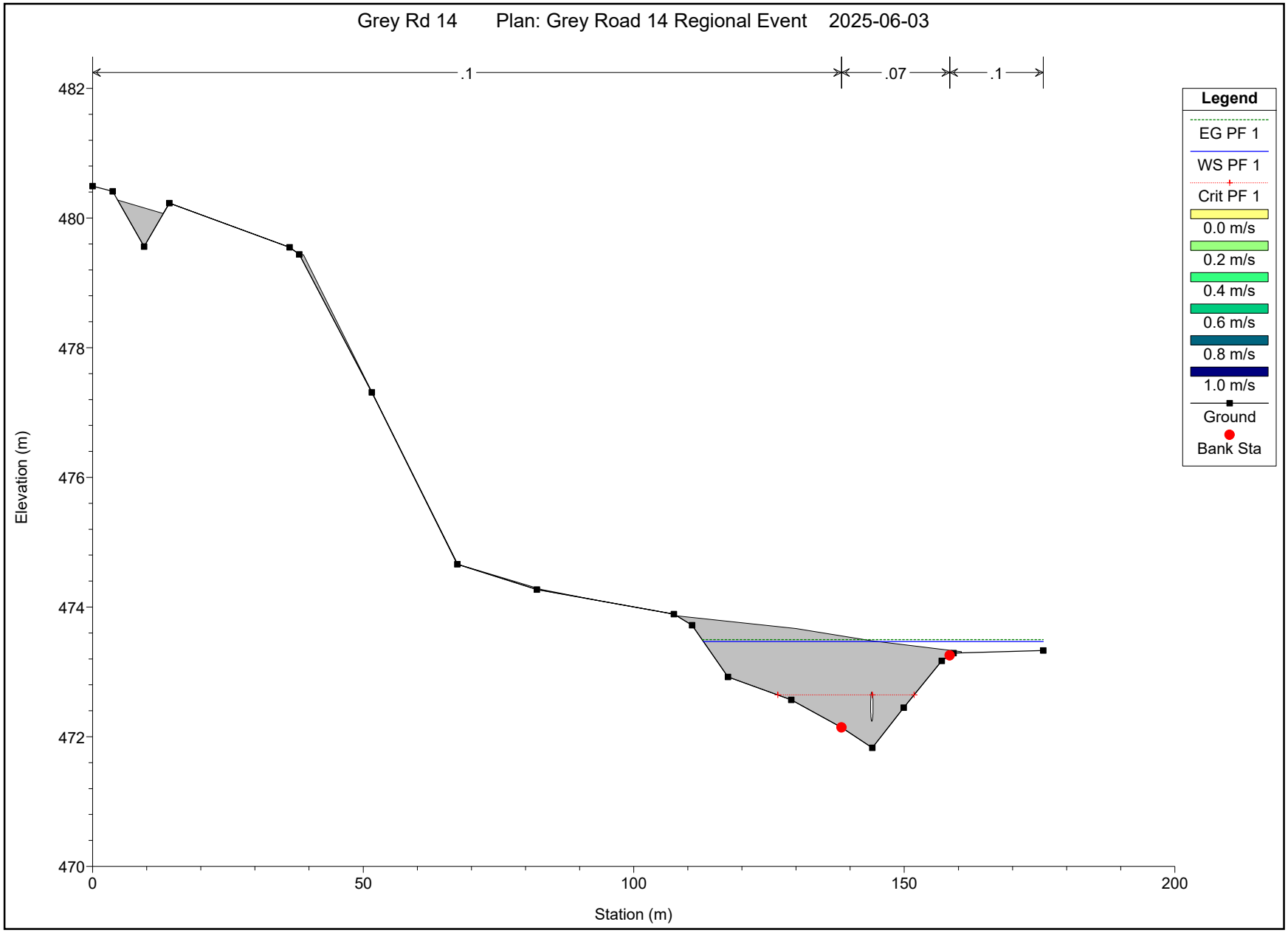
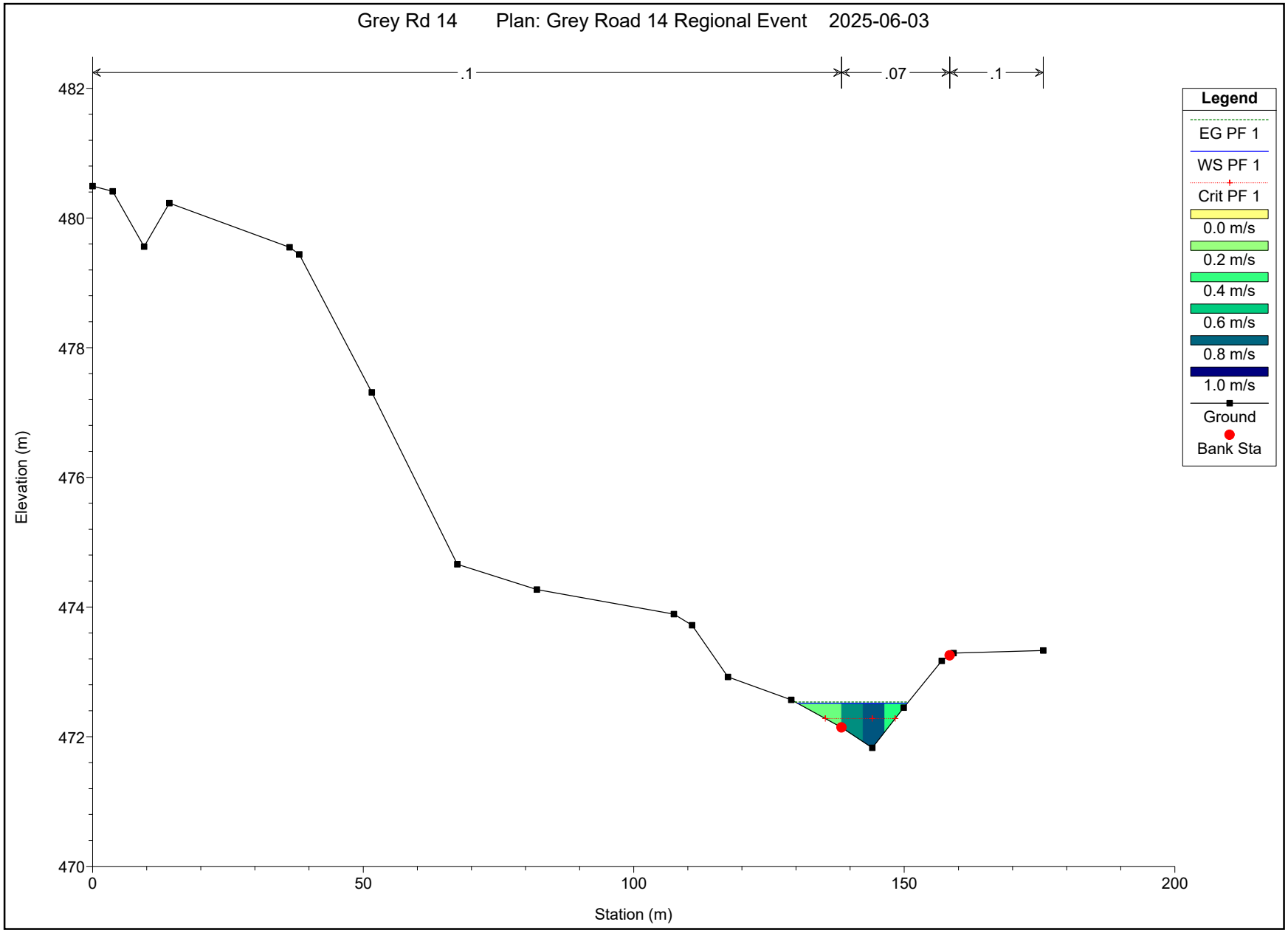
476
475
474
473
472
0
50
100
150
200
250
Station (m)

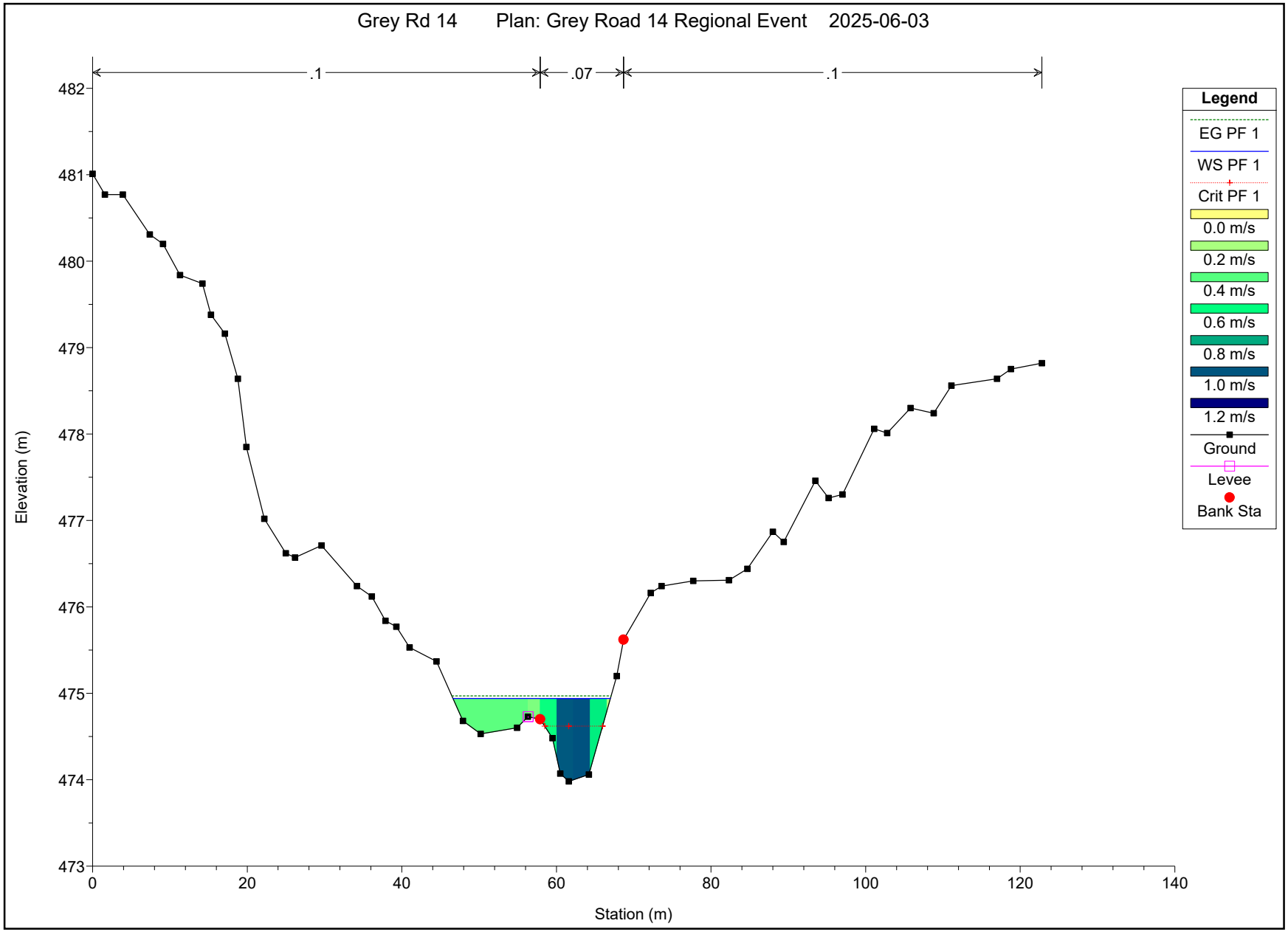

Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
Legend
EG PF 1
WS PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Bank Sta
Elevation (m)
481
480
479
478
477
476
475
474
473
472
0
50
100
150
200
250
Station (m)

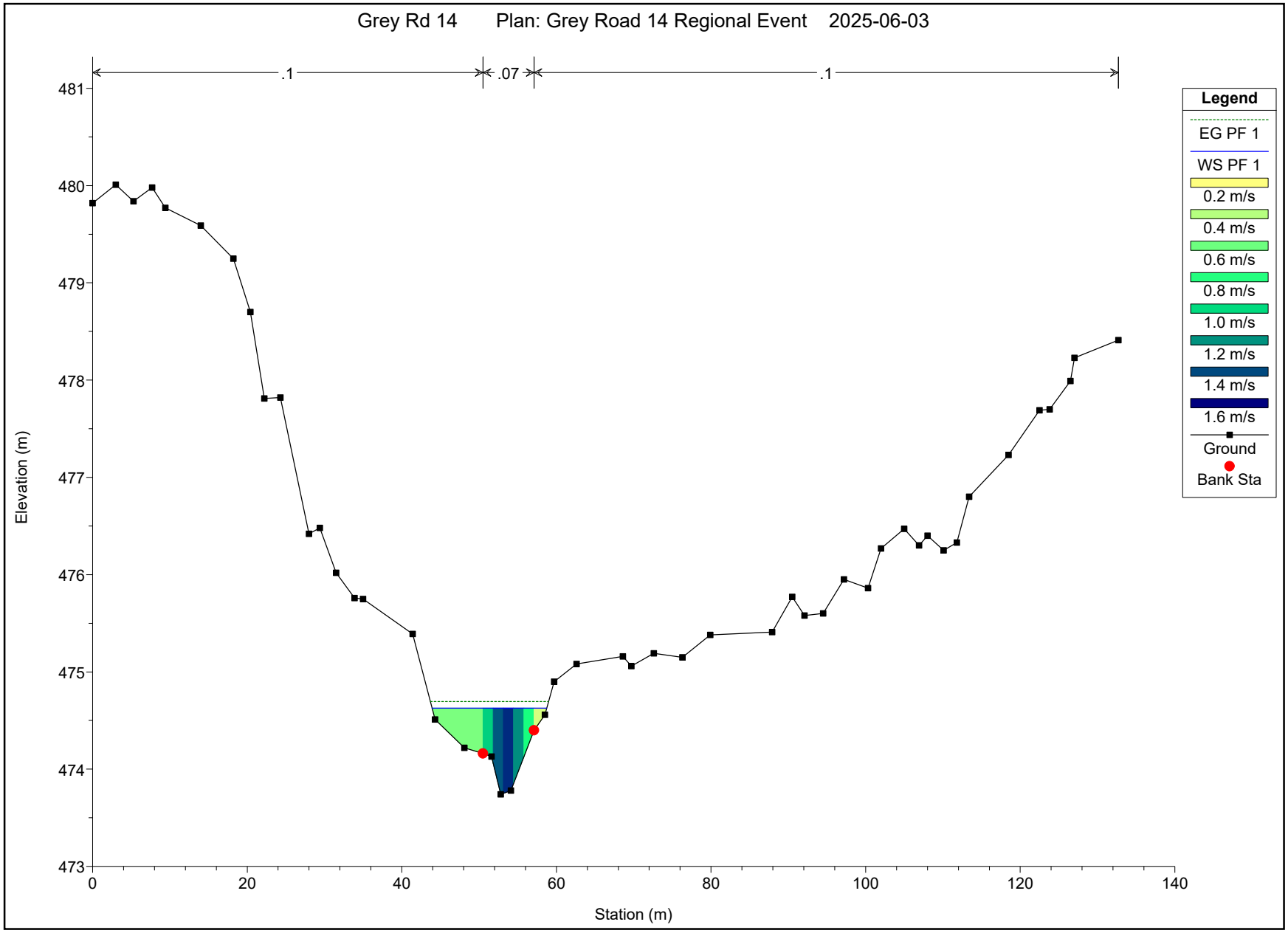

Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
482
480
478
476
474
472
Elevation (m)
0
50
100
150
200
Station (m)
Legend
EG PF 1
WS PF 1
Crit PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Levee
Bank Sta

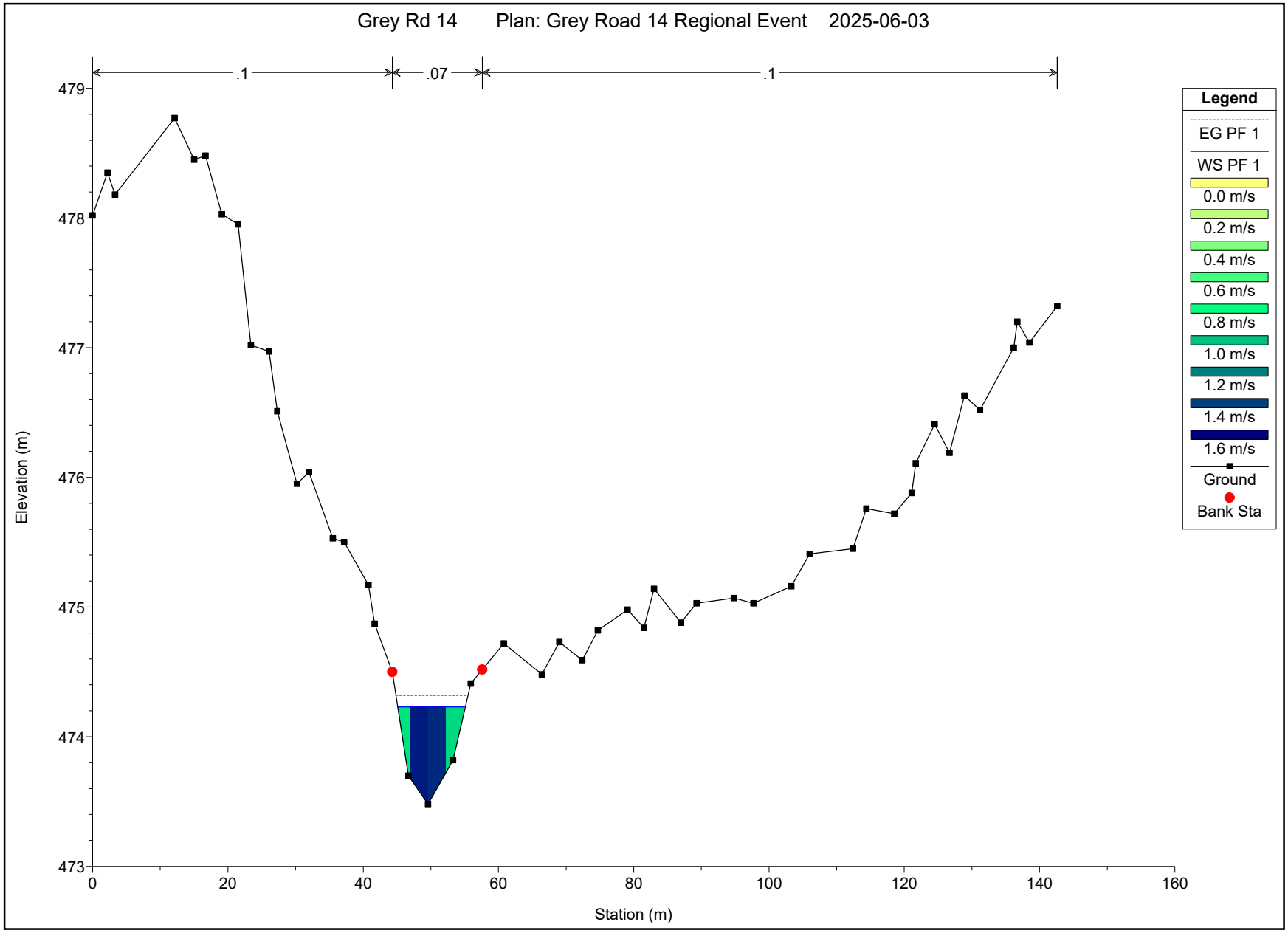

Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
482
480
478
476
474
472
Elevation (m)
0
50
100
150
200
Station (m)
Legend
EG PF 1
WS PF 1
Crit PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Levee
Bank Sta


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
482
480
478
476
474
472
470
Elevation (m)
0
50
100
150
200
Station (m)
Legend
EG PF 1
WS PF 1
Crit PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Bank Sta


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
482
480
478
476
474
472
470
Elevation (m)
0
50
100
150
200
Station (m)
Legend
EG PF 1
WS PF 1
Crit PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
Ground
Bank Sta


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
Elevation (m)
482
481
480
479
478
477
476
475
474
473
0
20
40
60
80
100
120
140
Station (m)
Legend
EG PF 1
WS PF 1
Crit PF 1
0.0 m/s
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
1.2 m/s
Ground
Levee
Bank Sta


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
.07
.1
481
480
479
478
477
476
475
474
473
Elevation (m)
0
20
40
60
80
100
120
140
Station (m)
Legend
EG PF 1
WS PF 1
0.2 m/s
0.4 m/s
0.6 m/s
0.8 m/s
1.0 m/s
1.2 m/s
1.4 m/s
1.6 m/s
Ground
Bank Sta


Grey Rd 14 Plan: Grey Road 14 Regional Event 2025-06-03
.1
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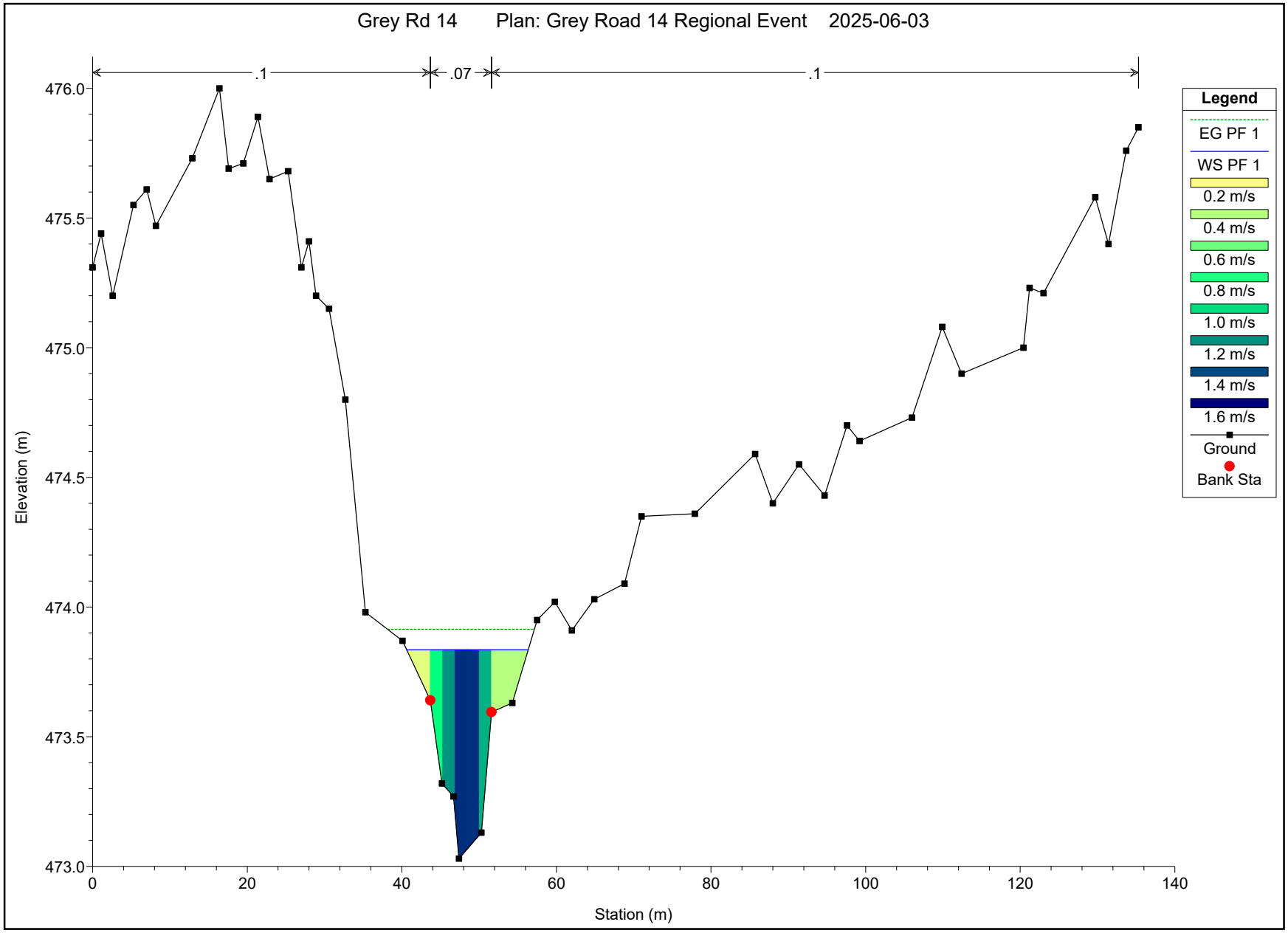
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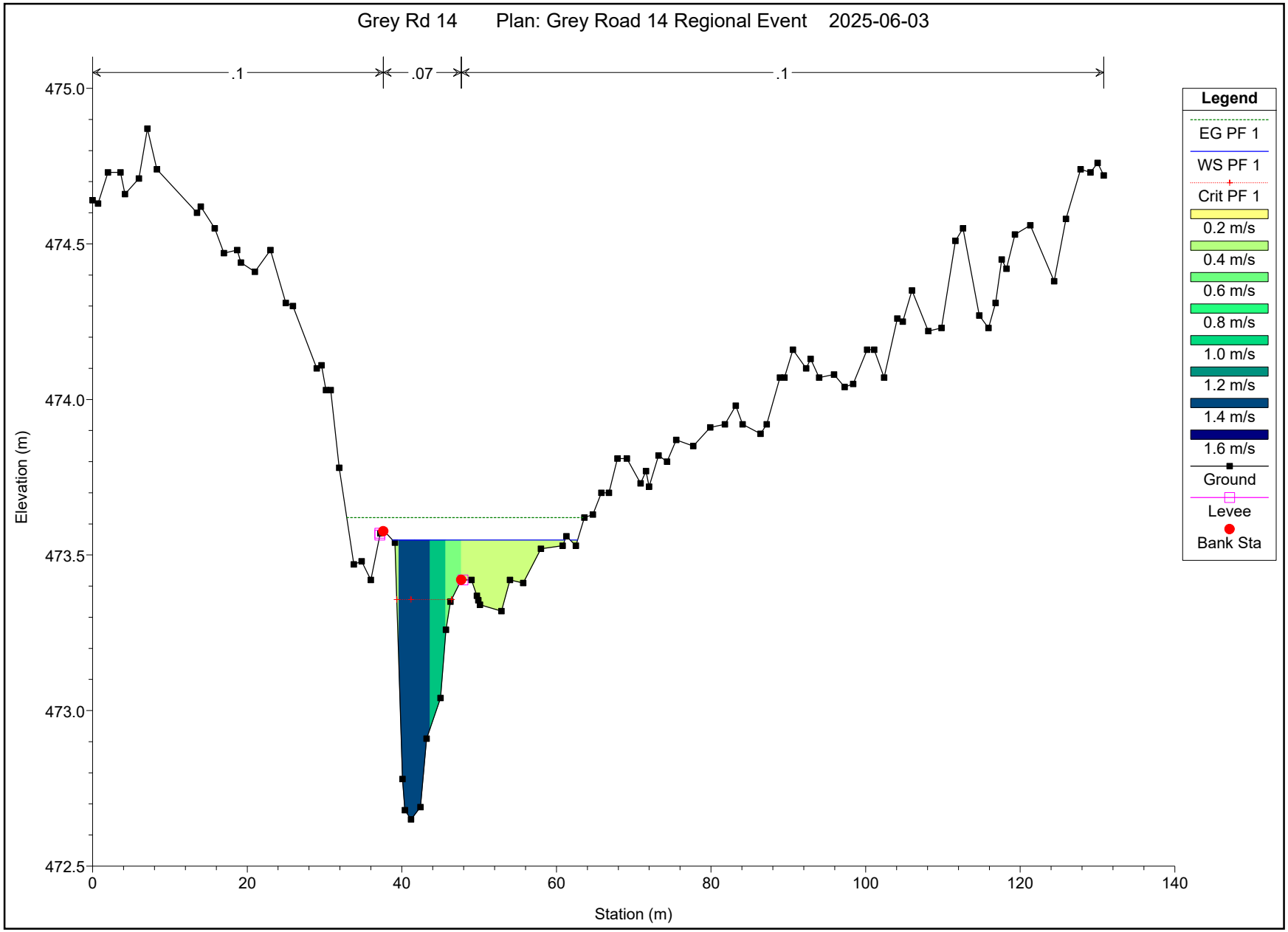
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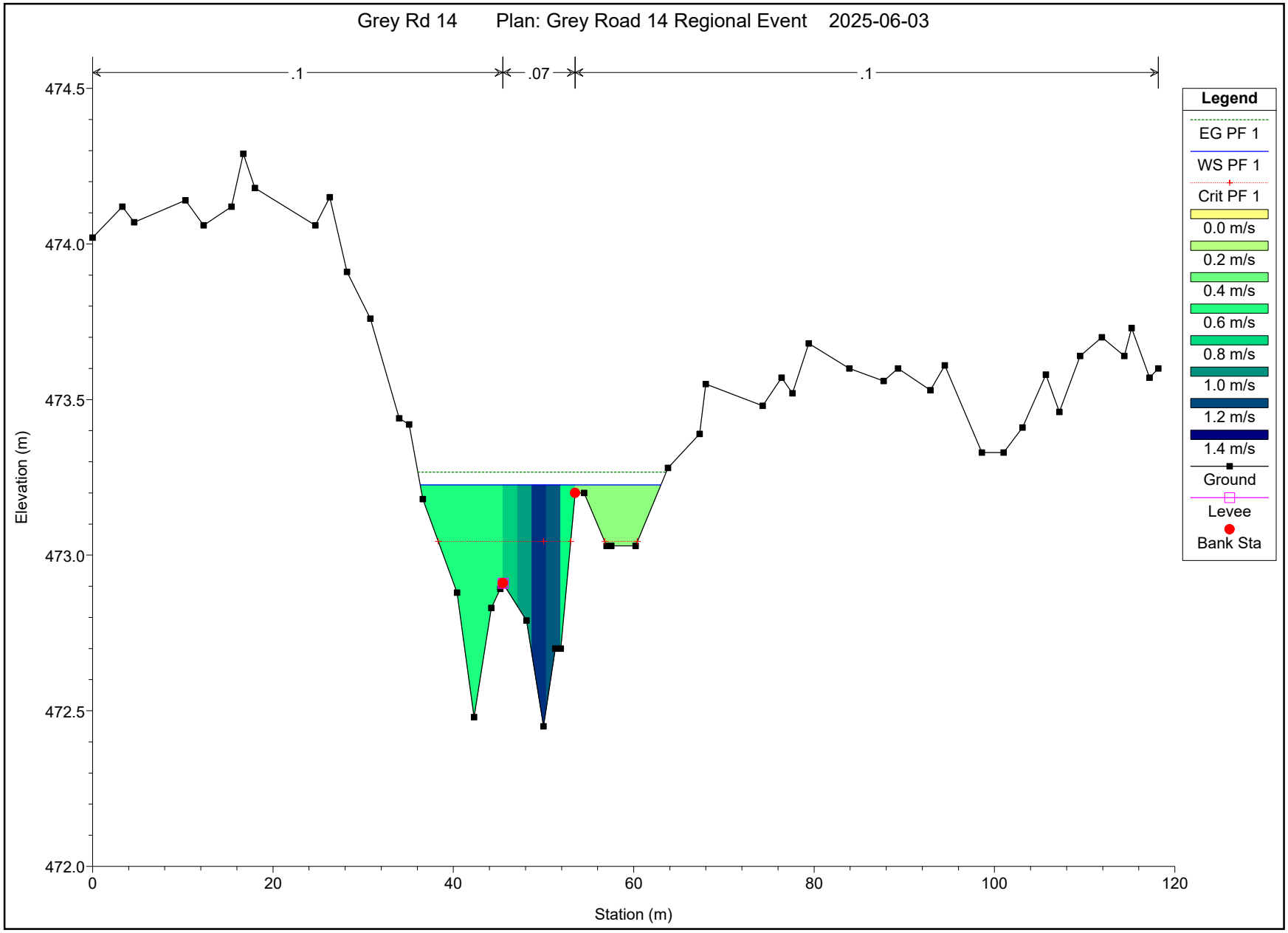
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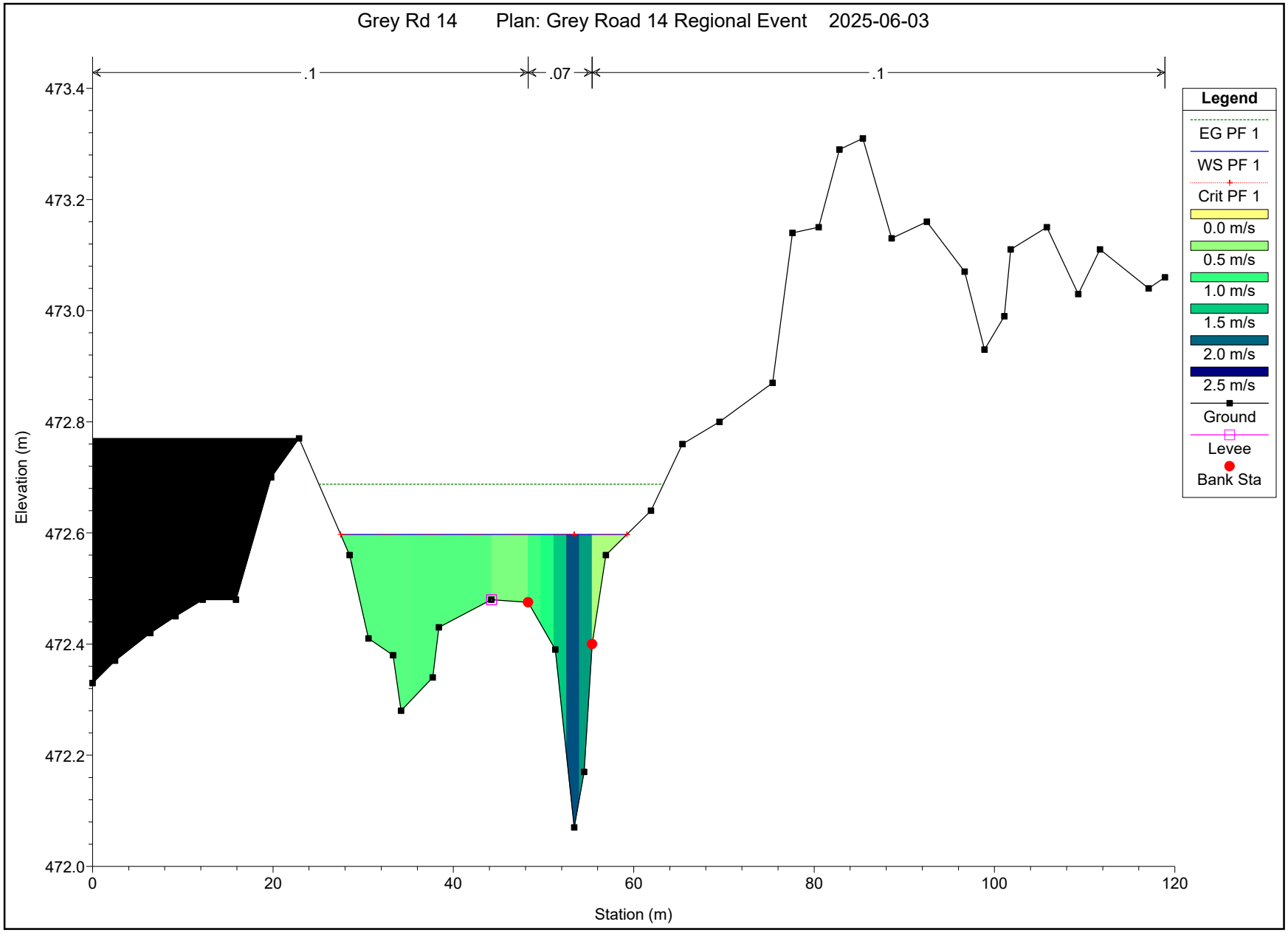
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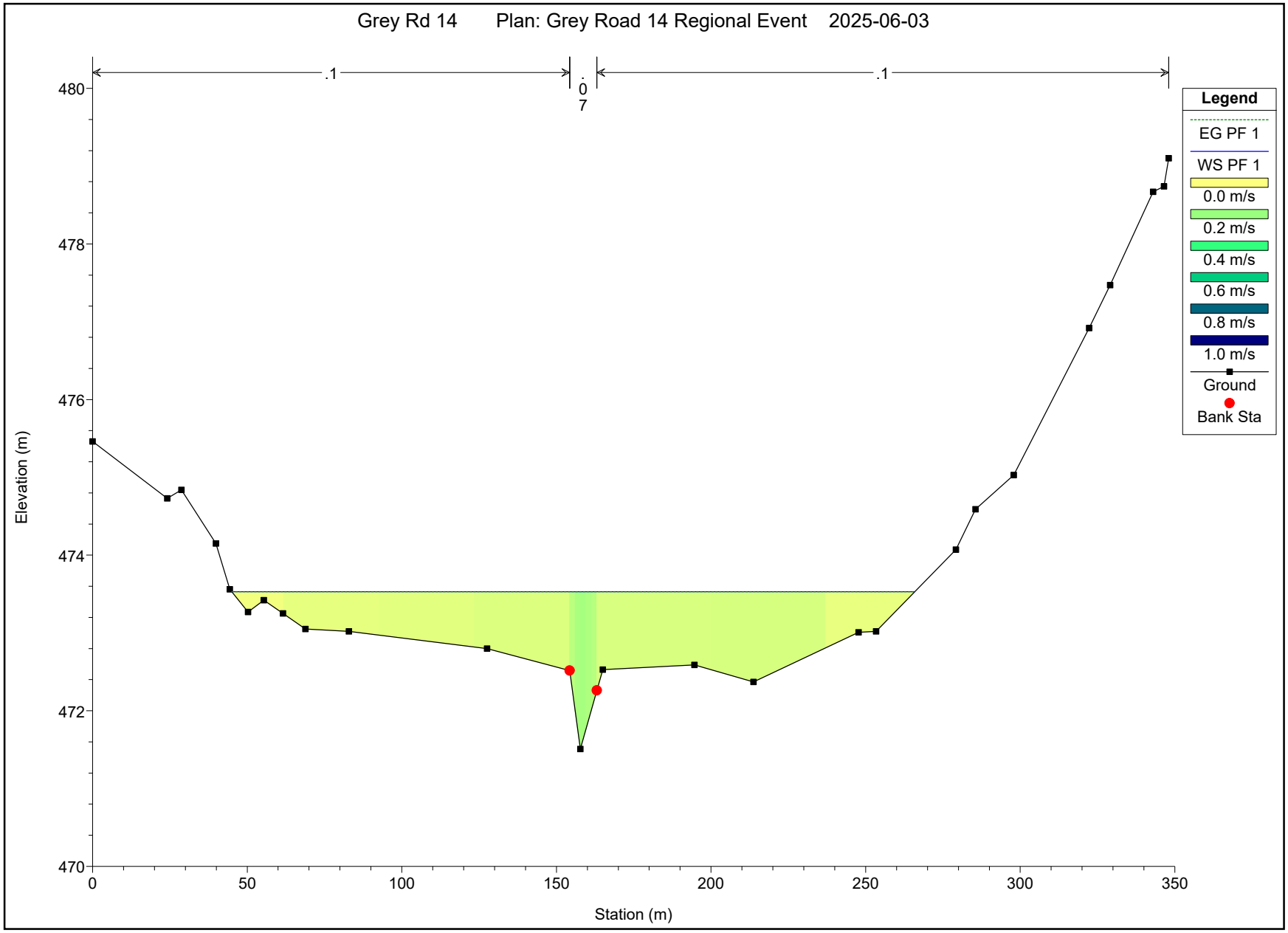
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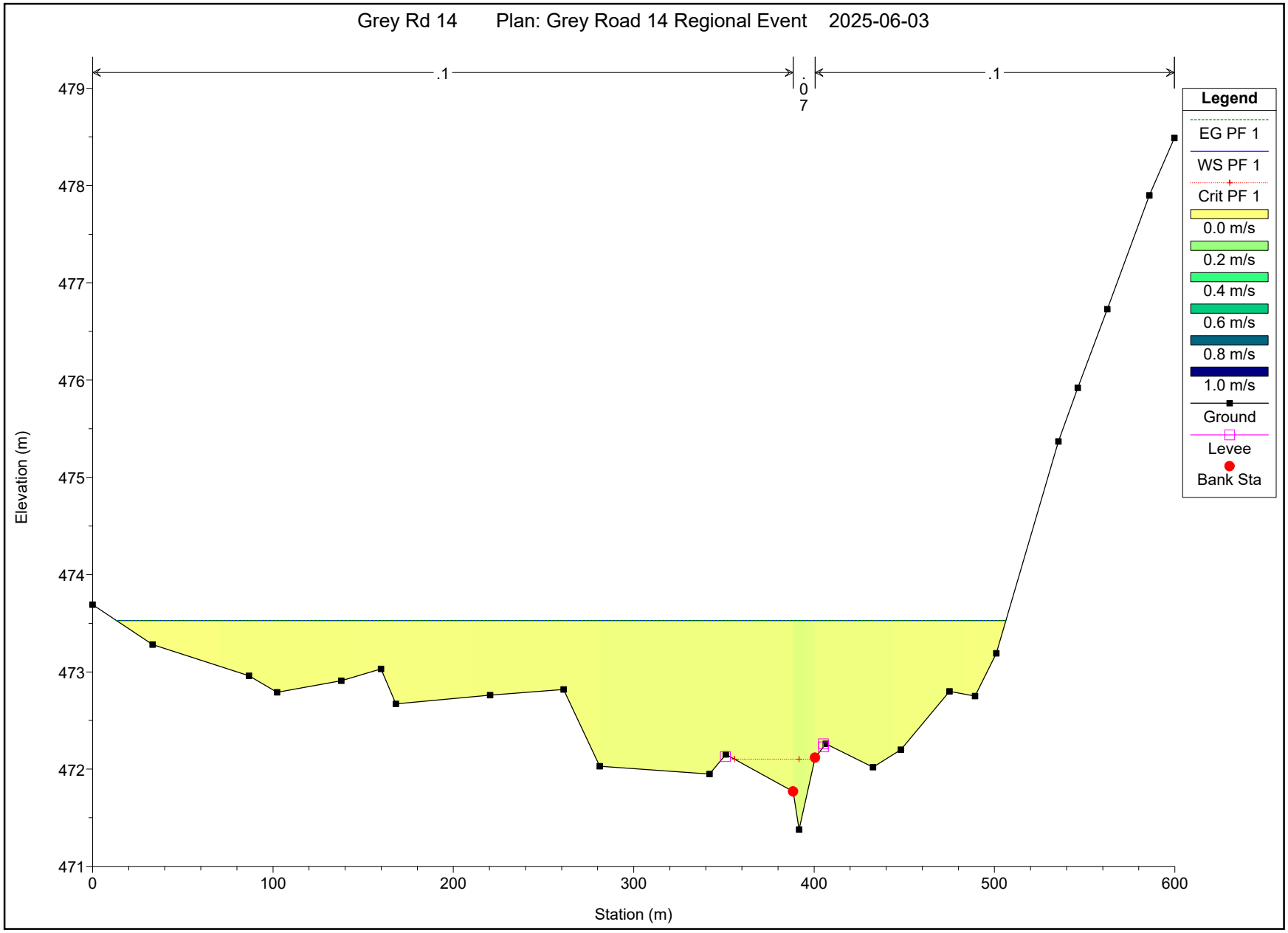
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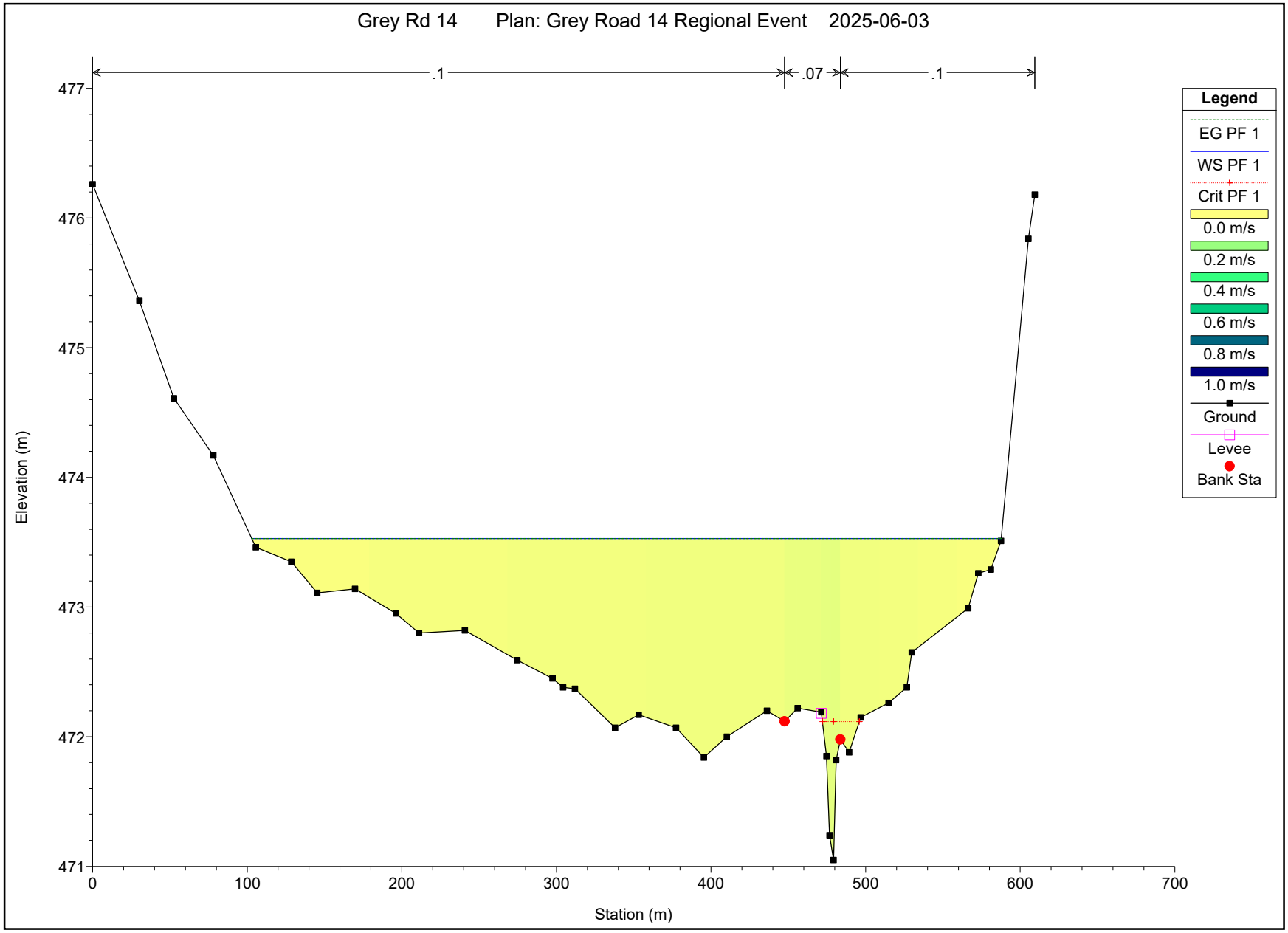
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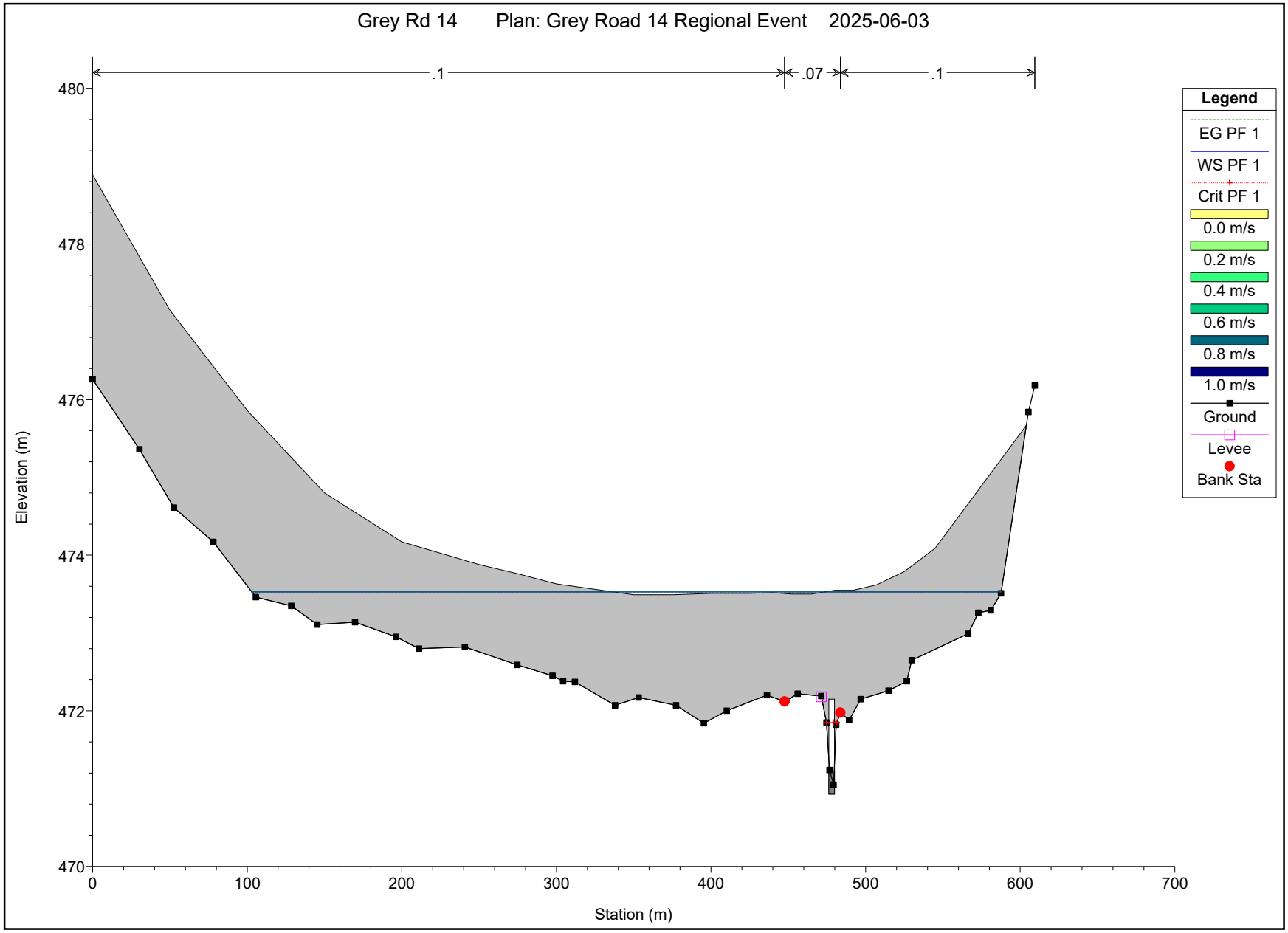
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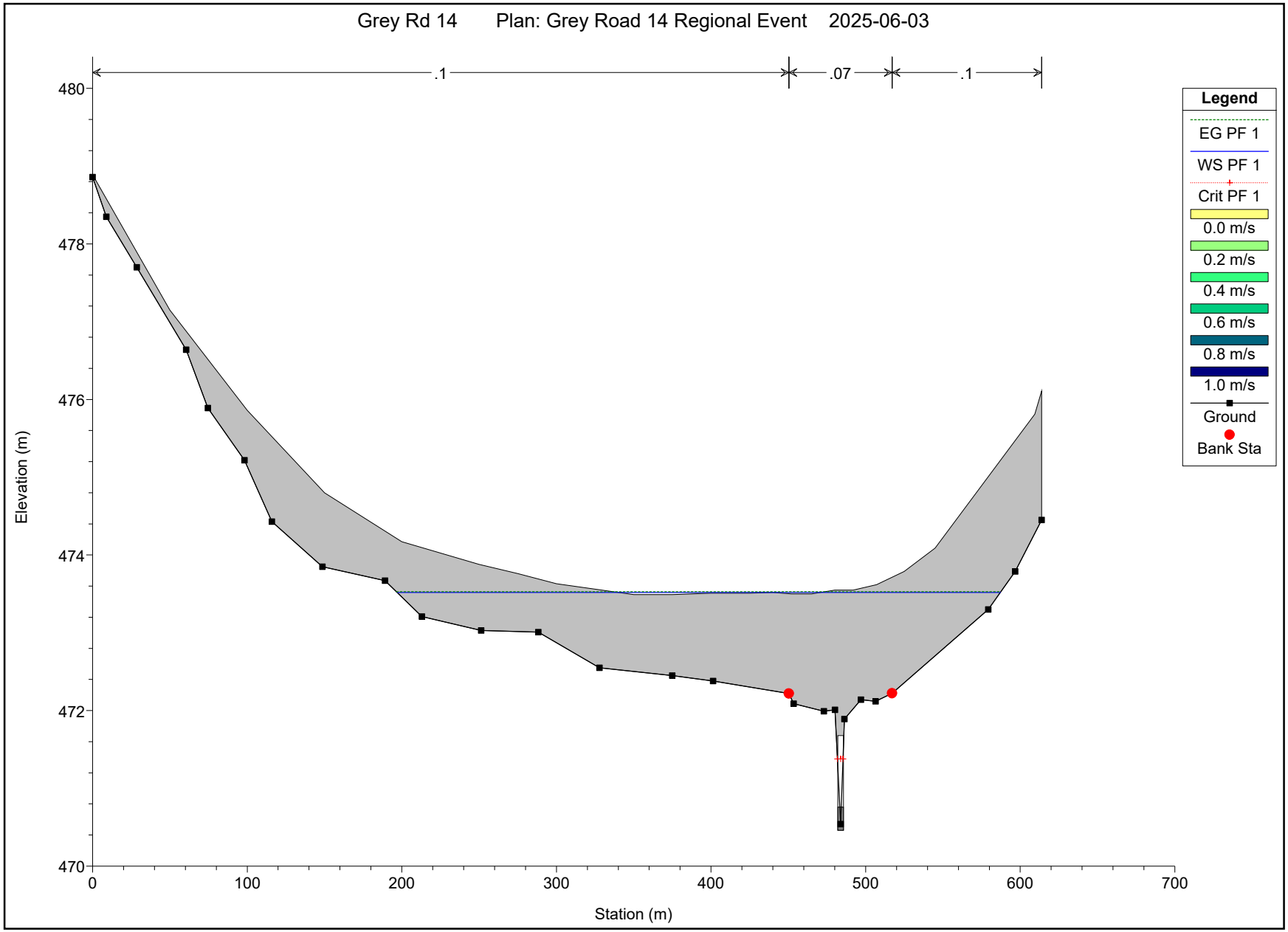
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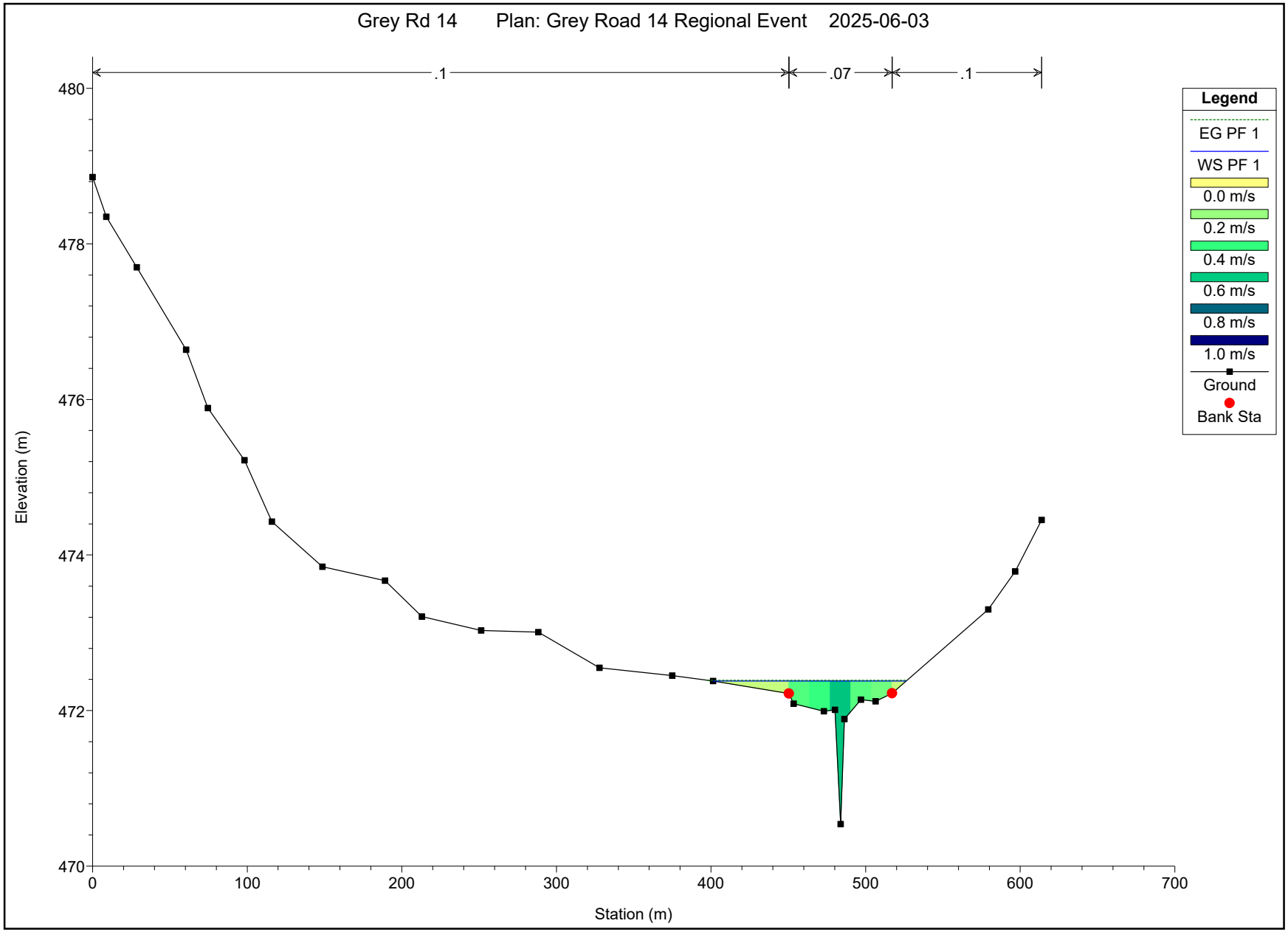
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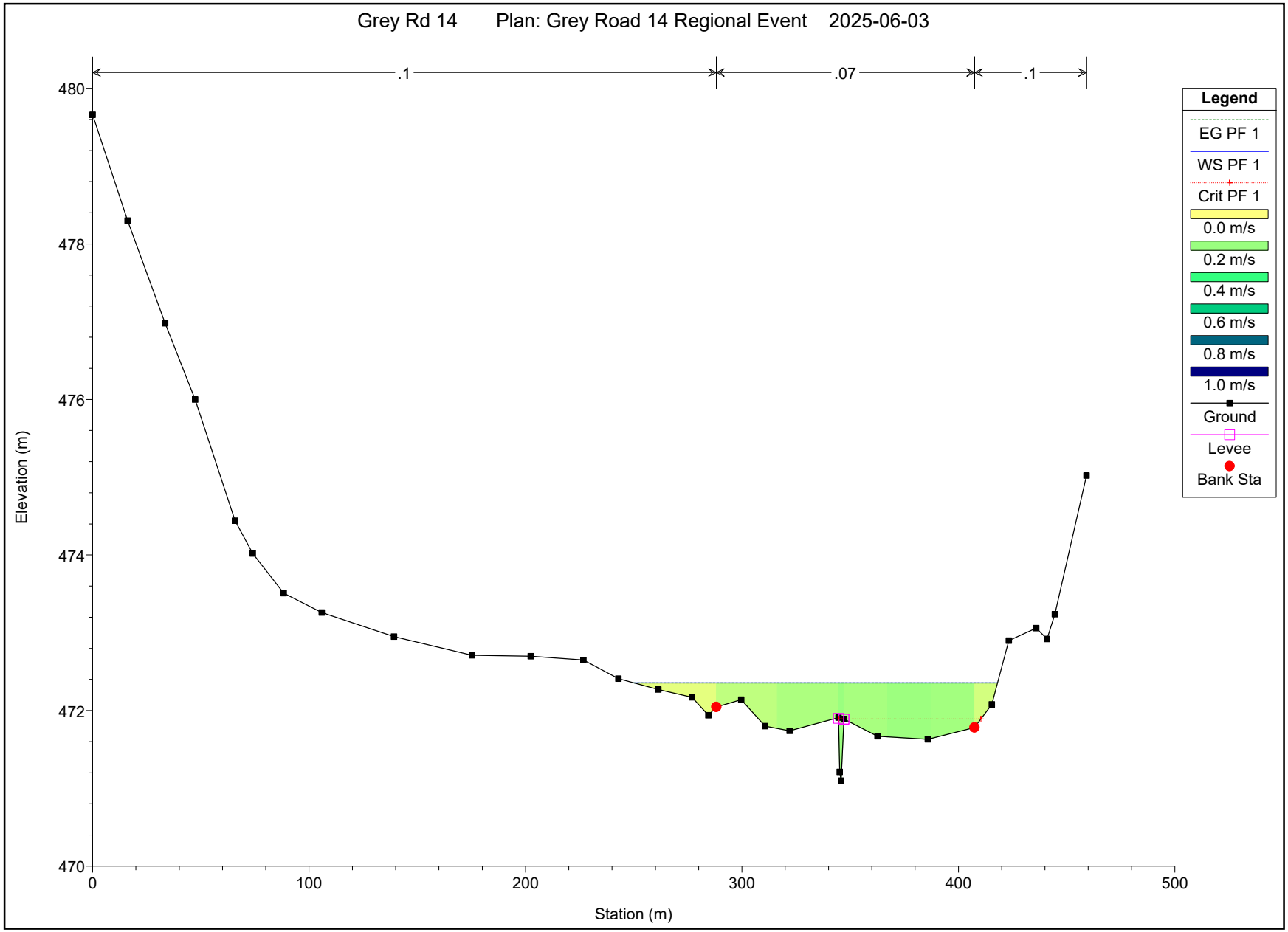
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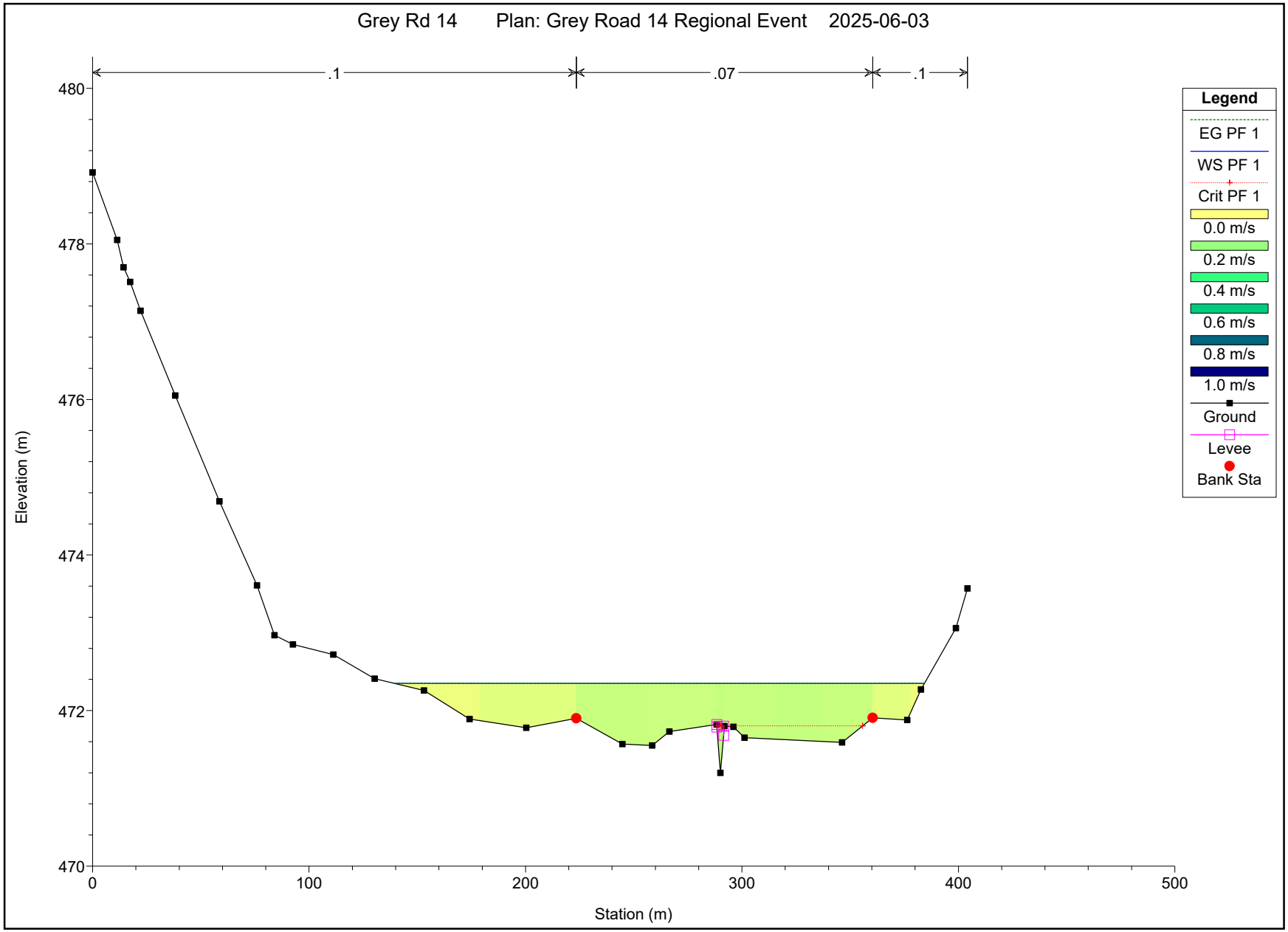
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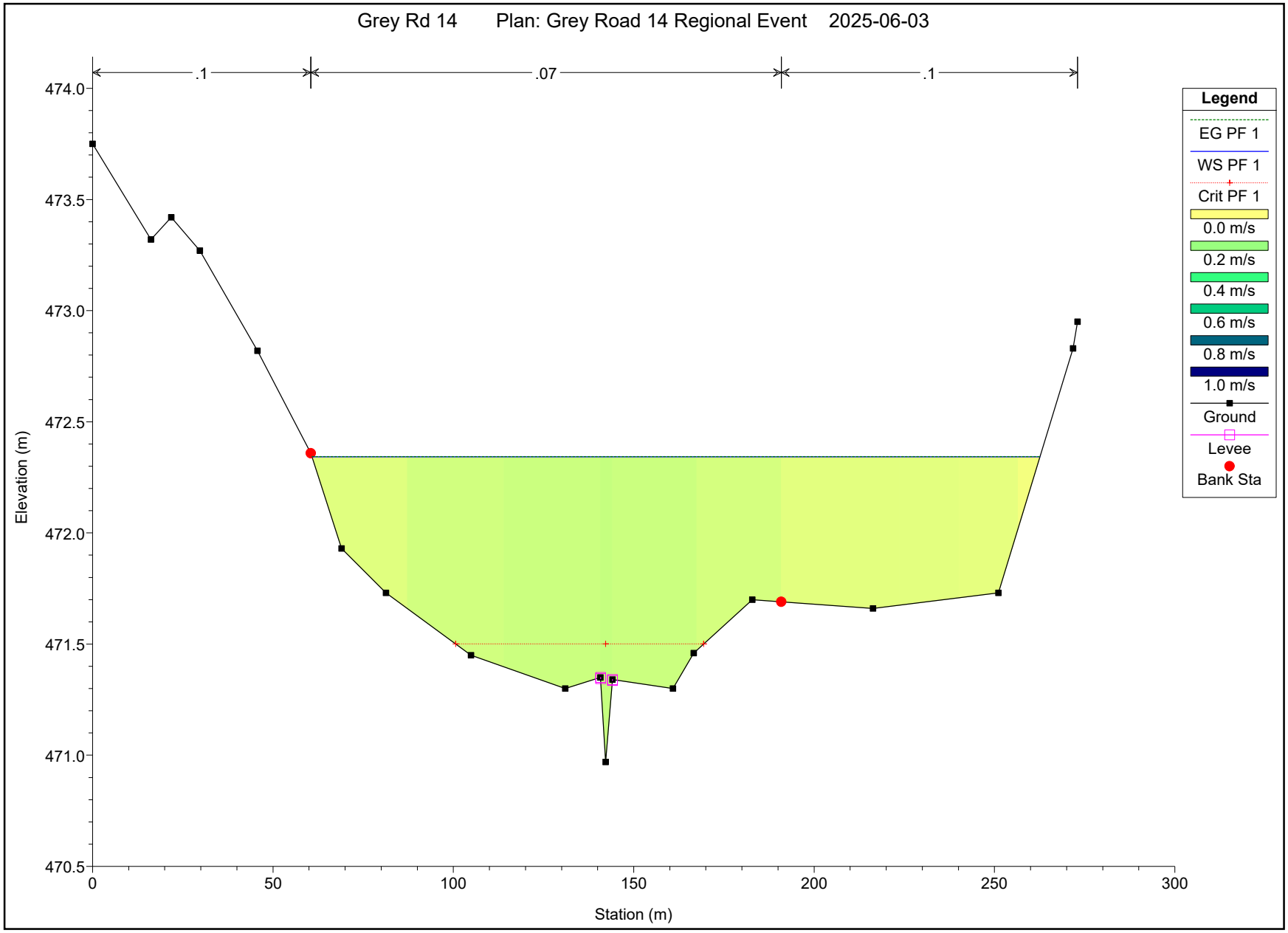
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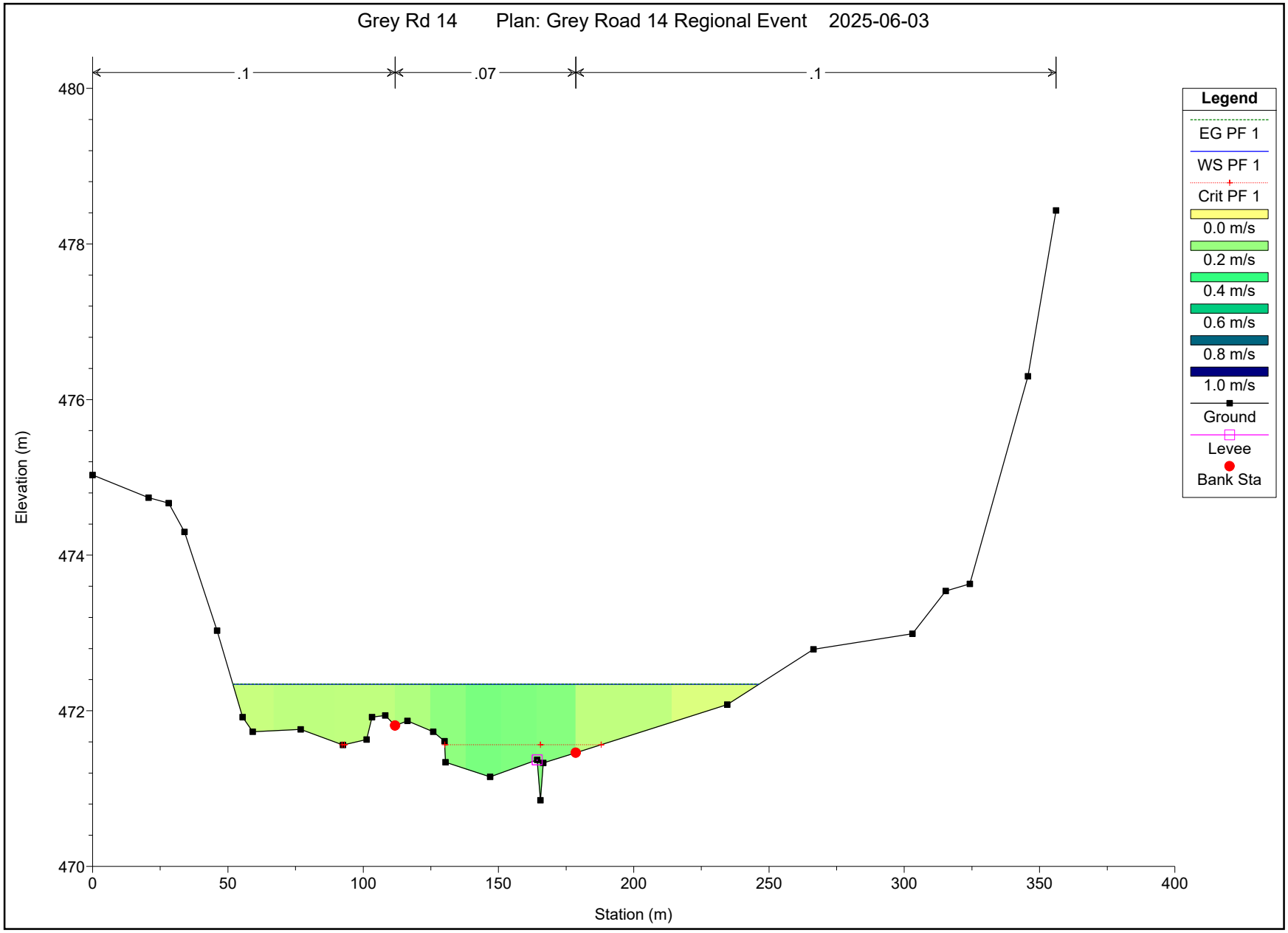
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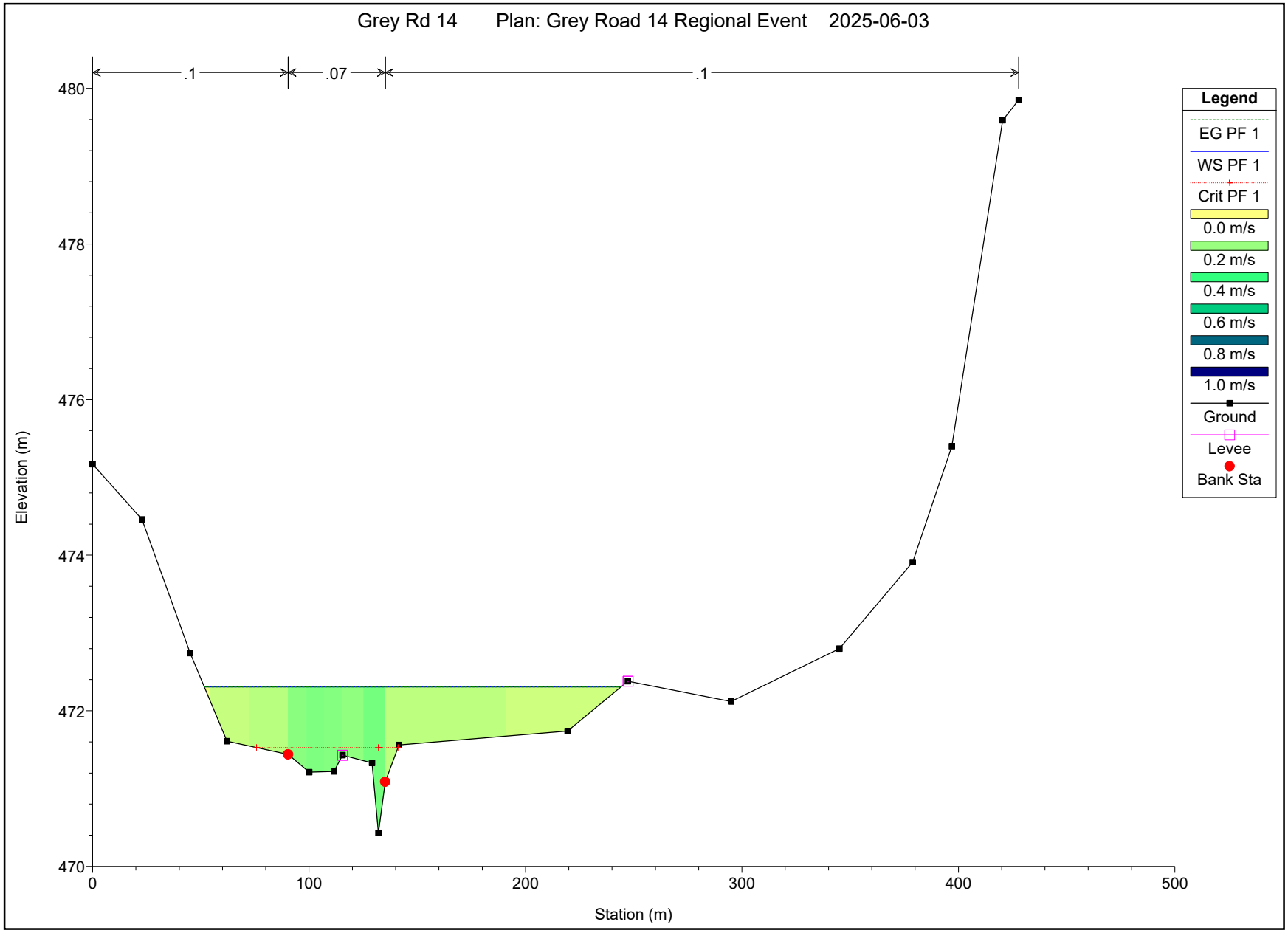
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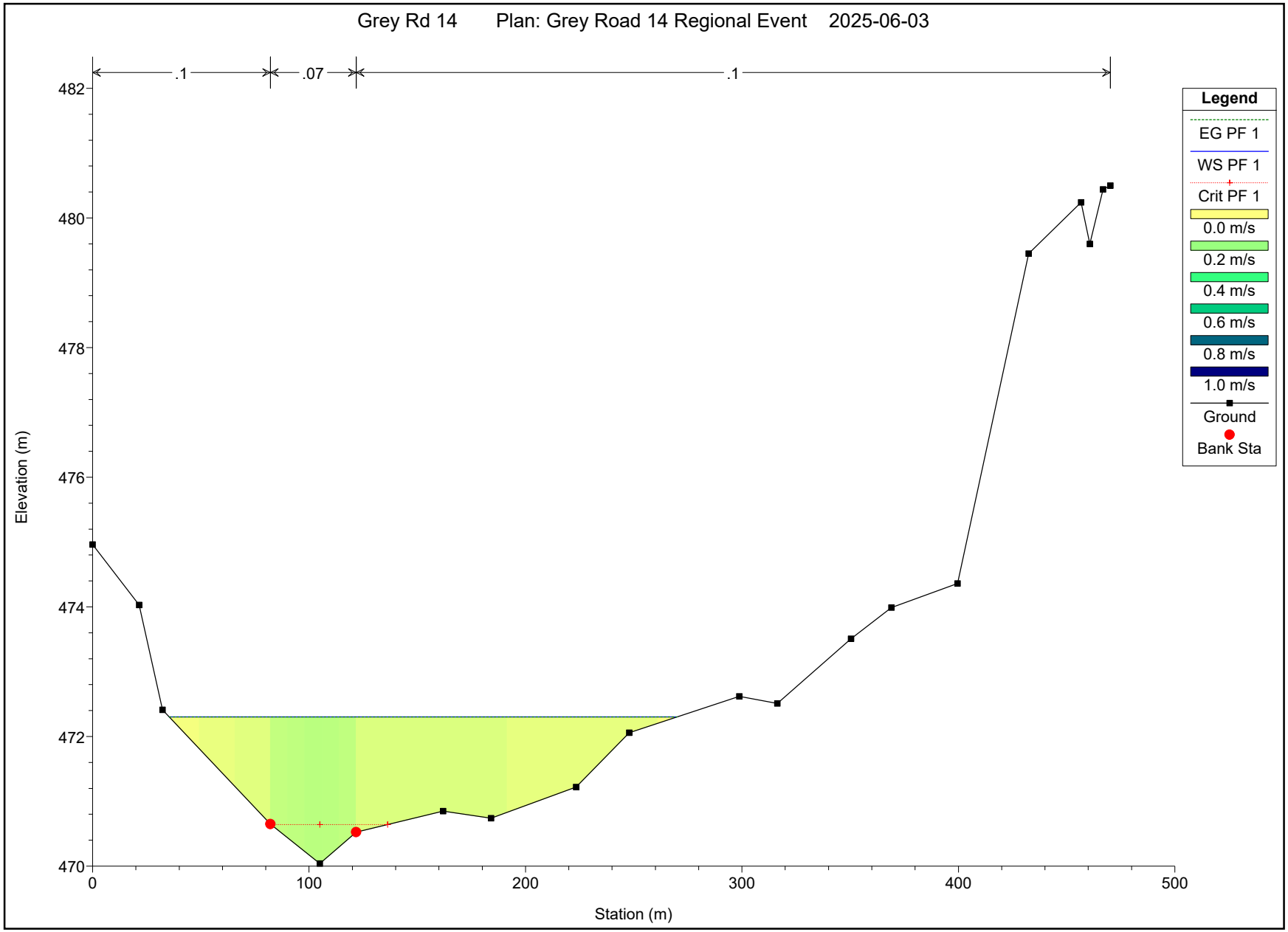
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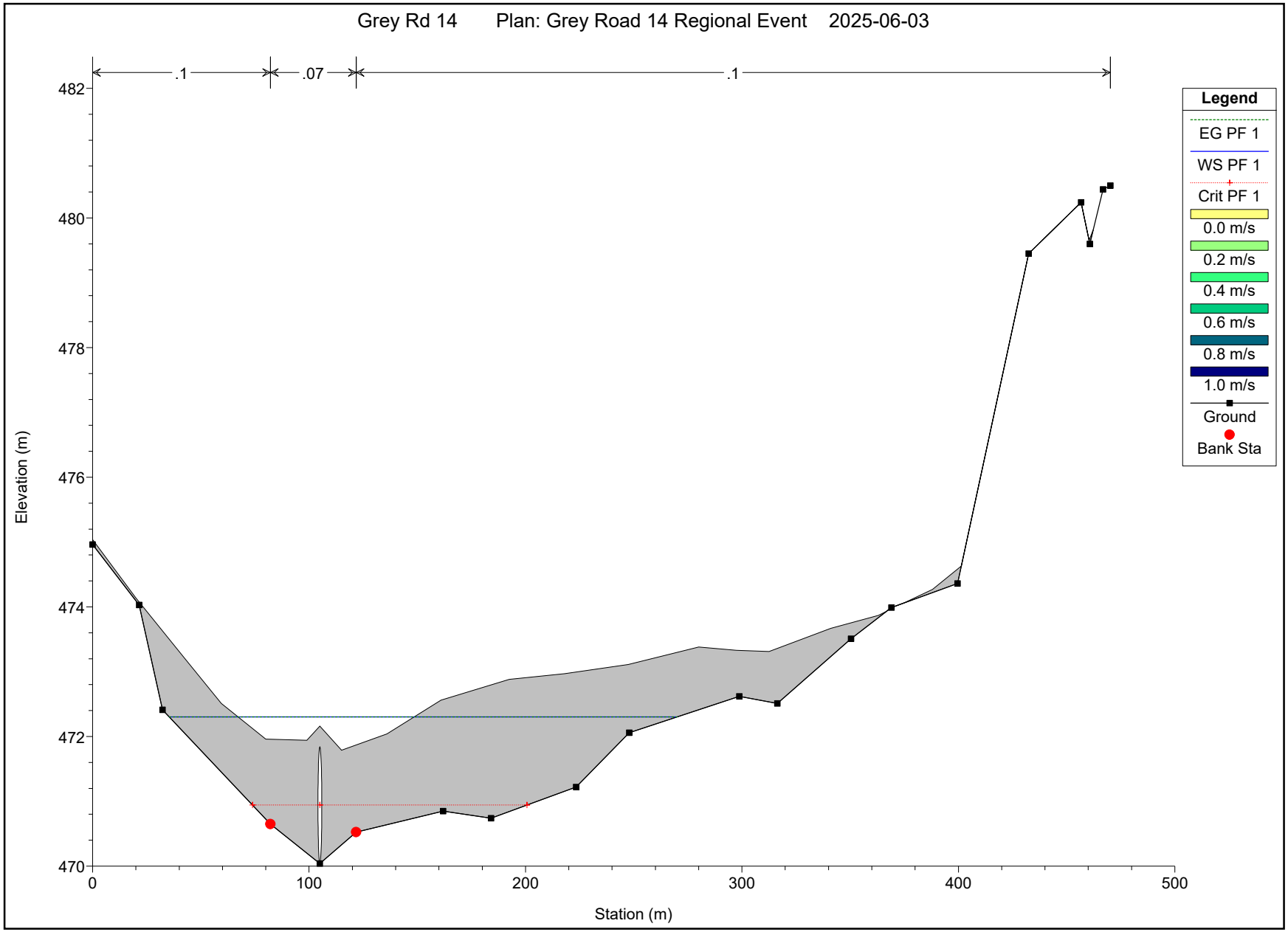
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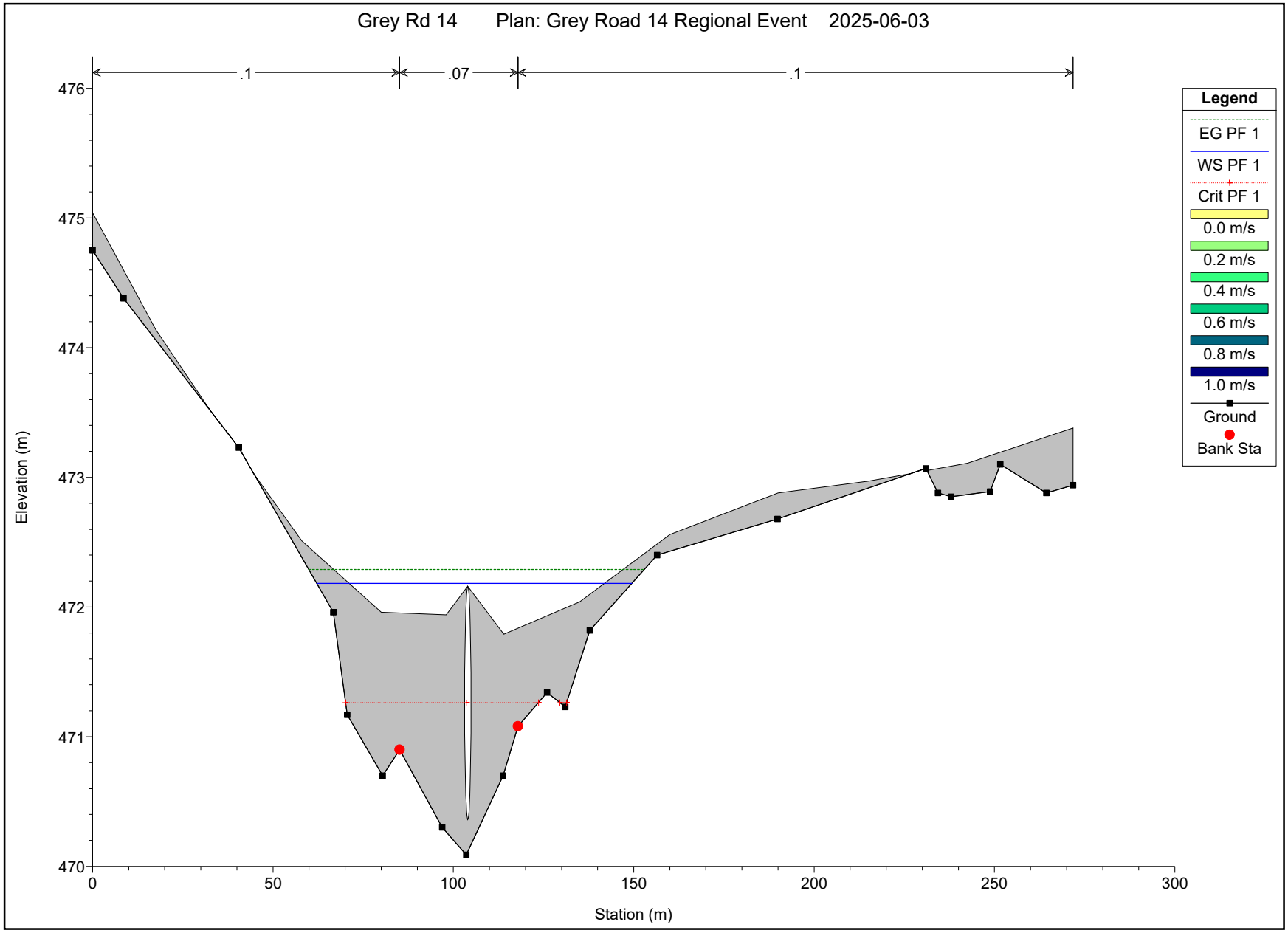
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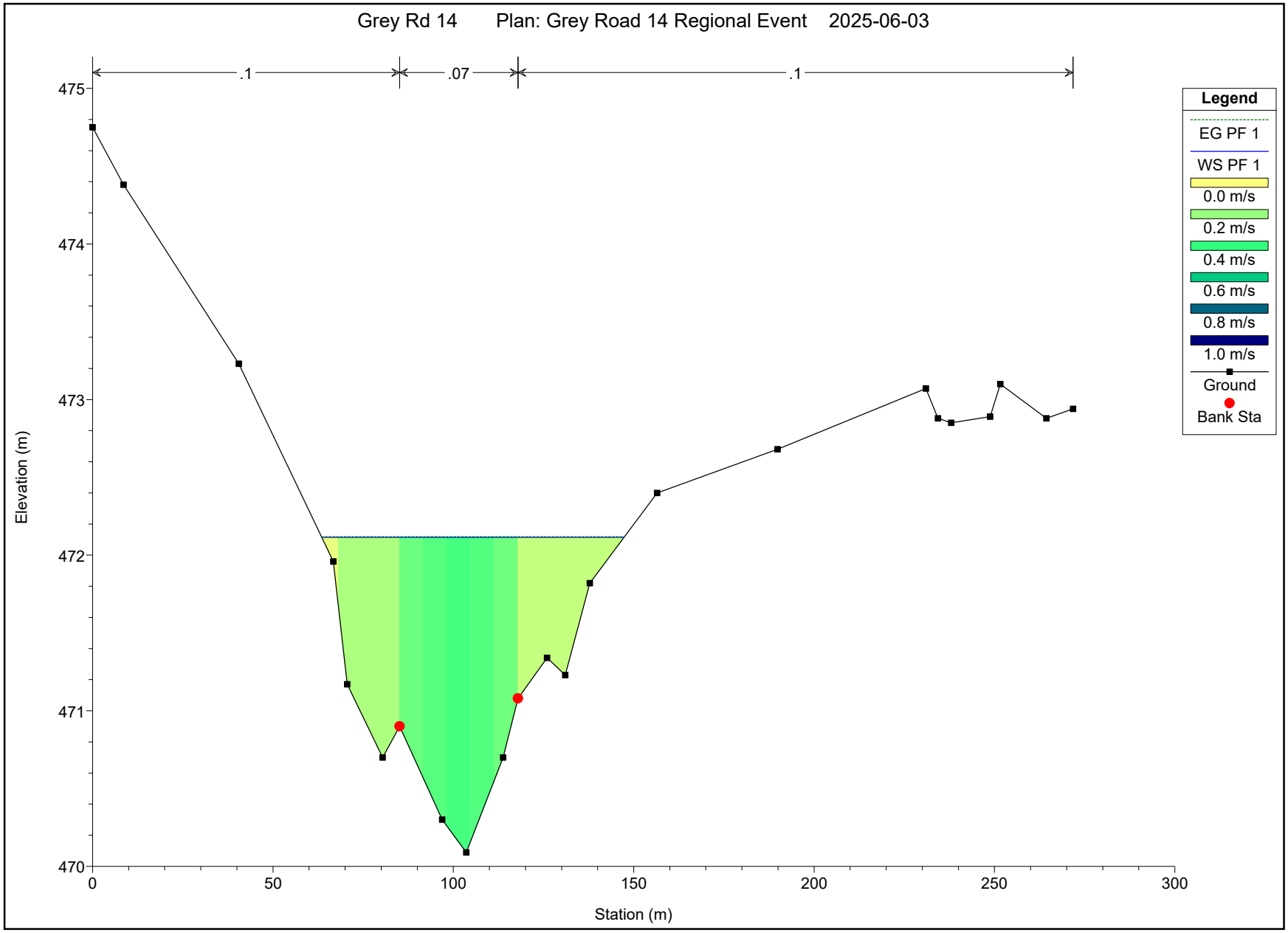
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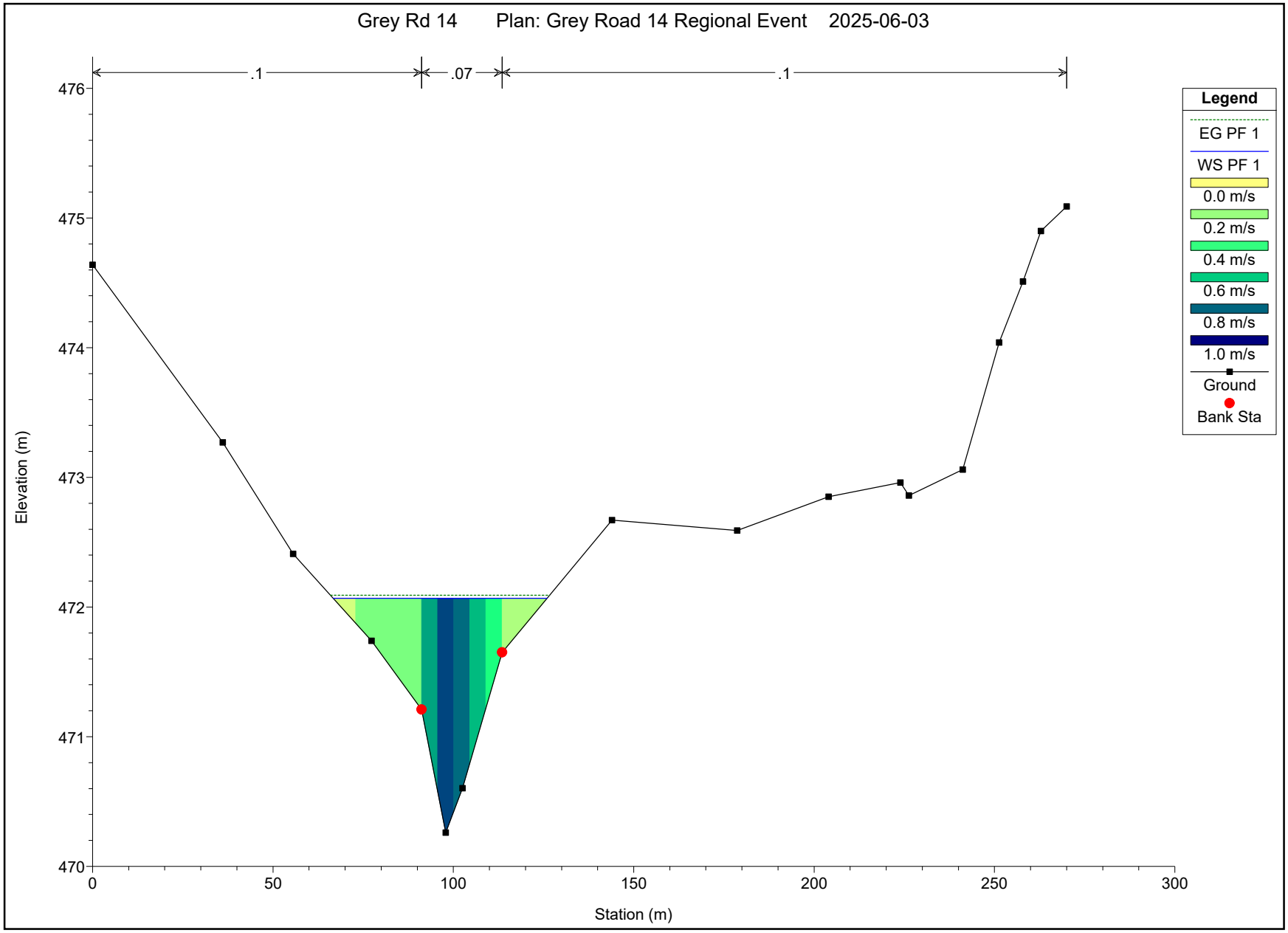
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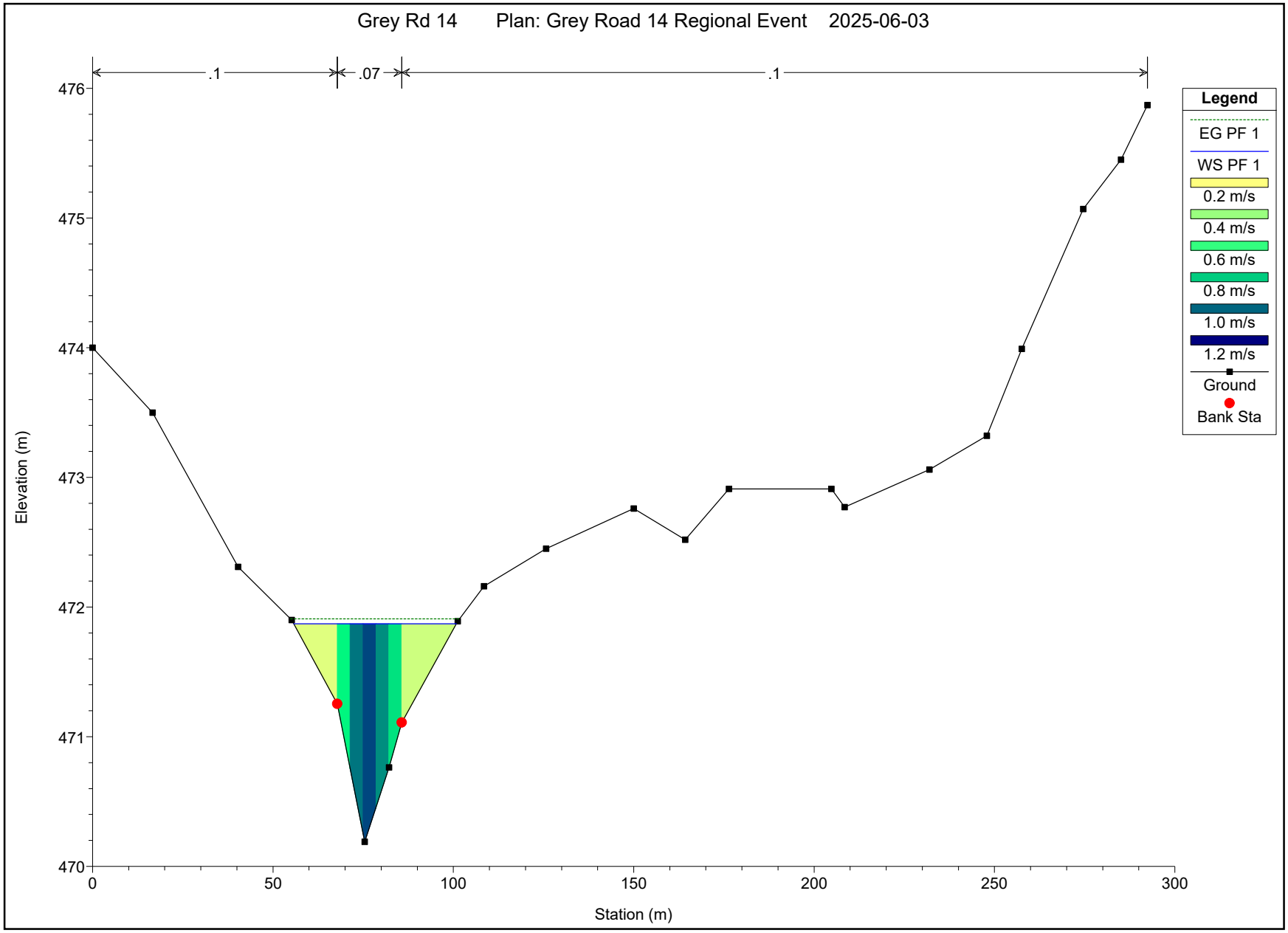
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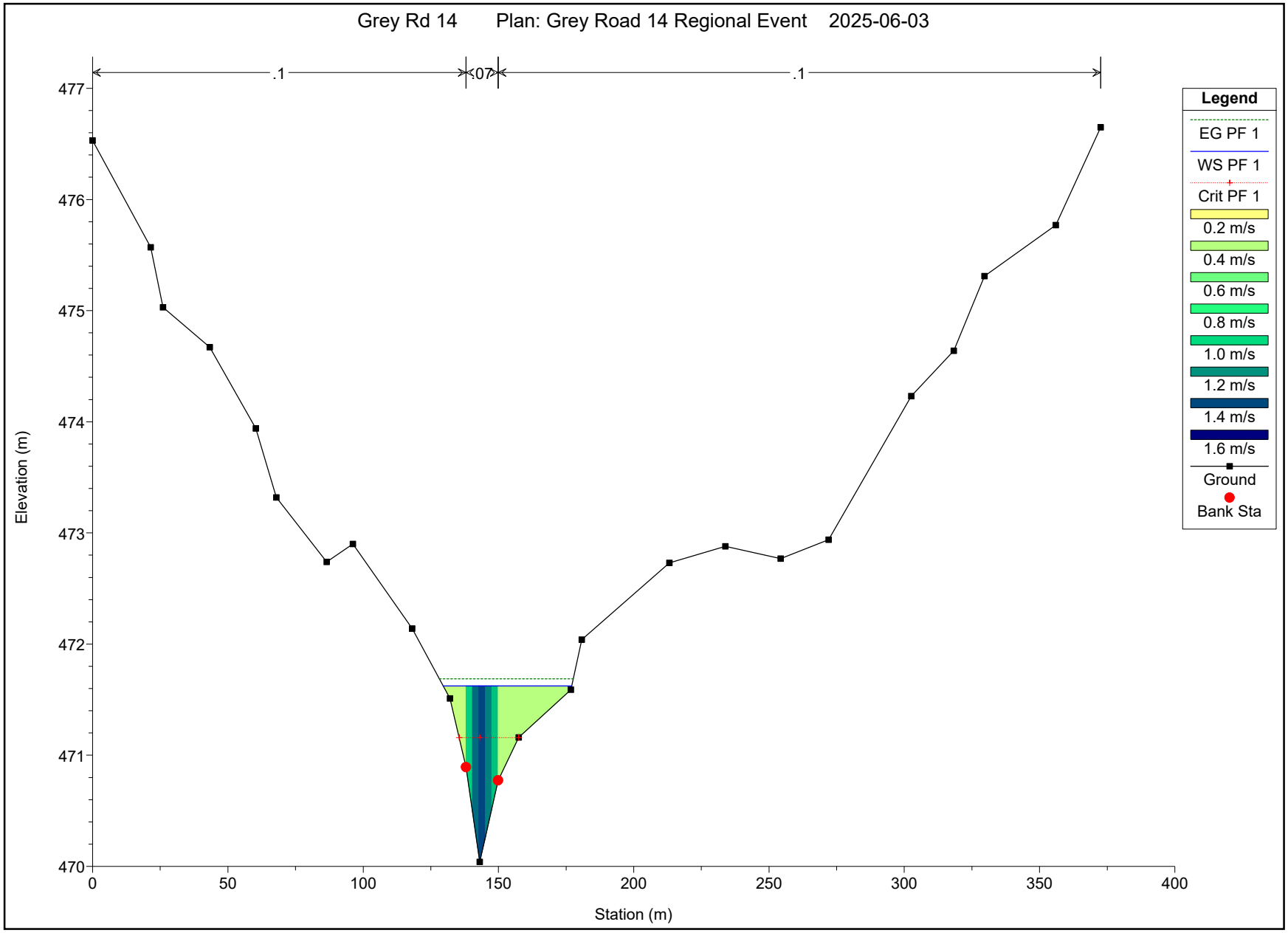
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Appendix D Additional Information

D.1. Proposed Site Plan

Subject Property:
ARN 420709000305506
Primary Address
112754 Grey Road 14
Township of Southgate
Legal Description
CON 16 PT LOT 11 PT LOT 12
Acreage 52.17

Property Boundary

3.00

Proposed SFD

15.24

Property Boundary

Proposed Septic

9.144

Existing tree buffer strip

Grey Rd 14

Proposed Retaining Wall to avoid increase in fill in wetland setback area

12.192

Proposed Horse Barn/ Buggy Shed

38.1

30m Setback

45.72

P
P
P
P
P

Proposed Gravelled yard area

Proposed new entrance

Existing Driveway to be removed

43.129

Existing Bush Lane

Proposed Power Room

16.764

5

21.946

Proposed OFDU Workshop

Existing tree buffer strip

Proposed laneway to meet existing

Proposed Retaining Wall

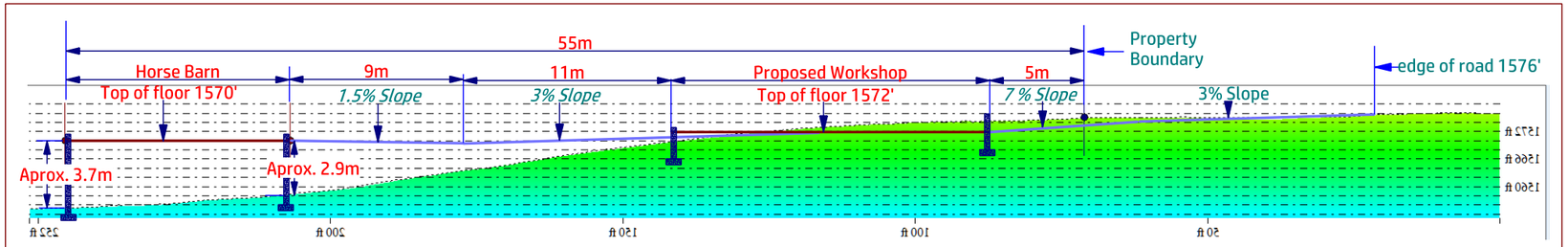
Wetlands Boundary

12.192

24.384

Proposed Shed / Sap Shanty

Shop Septic



Cross section profile of pink line

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Site Plan
< Property Owner >
Solomon Bauman
Phone : 519-897-1293
< Project Address >
112754 Grey Road 14
Swinton Park Ont.
CON 16 PT LOT 11 PT LOT 12
< Drawing Scale >
1:600
Drawn By E.M.S
Page:
Drawing Date
May 21, 2024